GMSD Work Session
November 12, 2019 5:30 PM
Board Room, GMSD Office

1. Annual Review/ Revision of Policies - First Reading
2. Textbook Adoption Selection Committee
3. 2019 LEA Compliance Report
4. Miscellaneous GMSD FY 2019-20 Budget Amendments # 9 through 13
5. Miscellaneous GMSD FY 2019-20 Budget Amendment # 14
6. Turnover Audit
7. Houston High School Band Room and Concession Stand Additions
8. Further Business

Germantown Municipal School District

Monitoring:	Descriptor Term:	Descriptor Code:	Issued Date:
Review: Annually, in September	**Comparability of Services**	**2.300**	**12/09/19**
		Rescinds:	Issued:

In order to ensure comparability of services[1] from local and state funds in all of its schools, the Board shall ensure that:

1. A system wide salary schedule is adopted annually;

2. Teachers, principals, and support personnel are assigned to schools on an equivalent basis according to grade levels and need; and

3. Curriculum materials and instructional supplies are provided to schools on an equivalent basis according to grade levels and need.

Legal References

1. 20 USCA § 6321

Germantown Municipal School District

Monitoring:	Descriptor Term:	Descriptor Code:	Issued Date:
Review: Annually, in August	**Zero Tolerance Offenses**	**6.309**	**12/09/19**
		Rescinds:	Issued: 03/06/17

The Germantown Municipal School Board will ensure a safe and secure learning environment for all of its students and staff. Immediate disciplinary action will be warranted for:

WEAPONS & DANGEROUS INSTRUMENTS

Students shall not possess, handle, transmit, use or attempt to use any dangerous weapon in school buildings or on school grounds at any time, or in school vehicles and/or buses or off the school grounds at a school-sponsored activity, function or event.[1]

Dangerous weapons for the purposes of this policy shall include, but are not limited to a firearm or anything manifestly designed, made or adapted for the purpose of inflicting death or serious bodily injury or anything that in the manner of its use or intended use is capable of causing death or serious bodily injury.[2]

Violators of this section shall be subject to suspension and/or expulsion from school.

Firearms (as defined in 18 U.S.C. § 921) [3]

In accordance with state law, any student who brings or possess a firearm on school property shall be expelled for a period of not less than one (1) calendar year. The director of schools shall have the authority to modify this expulsion requirement on a case-by-case basis.[4]

DRUGS

In accordance with state law, any student who unlawfully possesses any drug including any controlled substance or legend drug shall be expelled for a period of not less than one (1) calendar year. The director of schools shall have the authority to modify this expulsion requirement on a case-by-case basis.[4]

ASSAULT

In accordance with state law, any student who commits aggravated assault[5] or commits assault that results in bodily injury[6] ~~as defined in § 39-13-102~~ upon any teacher, principal administrator, any other employee of the school or school resource officer shall be expelled for a period of not less than one (1) calendar year. The director of schools shall have the authority to modify this expulsion requirement on a case-by-case basis.[4]

ELECTRONIC THREATS

In accordance with state law, any student who transmits by an electronic device any communication containing a credible threat to cause bodily injury or death to another student or school employee and the transmission of such threat creates actual disruptive activity at the school that requires administrative intervention shall be expelled for a period of not less than one (1) calendar year. The director of schools shall have the authority to modify this expulsion requirement on a case-by-case basis.[4]

NOTIFICATION

When it is determined that a student has violated this policy, the principal of the school shall notify the student's parent or guardian and the criminal justice or juvenile delinquency system as required by law.[7]

Legal References

1. TCA 39-17-1309
2. TCA 39-11-106(a)(5)(A), (B)
3. 18 U.S.C. 921
4. TCA 49-6-3401(g)
5. TCA 39-13-102
6. TCA 39-13-101(a)(1)
7. TCA 49-6-4209; TCA 39-17-1312

Cross References

Discipline Procedures 6.313

Germantown Municipal School District

Monitoring:	Descriptor Term:	Descriptor Code:	Issued Date:
Review: Annually, in September	**Administering Medicines to Students**	**6.405**	12/9/19 **03/06/17**
		Rescinds: **SP 6.405**	Issued: **09/15/14**

If under exceptional circumstances a student is required to receive medication during school hours in the event that a parent cannot be at school to administer the medication, only the school nurse or Principal's designee will administer the medication in compliance with the regulations that follow:[1]

A. Written instructions will be signed by the parent and legal guardian and will include:
   1. Student's name
   2. Name of medication
   3. Purpose of medication
   4. Time administered
   5. Dosage
   6. Possible side effects
   7. Termination date for administering the medication
   8. Name and phone number of student's physician

B. The signed instruction form will be kept on file at school.

C. All medications must be brought to school by the parent or guardian, unless other arrangements have been approved by the school Principal, but under no circumstance shall a student bring the medication to school him/herself. All medication must be in its original container, whether prescription or nonprescription, and be clearly marked with student's name, prescription number, medication name/dosage, administration route, date and refill, licensed prescriber's name, pharmacy address and phone number. Over-the-counter medication must be in original container with ingredients listed and the child's name affixed to the container.

D. The principal or his/her designee will:

   1. Inform appropriate school personnel of the medication being taken.
   2. Keep a record of the administration of medication on a designated form and keep this record on file at school.
   3. Keep medication in the locked area (Exception: When District procedures are followed, students may self-carry emergency medications such as a rescue inhaler and epinephrine).
   4. Return unused medication to the parent only or discard appropriately. If discarded at school, the following procedure will be followed:

      a. medication will be disposed in a manner so that no student will be able to get the medication.

b. the method used, the date the medication is discarded, and the person or people involved will be documented.

E. The parents of the student must assume responsibility for informing the school principal of any change in the student's health or change in medication.

F. Should medications of an invasive nature (ex. intramuscular, intravenous, or suppository) be required to be given by school personnel for emergency action, proper physician's orders and instructions will be obtained and proper training will be given to appropriate personnel.

G. The school system retains the discretion to reject a request for administration of medication.

H. A copy of this procedure will be provided to the parents upon the request for administration of medication in the schools

Self-Administration of Medication

The provision of Tennessee Code Annotated, Section 49-5-415(a) states that a local board of education or a governing board for non-public school may permit an employee or person under contract to the board to assist in self-administration of medications, under the following conditions:

(1)(A) The student must be competent to self-administer nonprescription or prescription medication with assistance;

(B) The student's condition, for which the medication is authorized or prescribed, must be stable;

(C) The self-administration of the medication must be properly documented;

(D) Guidelines, not inconsistent with this section, for the assistance in self-administration of nonprescription or prescription medication by personnel in the school setting, developed by the Department of Health and Education and approved by the board of nursing, must be followed;

(E) The student's parent or guardian must give permission in writing for school personnel to assist with self-administration of medications. The written permission shall be kept in the student's school records; and

(F) Assistance with self-administration shall primarily include storage and timely distribution of medication.

All training of school personnel providing assistance with self-administration of medications shall be done by a registered nurse employed by or contracted by Germantown Municipal School District. Training for school personnel in the assistance with self-administration of medications shall be repeated annually, and competencies shall be documented in the employee personnel file.

T.C.A. § 49-49-415 (a)(3) requires that any person assisting in self-administration of medication or performing health care procedures, including administration of medication under the section, and any local board or governing board of nonpublic school authorizing the self-administration of medications of the performance of health care procedures shall not be liable in any court of law for injury resulting from the reasonable performance of the health care procedures, including administration of medications, if performed pursuant to the polices and guidelines developed by the Department of Health and Education and approved by applicable regulatory or governing boards or agencies.

Student with Pancreatic Insufficiency or Cystic Fibrosis[2]

Students diagnosed with pancreatic insufficiency or cystic fibrosis shall be permitted to self-manage their prescribed medication in a manner directed by a licensed healthcare provider without additional assistance or direction. The Director of Schools shall develop produces for the development of both an Individualized Health Care Plan (IHP) and an Emergency Care Plan (ECP) that conforms to state law for every student with pancreatic insufficiency or cystic fibrosis that wishes to self-medicate.

Administration of Adrenal Insufficiency Medication

"Adrenal Insufficiency" means a hormonal disorder that occurs when the adrenal glands do not produce enough adrenal hormones.

"Adrenal Crisis" means a sudden, severe worsening of symptoms associated with adrenal insufficiency, such as severe pain in the lower back, abdomen or legs, vomiting, diarrhea, dehydration, low blood pressure, or loss of consciousness.

GMSD employees who have successfully completed educational training in the treatment of adrenal insufficiency may administer medications that treat adrenal insufficiency as prescribed by the student's licensed health care provider. In an emergency situation when a licensed health care professional is not immediately available, GMSD employees that are not health care professionals may administer the medication to the student if the student is suffering an adrenal crisis. GMSD employees shall not administer adrenal insufficiency medications unless they have received appropriate training to administer the medication.

Parents and students must follow the "General Medication Administration Guidelines" set forth above.

GMSD shall annually offer training to GMSD employees who volunteer to administer adrenal insufficiency medications in emergency situations when a licensed health care professional is immediately available. All health care professionals employed by and/or contracted by GMSD shall receive educational training in the treatment of adrenal insufficiency.

The training shall be conducted under the supervision of a physician or nurse practitioner or any other health care professional licensed by State law. The training shall include, at a minimum, the following

subjects:

a) General information about adrenal insufficiency and the dangers associated with adrenal insufficiency;
b) Recognition of the symptoms of a person who is experiencing an adrenal crisis;
c) The types of medications that are available for treating adrenal insufficiency; and
d) Proper administration of medications that treat adrenal insufficiency.

Legal References

1. TCA 49-50-1602
2. TCA 49-50-1601

Germantown Municipal School District

Monitoring:	Descriptor Term:	Descriptor Code:	Issued Date:
Review: Annually, in September	**Student Wellness**	**6.411**	12/9/19 **09/16/19** **08/21/17**
		Rescinds: **SP 6.411**	Issued: **07/11/16**

The Board recognizes the link between student wellness and academic achievement. In order to provide an environment conducive to overall student wellness, this policy shall be followed by all schools in the District.[1] The board shall permit teachers, school health professionals, parents, administrators, and any interested citizens to participate in development of wellness polices.

COMMITMENT TO COORDINATED SCHOOL HEALTH

All schools shall implement the CDC's Coordinated School Health approach to managing new and existing wellness related programs and services in schools and the surrounding community based on State law and State Board of Education CSH standards and guidelines. The district's Coordinated School Health Coordinator shall be responsible for overseeing compliance with the State Board of Education CSH standards and guidelines in the school district.

SCHOOL HEALTH ADVISORY COUNCIL[2, 3]

A school health advisory council shall be established to serve as a resource at school sites for implementing policies and programs and to develop an active working relationship with the community health council. The council shall consist of individuals representing the school and community, including parents, students, teachers, school administrators, health professionals, school food service representatives, and members of the public. The primary responsibilities of the council include but are not limited to:

1. ~~Developing, implementing, monitoring, reviewing and as necessary,~~ Making recommendations regarding student physical activity and nutrition policies;
2. Ensuring that all schools within the district create and implement an action plan related to all School Health Index modules;
3. Ensuring that the results of the action plan are annually reported to the council; and
4. Ensuring that school level results include measures of progress on each indicator of the School Health Index.

The State Board of Education's Coordinated School Health and Physical Activity Policies shall be used as guidance by the Council to make recommendations. The board will consider recommendations of the Council in making policy changes or revisions.

Additionally, each school will have a Healthy School Team consisting of teachers, students, parents, community members, and administrators.[2] The Team will hold Healthy School Team meetings during the school year to assess needs and oversee planning and implementation of school health efforts. The

Director of Schools/designee will ensure compliance with school wellness policy, to include an assessment of the implementation of the wellness policy and the progress made in attaining policy goals. The assessment will be made available to the public.

SCHOOL HEALTH INDEX

All schools within the district shall annually administer a baseline assessment on each of the ~~three~~ recommended School Health Index modules. Results shall be submitted to the School Health Advisory Council and reported to the State Department of Education.

NUTRITION GUIDLELINES

The nutrition guidelines for all food and beverages offered for sale to students are follows:

- Will be consistent with the meal pattern requirements and nutrition standards for competitive foods developed by USDA Smart Snacks in School nutrition standards.
- For other, non-sold foods and beverages made available on the school campus during the school day, each school Principal shall monitor all such foods and beverages to ensure that non-sold food and beverages comply as much as possible with USDA Smart Snack in School national standards. However, it shall be the responsibility of each school Principal to ensure that non-sold food and beverages that do not comply with the Smart Snacks guidelines are kept to a minimum.

~~EVALUATION OF EFFECTIVENESS OF NUTRITION PROGRAM~~

~~The board shall monitor the effectiveness of the school wellness plan within a random wide-range of student constituency groups. Factors to be considered shall include, but are not limited to:~~

1. ~~Participation rates in school meal programs;~~
2. ~~Nutrition satisfaction surveys;~~
3. ~~Frequency and types of health problems which include medical issues, mental/emotional and behavioral health;~~
4. ~~Teacher surveys of student's classroom behavior, attention span and memory; and~~
5. ~~Test scores.~~[3]

COMMITMENT TO NUTRITION

All schools within the District shall participate in the USDA child nutrition programs, which may include but not be limited to, the National School Lunch Program, the School Breakfast Program, the Summer Food Service Program, and the After-School Snack Program.[4,5,6]

Meals shall be accessible to all students in a non-stigmatizing manner. Students will be given adequate time to enjoy healthy meals and relax in a pleasant environment. Good nutritional habits shall be encouraged. All food, including vending machines, fundraising items, and concessions during the school day, must meet guidelines set forth by the Healthy, Hunger-free Kids Act, 2010, Smart Snacks in Schools.[4,5,6] The school principal/designee shall be responsible for overseeing the school district's compliance with the State Board of Education Rules and Regulations for sale of food items in the school district.[2,5,6]

DISTRICT GOALS

The district will provide healthy nutrition through various activities, including nutrition related newsletters, informational links on the district website, healthy eating posters and bulletin boards in dining areas, and informational booths at various community functions. Nutrition education will be offered as a part of a standard based program designed to provide students with the knowledge and skills needed to promote optimum health as outlined in the State Board of Education Health Education and Lifetime Wellness Standards. Nutrition education will discourage teachers from using high fat, sugar, and sodium foods as rewards and encourage student to start each day with a healthy breakfast.

FOOD AND BEVERAGE MARKETING

Only those foods and beverages that meet the nutritional standards 7 C.F.R. § 210.11 may be marketed on GMSD campuses. Marketing and advertising of food and beverages other than that sold on the school campus is prohibited

COMMITMENT TO PHYSICAL ACTIVITY AND PHYSICAL EDUCATION[7]

The board recognizes that physical activity is extremely important to the overall health of a child. Schools will provide students with certain periods of physical activity depending on grade level:

- 130 minutes of physical activity each full school week for all elementary school students. Elementary schools must offer at least one period of physical activity that is at least 15 minutes each day.
- 90 minutes of physical activity each full school week for middle and high school students.
- Physical activity may be integrated into any areas of the school program
- Physical activity shall not be employed as a form of discipline or punishment.

Physical Education classes shall be offered as part of a standards based program designed to provide developmentally appropriate, moderate to vigorous physical activity as an integral part of the class. All physical education classes shall comply with the State Board of Education's Physical Education standards.

COMMITMENT TO CURRICULUM[3]

All applicable courses of study should be based on Lifetime Wellness Curriculum Standards, the K-8 Healthful Living Curriculum Standards, and the K-12 Physical Education Curriculum Standards.

RECORD KEEPING COMPLIANCE

The district's Coordinated School Health Supervisor shall ensure that records demonstrating stakeholder's involvement requirements are maintained. The Coordinated School Health Supervisor shall additionally document the school wellness policy and ensure triennial assessments are made available to the public.

Legal References

~~1. TCA 49-1-1002~~

~~2. State Board of Education Policy 4.204~~
~~3. State Board of Education Policy 4.206~~
~~4. 42 USCA § 1758b (Section 204 of the Healthy, Hunger-Free Kids Act of 2010 (Public Law 111-296))~~
~~5. TRR/MS 0520-01-06~~
~~6. 7 C.F.R. § 210 and 220~~
7. ~~TCA 49-6-1021~~

Legal References

1. State Board of Education Policy 4.204
2. State Board of Education Policy 4.206
3. State Board of Education Rule 0520-1-6, Child Nutrition Programs
4. 7 C.F.R. § 210.10
5. 7 C.F.R. § 210.11
6. 7 C.F.R. § 210.31
7. TCA 49-6-2303
8. Public Acts of 2016, Chapter No. 669
9. 42 U.S.C. 1758b (Section 204 of the Healthy, Hunger-Free Kids Act of 2010 (Public Law 111-296)

Director of Schools Record of Names and Qualifications of Members of Local Textbook Selecting Committees

Use the <Tab> Key to Move from Point to Point in the Form

This Form Remains in the Office of the Local Director of Schools for the 6 years of the Adoption

For the School Year **2019/2020**

Adoption for Schools of **Germantown Municipal School District**
County, ☐ City, ■ or Special School District, ☐

I, _____, hereby certify that the following school personnel have
Superintendent's Signature
been named by me and approved by the local board of education as a textbook selecting committee for the adoption of textbooks in the following subject(s):

English Language Arts

Name	Endorse. Code	Certificate Number	Years Experience (Public School)	School	E-Mail Address:
Rebecca Carey	407, 499	000636151	6 years	Farmington ES	rebecca.carey@gmsdk12.org
Regina Castellaw	002, 101	000208127	14 years	Houston MS	regina.castellaw@gmsdk12.org
Lindsey Collins	402	000247969	15 years	Riverdale ES	lindsey.collins@gmsdk12.org
Andrea Dancy	467	000197472	12 years	Forest Hill ES	andrea.dancy@gmsdk12.org
Cynthia Davenport	121, 159, 466	000706713	25 years	Houston MS	Cynthia.Davenport@gmsdk12.org
Katie Faught	499	000504249	11 years	Riverdale ES	Katie.Faught@gmsdk12.org
Alexa Guynes	407, 413, 499	000616458	5 years	Dogwood ES	alexa.guynes@gmsdk12.org
Meredith Holden	407	000622197	2 years	Houston HS	Meredith.Holden@gmsdk12.org

For qualifications and parameters for appointments to local textbook adoption committees, see TCA-49-6-2207 (c) (1-4); (d)(1-2);(e); (f)

(c) (1) Boards shall make their adoption upon recommendations of committees. These committees shall be set up by subject matter fields and composed of teachers, or supervisors and teachers, with the number of members of each committee to be determined by the board based upon the relative size of the local school system.

(2) These committees shall be composed of teachers and supervisors who are now teaching or supervising the respective subject and shall be by grade or groups of grades arranged so that a committee may consider an entire series of books if it should so desire; provided, that in all cases, the teachers appointed on the committees herein provided for shall hold assignments utilizing electronic textbooks furnished by the board.

(3) The members of the committee authorized in this section shall serve for one (1) fiscal year.

(4) In recommending textbooks for use in economics or business-oriented courses or programs, the local committee should include, at least as a supplemental textbook, one (1) textbook written, illustrated and exemplified in such a manner as to facilitate comprehension by all students, including those of disadvantaged socioeconomic circumstances and of culturally different backgrounds

(d) (1) All members appointed on such committees shall subscribe to the oath as set out in § 49-6-2201(f). (See page 2)

(2) The oath shall be administered by the county executive or by some authorized official empowered to administer an oath

(e) The director of schools in the school district, adopting textbooks under the provisions of this part, shall serve as ex officio member of all committees, and shall record a list of all books adopted and immediately at the completion of the adoption forward a copy of such recorded adoption to the commissioner of education.

(f) As provided in 49-6-2202(d), a local board may furnish electronic textbooks to pupils attending the public schools, provided the electronic textbooks are furnished free of charge. A board that chooses to furnish electronic textbooks to pupils attending school in the district shall provide reasonable access to the electronic textbooks and other necessary computer equipment to pupils in the district who are required to complete homework assignments and to teachers providing homework assignments utilizing electronic textbooks furnished by the board.

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been named by me and approved by the local board of education as a textbook selecting committee for the adoption of textbooks in the following subject(s):

English Language Arts

Name	Endorse. Code	Certificate Number	Years Experience (Public School)	School	E-Mail Address:
Kara Lowe	403	000246037	9 years	Dogwood ES	Kara.Lowe@gmsdk12.org
Julie Nanney	459, 460, 467, 499	000600543	5 years	Riverdale ES	Julie.Nanney@gmsdk12.org
Lori Pettit	402	000290040	14 years	Farmington ES	Lori.Pettit@gmsdk12.org
Mitzi May	Community	Volunteer			mitzimaymay@gmail.com
Sherri Sands	Community	Volunteer			briancsherris@bellsouth.net
Storm Schoonover	Community	Volunteer			stormfunston@hotmail.com

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County, ☐ City, ■ or Special School District, ☐

I, _____, hereby certify that the following school personnel have
Superintendent's Signature
been named by me and approved by the local board of education as a textbook selecting committee for the adoption of textbooks in the following subject(s):

CTE : Criminal Justice

Name	Endorse. Code	Certificate Number	Years Experience (Public School)	School	E-Mail Address:
Chad Uhiren	**590, 750**	**000580554**	**5 years**	**Houston High School**	**chad.uhiren@gmsdk12.org**

For qualifications and parameters for appointments to local textbook adoption committees, see TCA-49-6-2207 (c) (1-4); (d)(1-2);(e); (f)

(c) (1) Boards shall make their adoption upon recommendations of committees. These committees shall be set up by subject matter fields and composed of teachers, or supervisors and teachers, with the number of members of each committee to be determined by the board based upon the relative size of the local school system.

(2) These committees shall be composed of teachers and supervisors who are now teaching or supervising the respective subject and shall be by grade or groups of grades arranged so that a committee may consider an entire series of books if it should so desire; provided, that in all cases, the teachers appointed on the committees herein provided for shall hold assignments utilizing electronic textbooks furnished by the board.

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TN Department of Education

2019 Local Education Agency Compliance Report

Local education agencies (LEAs) are required to comply with all state education laws and State Board of Education (SBE) rules. This annual compliance report is one mechanism the Tennessee Department of Education (TDOE) employs to ensure LEAs faithfully execute those laws and rules. New to the report is the attached LEA compliance self-assessment that is specific to Chapter 0520-01-03 of the SBE rules. Chapter 0520-01-03 is highlighted in the self-assessment because (a) it comprises the minimum requirements for the approval of schools and (b) data collected via the self-assessment can inform the department's baselines for school approval related-compliance.

LEAs must complete this report, including the self-assessment, and, if applicable, the corrective action form, and submit it to the department. During completion, each LEA should carefully check the status of its compliance with all state education laws and SBE rules. The self-assessment can be used to structure an internal compliance review. The department verifies and monitors LEA compliance via multiple data sources (e.g., Education Information System) and will consider those sources when making final decisions regarding an LEA's compliance status. The commissioner of education is charged with taking corrective action when an LEA is not in compliance with state education laws and SBE rules and is not following a TDOE-approved plan addressing areas of noncompliance. The commissioner may waive a state board rule or statute. The LEA waiver request form, which is accessible here, includes exceptions.

- (●) I certify that the LEA is in compliance with all Tennessee education statutes and SBE rules.
- ( ) I certify that, with the exception of the areas reflected in the attached corrective action plan, the LEA is in compliance with all Tennessee education statutes and SBE rules.

Completion of each field below is required.	
Germantown Muncipal School District **LEA Name**	
Jason Manuel **Superintendent/Director of Schools Name**	Rebecca Luter **School Board Chair Name**
 Superintendent/Director of Schools Signature	**School Board Chair Signature**
Date of School Board Approval	
UPLOAD COMPLETED REPORT TO ePlan (including the self-assessment, and, if applicable, the corrective action form)	**DUE DATE: November 29, 2019**

TN Department of Education

Appendix B

LEA Compliance Self-assessment

Instructions: The self-assessment below reflects areas from Chapter 0520-01-03 of State Board of Education Rule 0520-01-03, which is informally referred to as the school approval rule. For each area, indicate the LEA's degree of compliance. Click on a hyperlink to access details for an area within that subsection.

An area marked "Noncompliant" or "Not Applicable" requires an explanation in Appendix C. Please be advised that "Not Applicable" is appropriate in limited cases only (e.g., "Graduation Requirements" for a K-5 LEA).

Finally, it may be helpful to provide a blank copy of the self-assessment to each principal. Those school-level responses could be used to inform the LEA-level self-assessment. **Only submit the LEA-level self-assessment to the department.**

Compliant	Noncompliant	Not Applicable	Rules of the State Board of Education Chapter 0520-01-03 Minimum Requirements for the Approval of Public Schools
			0520-01-03.-02 ORGANIZATION OF SCHOOLS
◉	○	○	Length of School Day for Students
			0520-01-03-.03 ADMINISTRATION OF SCHOOLS
◉	○	○	Teacher Assignment
◉	○	○	Salaries and Licensure for all Licensed Personnel
◉	○	○	Class Size for Grades Kindergarten (K) through Twelve (12)
◉	○	○	Planning Time
◉	○	○	Duty Free Lunch Period
◉	○	○	Summer Schools
◉	○	○	Student Evaluation in Grades Kindergarten (K) through grade eight (8)
◉	○	○	Admission and Enrollment of Students
◉	○	○	Students Transferring From One School to Another

TN Department of Education

○	○	◉	Public Virtual Schools
◉	○	○	Records and Reports
◉	○	○	School Fees
◉	○	○	Withholding of Student Grades for Debts Owed to the School
◉	○	○	School Board, District School Improvement Planning
◉	○	○	Multi-Hazard Emergency Operations Plans
			0520-01-03-.05 STATE ACADEMIC STANDARDS
◉	○	○	Academic Standards
◉	○	○	Experimental Projects and Special Courses
◉	○	○	Grading and Promotion
			0520-01-03-.06 GRADUATION
◉	○	○	Graduation Requirements
◉	○	○	Testing for Credit
◉	○	○	Work-Based Learning Experiences
◉	○	○	Enrollment in College Level Courses
○	○	◉	The High School Equivalency Testing (HISET) Program and the Issuance of Equivalency Diplomas
			0520-01-03-.07 LIBRARY INFORMATION CENTER
◉	○	○	School Library Information Center
◉	○	○	Library Information Center Personnel
◉	○	○	Library Information Center Collection
			0520-01-03-.08 PUPIL PERSONNEL SERVICES

TN Department of Education

◉	○	○	Local Board of Education Standards and Policies for the Following: (a) Attendance Services (b) Guidance Services (c) School Psychological Services (d) School Social Work Services (e) School Health Services
◉	○	○	School Health Services Program: (a) Written policy requiring a physical examination for every child entering school for the first time (b) Written policy requiring a physical examination for every student participating in interscholastic athletics (c) Written policy for excluding pupils with communicable diseases and for readmitting them following recovery (d) Written policy for handling drug/alcohol problems (e) Procedures for reporting suspected cases of child abuse and neglect (f) Requirement for each new employee to present a physician certificate showing a satisfactory health record (g) Inclusion of HIV, HIV-Related Illness, and AIDS provisions
			0520-01-03-.09 SPECIAL EDUCATION PROGRAMS AND SERVICES
◉	○	○	RULE 0520-01-09 – Special Education Programs and Services
◉	○	○	**0520-01-03.-10 WAIVERS**

TN Department of Education

Appendix C

Noncompliance Corrective Action Plan

Instructions: Using the template reflected below, (a) provide a rationale for any area marked "Not Applicable" in the self-assessment and/or (b) report all areas of noncompliance and include corrective action details. Examples are included in the template. Click the attachment (paper clip) icon in the PDF navigation pane to access the Word version of the template.

Area of Noncompliance	Scope and Reason(s) for Noncompliance	Corrective Action Step(s)	Person(s) Responsible	Anticipated Completion Date(s)
T.C.A. § 49-5-413(a) (background checks)	Due to a misunderstanding of T.C.A. § 49-5-413(a) compliance requirements, 104 employees hired prior to 2000 have not been fingerprinted.	▪ Notify the 104 impacted employees and their supervisors of the outstanding requirement and next steps in writing. ▪ Coordinate fingerprinting scheduling, results processing, and related communications. ▪ Notify the TDOE director of school approval of compliance plan completion.	Human Resources Director Human Resources Director Human Resources Director (with director of schools copied)	October 11, 2019 October 14 – December 6, 2019 December 9, 2019
SBE Rule 0520-01-03-.03 – Class Size	While no individual K–12 classes within the district exceed the maximum number of students, class size averages at the three elementary schools are not in compliance.	We submitted a waiver request to the commissioner on October 2, 2019 — approval is pending.	NA	NA
0520-01-03-.03 ADMINISTRATION OF SCHOOLS – Public Virtual Schools	The district has not established a virtual school.	NA	NA	NA

TN Department of Education

Appendix D

For your convenience, the following is a list of helpful links to various state education laws and SBE rules available online.

Public chapters regarding education passed during the 2019 legislative session:
https://www.tn.gov/content/dam/tn/education/legal/2019_legislative_report.pdf

Current and pending SBE rules:
https://www.tn.gov/sbe/rules--policies-and-guidance/rules.html

SBE frequently asked questions:
https://www.tn.gov/sbe/about-us/frequently-asked-questions.html

Tennessee Code Annotated:
http://www.lexisnexis.com/hottopics/tncode/

If you have questions regarding applicable laws or SBE rules, please contact TDOE's general counsel, Christy Ballard, at (615) 741-2921.

Germantown Municipal School District
Budget Amendment

Fiscal Year: 2019-2020 Amendment # 9

GMSD Acct #	GMSD Acct	Original Budget	Approved Changes	Requested Changes	Amended Budget
142-71100-116	Teachers (2.87 FTEs)	189,005	-	(9,424)	179,581
142-71100-189	Other Salaries & Wages	101,130	-	(2,091)	99,039
142-71100-201	Social Security	17,988	-	(713)	17,275
142-71100-204	Retirement	28,966	-	(1,225)	27,741
142-71100-206	Life Insurance	441	-	-	441
142-71100-207	Health Insurance	8,942	-	-	8,942
142-71100-212	Medicare	4,207	-	(167)	4,040
142-71100-311	Contracts - Other Systems	34,400	-	-	34,400
142-71100-399	Other Contracted Services	2,000	-	-	2,000
142-71100-429	Instructional Supplies & Materials	361,790	-	102,456	464,246
142-71100-499	Other Supplies & Materials	500	-	-	500
142-71100-722	Regular Instruction Equipment	383,218	-	180,945	564,163
142-72130-399	Other Contracted Services	23,348	-	3,000	26,348
142-72130-599	Other Charges	17,374	-	-	17,374
142-72210-189	Other Salaries & Wages (2 FTEs)	137,727	-	-	137,727
142-72210-201	Social Security	8,331	-	-	8,331
142-72210-204	Retirement	14,283	-	-	14,283
142-72210-206	Life Insurance	314	-	-	314
142-72210-207	Health Insurance	11,407	-	-	11,407
142-72210-212	Medicare	1,948	-	-	1,948
142-72210-355	Travel	2,000	-	-	2,000
142-72210-369	Contracts for Substitute Teachers	-	-	19,970	19,970
142-72210-399	Contracted Services	-	-	60,000	60,000
142-72210-499	Other Supplies & Materials	3,000	-	-	3,000
142-72210-524	In-service/Staff Development	246,873	-	65,550	312,423
142-72210-790	Other Equipment	3,000	-	3,000	6,000
142-99100-504	Indirect Costs	27,535	-	-	27,535
142-47141	Revenues - Title I	1,629,727	-	421,301	2,051,028

REASON FOR AMENDMENT:

Additional Title I allocations for tutoring at-risk students, educational supplemental materials and intervention programs, technology and equipment for instructional purposes, activities and supplies for family engagement, student motivational speakers, substitute teachers, and professional development.

APPROVAL / DENIAL:

_____ Budget revision is approved effective _____.

_____ Budget revision is denied for the following reason(s):

_____

_____

_____

_____ _____

GMSD Board Chair Date

_____ _____

GMSD Superintendent Date

Germantown Municipal School District
Budget Amendment

Fiscal Year: 2019-2020 Amendment # 10

GMSD Acct #	GMSD Acct	Original Budget	Approved Changes	Requested Changes	Amended Budget
142-72210-189	Other Salaries & Wages (0.75 FTE)	57,153	-	-	57,153
142-72210-201	Social Security	3,543	-	-	3,543
142-72210-204	Retirement	6,075	-	-	6,075
142-72210-206	Life Insurance	135	-	-	135
142-72210-207	Health Insurance	6,909	-	-	6,909
142-72210-212	Medicare	829	-	-	829
142-72210-499	Other Supplies & Materials	2,072	-	-	2,072
142-72210-524	In-service/Staff Development	5,873	-	50,960	56,833
142-72210-790	Other Equipment	-	-	15,000	15,000
142-99100-504	Indirect Costs	2,120	-	-	2,120
142-47181	Revenues - Title II	84,709	-	65,960	150,669

REASON FOR AMENDMENT:

Additional Title II allocations for professional development for GMSD teachers and for nonpublic schools, and for computer equipment for teacher development and observation feedback.

APPROVAL / DENIAL:

_____ Budget revision is approved effective _____.

_____ Budget revision is denied for the following reason(s):

_____

_____

_____

_____ _____

GMSD Board Chair Date

_____ _____

GMSD Superintendent Date

Germantown Municipal School District
Budget Amendment

Fiscal Year: 2019-2020 Amendment # 11

GMSD Acct #	GMSD Acct	Original Budget	Approved Changes	Requested Changes	Amended Budget
142-71100-429	Instructional Supplies & Materials	8,860	-	2,818	11,678
142-72210-524	In-service/Staff Development	1,273	-	-	1,273
142-99100-504	Indirect Costs	100	-	-	100
142-47146	Revenues - Title III	10,233	-	2,818	13,051
142-71100-429	Instructional Supplies & Materials	22,200	-	2,000	24,200
142-71100-722	Regular Instruction Equipment	44,929	-	6,562	51,491
142-72120-499	Other Supplies & Materials	5,925	-	-	5,925
142-72130-499	Other Supplies & Materials	5,200	-	-	5,200
142-72130-790	Other Equipment	-	-	3,000	3,000
142-72210-369	Contracts for Substitute Teachers	-	-	5,000	5,000
142-72210-524	In-service/Staff Development	52,100	-	2,000	54,100
142-47147	Revenues - Title IV	130,354	-	18,562	148,916

REASON FOR AMENDMENT:

Additional Title III allocations for instructional supplies and materials for ESL teachers. Additional Title IV allocations for MAPS equipment and instruments, diagnostic equipment for athletic safety, and substitute teachers.

APPROVAL / DENIAL:

_____ Budget revision is approved effective _____.

_____ Budget revision is denied for the following reason(s):

_____

_____

_____

_____ _____

GMSD Board Chair Date

_____ _____

GMSD Superintendent Date

Germantown Municipal School District
Budget Amendment

Fiscal Year: 2019-2020 Amendment # 12

GMSD Acct #	GMSD Acct	Original Budget	Approved Changes	Requested Changes	Amended Budget
142-71200-116	Teachers' Salaries (2 FTEs)	112,335	-	-	112,335
142-71200-163	Educational Assistants (26 FTEs)	605,800	-	-	605,800
142-71200-201	Social Security	49,501	-	-	49,501
142-71200-204	Retirement	68,099	-	-	68,099
142-71200-206	Life Insurance	7,000	-	-	7,000
142-71200-207	Health Insurance	134,250	-	-	134,250
142-71200-212	Medicare	10,413	-	-	10,413
142-71200-312	Contracts with Private Agencies	25,387	-	-	25,387
142-71200-399	Other Contracted Services	5,387	-	(5,387)	-
142-71200-429	Instructional Supplies & Materials	22,965	-	101,560	124,525
142-71200-725	Special Education Equipment	5,000	-	26,277	31,277
142-72710-338	Maintenance & Repairs - Vehicles	-	-	3,000	3,000
142-72710-425	Gasoline	1,025	-	1,975	3,000
142-72710-511	Vehicle and Equipment Insurance	2,500	-	500	3,000
142-72710-729	Transportation Equipment	-	-	50,000	50,000
142-72220-105	Supervisor/Director Salaries (0.3 FTE)	33,209	-	-	33,209
142-72220-201	Social Security	2,059	-	-	2,059
142-72220-204	Retirement	3,530	-	-	3,530
142-72220-206	Life Insurance	75	-	-	75
142-72220-207	Health Insurance	4,491	-	-	4,491
142-72220-212	Medicare	482	-	-	482
142-72220-312	Contracts with Private Agencies	-	-	20,000	20,000
142-72220-355	Travel - mileage	300	-	-	300
142-72220-499	Other Supplies & Materials	25,000	-	10,000	35,000
142-72220-524	In-service/Staff Development	39,000	-	21,000	60,000
142-72220-599	Other Charges	-	-	12,000	12,000
142-99100-504	Indirect Costs	45,007	-	-	45,007
142-47143	Revenues - IDEA	1,202,815	-	240,925	1,443,740
142-71200-312	Contracts with Private Agencies	-	-	10,000	10,000
142-71200-429	Instructional Supplies & Materials	4,235	-	(4,235)	-
142-71200-725	Special Education Equipment	2,584	-	-	2,584
142-72220-399	Other Contracted Services	367	-	(367)	-
142-72220-499	Other Supplies & Materials	1,971	-	(1,398)	573
142-72220-524	In-service/Staff Development	3,926	-	2,120	6,046
142-99100-504	Indirect Costs	325	-	-	325
142-47145	Revenues - IDEA Preschool	13,408	-	6,120	19,528

REASON FOR AMENDMENT:

Additional allocations for IDEA, Part B, for supplemental curriculum for reading/language arts and math, transition and home living materials, voice output devices, adaptive equipment, professional development, Hepatitis B vaccinations for district personnel working with students with disabilities, and additional costs for a van purchase to transport students with disabilities to community based instruction and work-based learning experiences and sites.

APPROVAL / DENIAL:

_____ Budget revision is approved effective _____.

_____ Budget revision is denied for the following reason(s):

_____

_____

_____

_____ _____

GMSD Board Chair Date

_____ _____

GMSD Superintendent Date

Germantown Municipal School District
Budget Amendment

Fiscal Year: 2019-2020 Amendment # 13

GMSD Acct #	GMSD Acct	Original Budget	Approved Changes	Requested Changes	Amended Budget
142-72220-499	Other Supplies & Materials	-	-	1,845	1,845
142-72220-524	In-service/Staff Development	-	-	2,800	2,800
142-47143	Revenues - IDEA Discretionary Grant	-	-	4,645	4,645

REASON FOR AMENDMENT:

Allocations for IDEA Discretionary Grant, supporting benchmarks and progress monitoring through easycbm software and related staff development.

APPROVAL / DENIAL:

_____ Budget revision is approved effective _____.

_____ Budget revision is denied for the following reason(s):

_____

_____

_____

_____ _____

GMSD Board Chair Date

_____ _____

GMSD Superintendent Date

GERMANTOWN
MUNICIPAL SCHOOL DISTRICT
Excellence. Always.

Germantown Municipal School District
Budget Amendment

Fiscal Year: 2019 - 2020 Amendment # 14

GMSD Acct #	GMSD Acct	Original Budget	Approved Changes	Requested Changes	Amended Budget
141-71100-116	Teachers Salaries	18,922,091	-	378,442	19,300,533
141-71100-163	ED Assistants	525,813	(10,000)	10,316	526,129
141-71100-201	Social Security	1,225,579	(620)	24,103	1,249,062
141-71100-204	TCRS	2,094,124	-	41,325	2,135,449
141-71100-212	Medicare	286,627	(145)	5,637	292,119
141-71150-116	ALT ED Teachers Salaries	115,652	-	15,972	131,624
141-71150-130	Social Worker	60,620	-	1,212	61,832
141-71150-163	ED Assistants	22,497	-	450	22,947
141-71150-201	Social Security	13,936	-	1,093	15,029
141-71150-204	TCRS	22,763	-	1,875	24,638
141-71150-212	Medicare	3,259	-	256	3,515
141-71200-116	SPED Teachers Salaries	2,075,459	-	41,509	2,116,968
141-71200-128	Homebound Teachers	61,921	-	1,238	63,159
141-71200-163	ED Assistants	697,610	-	13,952	711,562
141-71200-171	Speech Therapists	439,229	-	8,785	448,014
141-71200-201	Social Security	206,102	-	4,060	210,162
141-71200-204	TCRS	343,877	-	6,961	350,838
141-71200-212	Medicare	56,176	-	950	57,126
141-71300-116	CTE Teachers Salaries	758,049	-	87,152	845,201
141-71300-201	Social Security	47,061	-	5,403	52,464
141-71300-204	TCRS	80,687	-	9,264	89,951
141-71300-212	Medicare	11,006	-	1,264	12,270
141-72110-105	Director/Supervisor Salaries	208,560	-	4,171	212,731
141-72110-130	Social Worker	137,370	-	2,747	140,117
141-72110-162	Clerical	57,222	-	1,144	58,366
141-72110-189	Other Salaries & Wages	122,000	-	2,440	124,440
141-72110-201	Social Security	32,559	-	651	33,210
141-72110-204	TCRS	51,518	-	1,116	52,634
141-72110-212	Medicare	7,615	-	152	7,767
141-72120-105	Student Health Coordinator	72,393	-	1,448	73,841
141-72120-131	Nurses' Salaries	290,237	-	5,805	296,042
141-72120-201	Social Security	22,762	-	450	23,212
141-72120-204	TCRS	35,017	-	771	35,788
141-72120-212	Medicare	5,323	-	105	5,428
141-72130-123	Guidance Salaries	884,991	-	17,700	902,691
141-72130-189	Other Salaries & Wages	59,513	-	1,190	60,703
141-72130-201	Social Security	58,838	-	1,171	60,009
141-72130-204	TCRS	100,070	-	2,008	102,078
141-72130-212	Medicare	13,761	-	274	14,035
141-72210-105	Director/Supervisor Salaries	671,659	-	13,433	685,092
141-72210-129	Librarians' Salaries	418,633	-	8,373	427,006
141-72210-136	TV Media Engineer	70,358	-	1,407	71,765
141-72210-137	TV Media Program Dir	69,838	-	1,397	71,235
141-72210-138	Instructional Computer Personnel	234,864	-	4,697	239,561
141-72210-161	Secretaries	57,222	-	1,144	58,366
141-72210-163	Library Assistants	55,234	-	1,105	56,339
141-72210-201	Social Security	98,103	-	1,956	100,059
141-72210-204	TCRS	155,855	-	3,354	159,209
141-72210-212	Medicare	22,943	-	458	23,401
141-72220-105	Director/Supervisor Salaries	251,963	-	5,039	257,002
141-72220-124	Psychological Personnel	230,384	-	4,608	234,992
141-72220-161	Secretaries	57,222	-	1,144	58,366
141-72220-162	Clerical	201,260	-	4,025	205,285
141-72220-189	OT/PT Therapists	468,268	-	9,365	477,633
141-72220-201	Social Security	75,026	-	1,499	76,525
141-72220-204	TCRS	115,510	-	2,571	118,081
141-72220-212	Medicare	17,546	-	351	17,897
141-72230-105	Director/Supervisor Salaries	17,952	-	359	18,311
141-72230-201	Social Security	1,113	-	22	1,135
141-72230-204	TCRS	1,908	-	38	1,946

141-72230-212	Medicare	260	-	5	265
141-72250-105	Director/Supervisor Salaries	105,582	-	2,112	107,694
141-72250-120	Computer Programmers	357,666	-	7,153	364,819
141-72250-161	Secretaries	36,728	-	735	37,463
141-72250-189	Other Salaries & Wages	75,000	-	1,500	76,500
141-72250-201	Social Security	35,855	-	713	36,568
141-72250-204	TCRS	53,609	-	1,222	54,831
141-72250-212	Medicare	8,385	-	167	8,552
141-72320-103	Deputy Superintendent/Other	74,500	-	1,490	75,990
141-72320-161	Secretaries	53,384	49,705	2,062	105,151
141-72250-189	Other Salaries & Wages	103,071	-	2,061	105,132
141-72320-201	Social Security	24,908	3,082	348	28,338
141-72320-204	TCRS	35,336	4,608	597	40,541
141-72320-212	Medicare	1,500	187	81	1,768
141-72410-104	Principals and Vice-Principal	765,363	-	15,307	780,670
141-72410-139	Assistant Principals	1,210,914	-	24,218	1,235,132
141-72410-161	Secretaries	247,191	-	4,944	252,135
141-72410-162	Clerical	475,312	-	9,506	484,818
141-72410-189	Other Salaries & Wages	18,481	10,000	570	29,051
141-72410-201	Social Security	169,152	620	3,382	173,154
141-72410-204	TCRS	279,937	-	5,798	285,735
141-72410-212	Medicare	39,560	145	791	40,496
141-72510-105	Director/Supervisor Salaries	118,431	-	2,369	120,800
141-72510-119	Accountants	197,521	-	3,950	201,471
141-72510-122	Purchasing	49,705	5,295	1,100	56,100
141-72510-161	Secretaries	56,100	-	1,750	57,850
141-72510-201	Social Security	26,149	328	568	27,045
141-72510-204	TCRS	39,097	491	975	40,563
141-72510-212	Medicare	6,115	77	133	6,325
141-72520-105	Director/Supervisor Salaries	196,248	-	3,925	200,173
141-72520-161	Secretaries	66,273	-	1,325	67,598
141-72520-162	Clerical	64,974	-	1,299	66,273
141-72520-201	Social Security	20,305	-	406	20,711
141-72520-204	TCRS	33,028	-	696	33,724
141-72520-212	Medicare	4,749	-	95	4,844
141-72610-167	Maintenance Personnel Salaries	315,354	-	6,307	321,661
141-72610-201	Social Security	19,552	-	391	19,943
141-72610-204	TCRS	29,233	-	670	29,903
141-72610-212	Medicare	4,573	-	91	4,664
141-72620-105	Director/Supervisor Salaries	118,431	-	2,369	120,800
141-72620-161	Secretaries	48,396	-	968	49,364
141-72620-167	Maintenance Personnel Salaries	294,132	-	5,883	300,015
141-72620-201	Social Security	28,579	-	572	29,151
141-72620-204	TCRS	44,454	-	980	45,434
141-72620-212	Medicare	6,684	-	134	6,818
141-39000	Reserves	11,183,890	-	(892,629)	10,291,261

REASON FOR AMENDMENT:

2% COLA for all GMSD staff retroactive to July 1, 2019

APPROVAL / DENIAL:

_____ Budget revision is approved effective _____.

_____ Budget revision is denied for the following reason(s):

_____

_____

_____

_____ _____

GMSD Board Chair Date

_____ _____

GMSD Superintendent Date

Houston High School
Band Room and Concessions Stand

Bid Tabulation-Houston High School	Addition GMSD Bid# FY 2020-02			
Band Room and Concession Additions 11-05-19 @ 2:00 PM				
GMSD FY 2020-02	**B and B Specialty**	**Grinder Taber Grinder**	**Wagner General**	**GMSD Recommendation Grinder Taber Grinder**
Base Bid				
Houston High School Band Room Addition and all associated work on the East side of the campus.	**$ 1,374,778.00**	**$ 1,352,487.00**	**$ 1,547,000.00**	**$ 1,352,487.00**
Alternate #1- Bid Alternate (Concession Stand Work and all asssociated work on the West side of campus)	**$ 697,849.00**	**$ 684,614.00**	**$ 613,000.00**	**$ 684,614.00**
Alternate #2- New parking area directly to the East of the new Band Room Addition.	**$ 480,480.00**	**$ 102,861.00**	**$ 98,000.00**	**$ 102,861.00**
Alternate #3- New parking area directly to the East of the new main school entrance.	**$ 127,377.00**	**$ 172,829.00**	**$ 185,000.00**	**Untaken Alternate**
	$ 2,680,484.00	**$ 2,312,791.00**	**$ 2,443,000.00**	**$ 2,139,962.00**
Price per thousand	**$ 20.00**	**$ 9.00**	**$ 10.00**	**$ 19,259.66**
Bid Bond Enclosed?	**yes**	**yes**	**yes**	
Grand Total				**$ 2,159,221.66**

GERMANTOWN
MUNICIPAL SCHOOL DISTRICT
Excellence. Always.

Germantown Municipal School District Invitation to Bid

Houston High School Band Room and Concession Additions
GMSD2020-02
ADDENDUM #2- October 30, 2019

TIME AND DATE DUE: 2:00 p.m. Central, Wednesday, October 30, 2019

LOCATION: Germantown Municipal School District Administrative Offices, 3350 South Forest Hill Road, Germantown, TN 38138

NUMBER OF PAGES OF ADDENDUM #2: 100 pages as indicated on the new bid form enclosed herein.

All signed Addenda must be acknowledged and included with your response to BID # GMSD2020-02 Houston High School Band Room and Concession Additions. Failure to sign, acknowledge and include any and all Addenda may result in your BID being disqualified and rejected.

Names and signatures below certify that you acknowledge, understand and agree to all information in Addendum #2- BID # GMSD2020-02.

_____ _____

Authorized Representative (Print) *Signature* *Date*

QUESTIONS & ANSWERS AND AMENDMENTS as of Wednesday, October 30, 2020

BID FORM
GMSD BID #FY2020-02
HOUSTON HIGH SCHOOL BAND ROOM ADDITION & CONCESSION STAND ADDITIONS

Project can begin sooner, but ground breaking should take place no later than Friday, December 13, 2019.
Project must be completed no later than Monday, August 31, 2020.
Sequencing of the project shall be as follows:
The Band Room Addition shall be the first phase of work. Substantial Completion must be given on the Band Room before demolition on the Concession Stand can start.

BIDDER:_____

Bid shall be filled in completely, by the Contractor, in the bid schedule by indicating total dollars and cents. All costs, including hourly rates, will be included here and will be fully-burdened to include, but not limited to: wages, transportation, lodging, overhead, and per diem. All figures shall be written in ink or typed. Penciled entries will NOT be accepted, and will be considered irregular and rejected.

Installation and on-site training are required. Installation, testing and training must be completed no later than Wednesday, September 30, 2020. Bidders must indicate project completion time after receipt of order (A.R.O.). Project Completion Date is critical and will be a factor in the evaluation and award of this bid. *Dates of work and schedule must be coordinated with Josh Cathey, Deputy Superintendent, Germantown Municipal School District, josh.cathey@gmsdk12.org, 901-752-7900.*

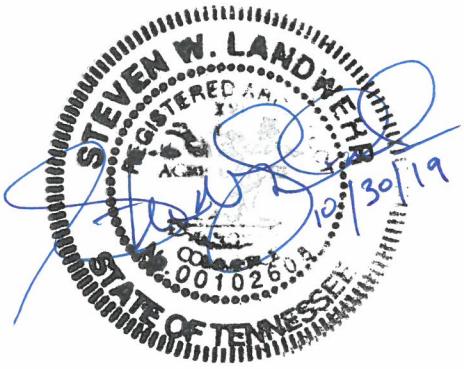
ITEM	Description	Unit	Project Total
1	Houston High School Band Room Addition and all associated work on the East side of the campus.	**LS**	
Alternate #1	Bid Alternate (Concession Stand Work and all associated work on the West side of the campus).	**LS**	
Alternate #2	New parking area directly to the east of the new Band Room Addition.	**LS**	
Alternate #3	New Parking area directly to the east of the new main school entrance.	**LS**	

Project Completion Date:_____

State your cost per $1000.00 for Performance, Materials and Labor Bond (if required): $_____

Company Name:			**Address:**				
Organized and existing under the laws of the State of :		**and doing business as:**	a corporation	a partnership	an individual	a limited liability company	other
City:	**State:**	**Zip:**	**Telephone (with Area Code):**		**Fax (with Area Code):**		
Name:			**Title:**				
Authorized Signature:				**Date:**			

FLEMING
architects



HOUSTON HIGH SCHOOL
BAND ROOM ADDITION & CONCESSION STAND
9755 WOLF RIVER BLVD.
GERMANTOWN, TN 38139

ADDENDUM NO. 2 OCTOBER 30, 2019

This Addendum forms a part of the Contract Documents and modifies the Plans and Specifications dated October 11, 2019. The Contractor shall acknowledge receipt of this Addendum on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of (5) pages and (55) attachments.

GENERAL CLARIFICATIONS/QUESTIONS

1. Addendum #1 was incorporated in the original bid set and the revisions are included in this Addendum #2 packet.

2. Could you give us an allowance amount for testing?
   RESPONSE: Testing will be by Owner.

3. Will the work be performed during normal business hours?
   RESPONSE: Work will be performed per the City of Germantown work ordinance.

4. On sheet C-002, could you clarify the makeup of the band truck parking? Is this concrete or asphalt? On C-004, the section cut of the 1' concrete water table shows asphalt to either side, but it was discussed during the pre-bid that this would be concrete. Is there any striping or markings to be placed here?
   RESPONSE: Yes, concrete. See revised drawings. No striping.

5. Note 1 on sheet L-001 calls for the contractor to install site furnishings (benches, tables, trash receptacles). Could you provide a list of those items that are to be installed by the contractor?
   RESPONSE: This note will be removed. Owner has not indicated what they will be providing.

6. Does the existing roof have any warranties that need to be upheld?
   RESPONSE: Yes, 20 years per specs.

7. Are there any available MEP existing/demo drawings for the concession stand?
   RESPONSE: No, request site visit to determine existing conditions.

8. The P0.1 fixture schedule calls for a DF-1 drinking fountain. The P1.1 does not have a DF-1 drawn in.
   RESPONSE: There is no drinking fountain in the project. See revised drawings.

9. Please advise who furnishes and install Appliances & Equipment listed in Spec 113100. Is it Owner or GC?
   RESPONSE: Equipment & Appliances are Contractor Furnished, Contractor Installed.

10. Please confirm if testing is provided by Owner or GC?
    RESPONSE: Testing will be paid for by the Owner. This testing cost will have to be a direct passed though Fleming.

11. Are the pipe bollards shown on C001, C003, and C005 existing?
    RESPONSE: The pipe bollards shown on the referenced sheets are existing to remain.

12. Section 2.35 Liquidated Damages - Ground breaking and beginning construction for GMSD BID # FY2020-02: Liquidated damages will be assessed at $500 per calendar day for every day past December 13, 2019. Liquidated damages will be accessed at $1,000 per calendar day for every day substantial completion is not achieved past August 31,2020.
    Ground breaking is the start of the project, so liquidated damages should not be assessed past December 13. Please confirm that LD's will not be assessed till August 31.
    RESPONSE: The initial liquidated damages statement is correct but needs explanation. Due to the need to start this project on or before December 13, 2019, there is a penalty of $500/calendar day for every day the project does not start on time. These damages will be paid until the project starts. Regular end of project liquidated damages ($1,000 / per calendar day) will start on September 1, 2020 if substantial completion is not reached by August 31, 2020.

13. A type storefront windows note to have triple pane glass, but the glass specs are for a two pane insulated glass. Please provide a glass spec. for the triple pane glass.
    RESPONSE: See revised spec per the Addendum.

14. B type slider window has no specs. Please provide window spec. and glass type for these windows.
    RESPONSE: See revised spec per the Addendum.

15. Please confirm Band Room and Concession stand work would not be allowed to start at the same time as this will affect the pricing and also please confirm that Band room addition work would need to be completed first before concession stand work can be started.
    RESPONSE: As stated in the pre-bid meeting, the Band room must be completed before the Concession Stand work can start.

<u>MODIFICATIONS/CLARIFICATIONS TO THE DRAWINGS – CIVIL</u>

1. Replace Sheet C-0001: Was Existing Condition Plan. Replaced in its entirety with General Notes.
2. Replace Sheet C-0002: Was the Site Plan Sheet. Replaced in its entirety with Existing Conditions & Demolition Plan.
3. Add Sheet C-0002.1 Existing Conditions & Demolition Plan (Add Alternates).
4. Replace Sheet C-0003: Was the Tree Plan. Replaced in its entirety with Site Plan.
5. Add Sheet C-0003.1 Site Plan (Add Alternates)
6. Replace Sheet C-0004 Grading & Drainage Plan.
7. Add Sheet C-0004.1 Grading & Drainage Plan (Add Alternates)

8. Replace Sheet C-0005: Was the Utility Plan Sheet. Replaced in its entirety with Erosion Control Plan.
9. Add Sheet C-0005.1 Erosion Control Plan (Add Alternates).
10. Add Sheet C-0006 Tree Plan: New sheet number replacing old Sheet C-003.
11. Add Sheet C-0006.1 Tree Plan (Add Alternates).
12. Add Sheet C-0007 Utility Plan: New sheet number replacing old Sheet C-005.

MODIFICATIONS/CLARIFICATIONS TO THE DRAWINGS – LANDSCAPE

1. Replace Sheet L-001: Revised Landscape Plan
2. Add Sheet L-001.1 Planting Plan in its entirety.
3. Replace Sheet L-002: Revised Irrigation Plan
4. Add Sheet L002.1 Irrigation Plan in its entirety.

MODIFICATIONS/CLARIFICATIONS TO THE DRAWINGS – ARCHITECTURAL

1. Replace Cover Sheet: Revised for code content and sheet revisions.
2. Replace Sheet LS1.1 Life Safety Plan: Revised for egress at concession stand.
3. Replace Sheet ASD1.1 Architectural Site Demolition Plans: Revised to accommodate new parking.
4. Replace Sheet AS1.1 Architectural Site Plan: Revised to accommodate new parking.
5. Replace Sheet A1.2 Band Room Reference Plan: Added column plan detail.
6. Replace Sheet A1.3 Concession Stand Dimension & Reference Plan: Added column wrap details.
7. Replace Sheet A2.1 Band Room Exterior Elevations: Removed canopy.
8. Replace Sheet A2.2 Concession Stand Exterior Elevations: Revised concession stand trim.
9. Replace Sheet A3.1 Building Sections: Revised building sections.
10. Replace Sheet A4.1 Wall Sections: Revised wall sections.
11. Replace Sheet A4.2 Wall Sections and Details: Added column details.
12. Replace Sheet A5.1 Roof Plan: Removed canopy.
13. Replace Sheet A5.2 Roof Details: Revised wall details.
14. Replace Sheet A6.1 Door & Window Schedules and Details: Revised door schedule.
15. Replace Sheet A7.1 Finish Plans: Revised finish schedule.
16. Replace Sheet A7.2 Interior Elevations: Revised sound panels in Band Room.
17. Replace Sheet A8.1 Reflected Ceiling Plans: Revised reflected ceiling plan.

MODIFICATIONS/CLARIFICATIONS TO THE DRAWINGS – MECHANICAL

1. Replace Sheet M1.1 Floor Plans - Mechanical: Relocated return air grilles.
2. Replace Sheet M1.2 Roof Plan - Mechanical: Gas piping routing and notes.

MODIFICATIONS/CLARIFICATIONS TO THE DRAWINGS – PLUMBING

1. Replace Sheet P0.1 Legends, Notes and Schedules - Plumbing: Additional notes added.
2. Replace Sheet P1.1 Floor Plans Plumbing: Revised for miscellaneous plumbing.

MODIFICATIONS/CLARIFICATIONS TO THE DRAWINGS – FIRE PROTECTION

1. Replace Sheet FP1.1 Floor Plan – Fire Protection: Fire riser information.

MODIFICATIONS/CLARIFICATIONS TO THE DRAWINGS – ELECTRICAL

1. Replace Sheet E0.1 Legend & Schedules - Electrical: Revised legend to add Sheet E0.4 and E1.1.
2. Replace Sheet E0.2 One Line Diagram - Electrical: Revised key notes.
3. Replace Sheet E0.3 Details – Electrical: Revised lighting schedule.
4. Replace Sheet E0.5 Panel Schedules - Electrical: Revised panel schedule.

5. Add Sheet E1.1 Site Plan Electrical: Added sheet in its entirety.
6. Replace Sheet E2.1 Floor Plan – Electrical - Lighting: Revised lighting plan.
7. Replace Sheet E3.1 Floor Plan – Electrical - Power: Revised power plan.

MODIFICATIONS/CLARIFICATIONS TO THE SPECIFICATIONS

1. Replace Bid Form with attached revised Bid Form.
2. Replace Section 01 21 00 Allowances.
3. Replace Section 01 23 00 Alternates.
4. Add Section 05 58 13 Metal Column Covers.
5. Add Section 07 42 93 Soffit and Liner Panels.
6. Delete Spec Section 08 43 13 Aluminum Framed Storefronts.
7. Add Section 08 44 13 Glazed Aluminum Curtain Walls.
8. Add Section 08 51 13 Aluminum Windows.
9. Replace Section 08 80 00 Glazing.
10. Replace Section 22 07 19 Plumbing Piping Insulation.
11. Replace Section 22 13 16 Sanitary Waste and Vent Piping.

ATTACHMENTS

1. Cover Sheet of Drawings
2. LS1.1 Life Safety Plans
3. C-0001
4. C-0002
5. C-0002.1
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15. L001
16. L001.1
17. L002
18. L002.1
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21. A1.2
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33. A8.1
34. M1.1
35. M1.2
36. P0.1
37. P1.1
38. FP1.1
39. E0.1
40. E0.2
41. E0.3
42. E0.5
43. E1.1
44. E2.1
45. E3.1
46. Revised Bid Form
47. Spec Section 01 21 00 Allowances.
48. Spec Section 01 23 00 Alternates
49. Spec Section 05 58 13 Metal Column Covers
50. Spec Section 07 42 93 Soffit and Liner Panels
51. Spec Section 08 44 13 Glazed Aluminum Curtain Walls
52. Spec Section 08 51 13 Aluminum Windows
53. Spec Section 08 80 00 Glazing
54. Spec Section 22 07 19 Plumbing Piping Insulation.
55. Spec Section 22 13 16 Sanitary Waste and Vent Piping.

END OF ADDENDUM NO. 2

MAJOR CODE ANALYSIS

Project Description: This project is a part of a multi-phase site development that includes an addition to the existing band room and a renovation of an existing pre-engineered metal building that will be renovated into a concession stand.

Applicable Codes:

State:
- 2012 International Building Code (IBC) (excluding Chapters 11 & 34)
- 2012 International Fire Code (IFC)
- 2012 NFPA 101 Life Safety Code
- 2012 International Mechanical Code (IMC)
- 2012 International Plumbing Code (IPC)
- 2012 International Fuel Gas Code (IFGC)
- 2017 National Electrical Code, NFPA 70
- 2012 International Energy Conservation Code (IECC)
- 2010 ADA Standards for Accessible Design (ADAAG)

Local
- 2015 International Building Code with Local Amendments
- 2015 International Existing Building Code with Local Amendments
- 2014 National Electrical Code
- 2018 Joint Electrical Code
- 2015 International Mechanical Code with Local Amendments
- 2015 International Fuel Gas Code with Local Amendments
- 2015 International Plumbing Code with Local Amendments
- 2015 International Energy Conservation Code with Local Amendments
- 2009 ICC A117.1 Accessibility and Useable Buildings and Facilities (by reference)
- 2013 ASME 17.1 Safety Code for Elevators and Escalators (by reference)

Occupancy Type: Educational (E)

Construction Type:
Band Addition - Type IIA, sprinklered, 1-hr protected;
Concession Stand - Type IIB, non-sprinklered, non-protected.

Building Data: (Allowed / Provided)

	Band Addition	Stand Alone Concession Stand
Fire Protection:	sprinklers required *and* provided	sprinklers not required *nor* provided
Building Height:	85' allowed / 27' - 8" provided	75' allowed / 18' - 3" provided
Number of Stories:	4 permitted / 1 provided	2 allowed / 1 provided
Gross Floor Area:	79,500 sf allowed / 6,423 sf provided	43,500 sf allowed / 3,200 sf provided

The Band Addition is a one story 6,423 sf addition to the existing 2 story high school building. The existing first floor contains 184,704 sf without the new addition. The existing second floor contains 68,311 sf. With the addition of the band the total square footage of the building comes to 259,438 sf.

Fire Resistance:

Exterior Walls:	For separations of 10' or greater: No Rating Required For separations 10' or less: 1-Hr Rating Required
Electrical Rooms:	1-Hr. Rating; 45-min. Protected Openings

Fire Safety:

Sprinklers: In compliance with NFPA 13
Portable Fire Extinguishers: In compliance with NFPA 10
Smoke Alarms: In compliance with NFPA 72
Automatic Fire Detection - Smoke Detectors

Responding Fire Department:

Germantown Fire Department
Jody Dwyer, Fire Marshal
2700 Cross Country Drive, Germantown, TN 38138
(901) 751-7600 - JDwyer@Germantown-TN.gov

Interior Finishes:

Interior exit passageways in unsprinklered Educational occupancies shall be Class A. Corridors and exit enclosures shall be Class B. Rooms and enclosed spaces shall be Class C per Table 803.9.

Egress:

Exit Width Per Occupant	0.2" per occupant for ramps, doors, other egress components
Maximum Common Path of Travel:	Shall Not Exceed 75 ft.
Maximum Travel Distance:	200 ft. Maximum Distance Allowed
Dead End Corridor Limitations:	Educational Occupancies: 20 ft.

Means of Egress (Per 2012 NFPA 101 Chapter 7 Means of Egress)

2012 NFPA 101 7.3.3 Egress Capacity
TABLE 7.3.3.1: Egress capacity for approved components of means of egress
Stairway Width 0.3" width per person
Level Components 0.2" width per person

2012 NFPA 101 28.3.6 Corridors
28.3.6.1.3: In Buildings protected throughout by an approved, supervised automatic sprinkler system in accordance with 28.3.5, corridor walls shall have a minimum 1/2-hour fire resistance rating.

2012 NFPA 101 28.3.6.2 Doors
28.3.6.2.1 Doors that open onto exit access corridors shall have not less than a 20-minute fire protection rating in accordance with Section 8.3.
28.3.6.2.3 Doors that open onto exit access corridors shall be self-closing and self latching.

1

HOUSTON HIGH SCHOOL
BAND ROOM ADDITION & CONCESSION STAND

9755 Wolf River Blvd
Germantown, TN 38139
October 11, 2019

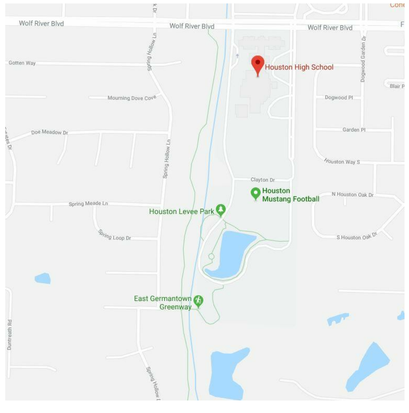
CONSULTANTS

CIVIL / LANDSCAPING
Fisher & Arnold
9180 Crestwyn Hills Drive
Memphis, TN 38125
(901) 748-1811

STRUCTURAL
Scallion Structural Engineering
63 Hicks Road
Alamo, TN 38001
(731) 217-1614

MECHANICAL / ELECTRICAL / PLUMBING / FIRE PROTECTION
HNA Engineering, PLCC.
11880 Cranston Drive, Suite 104
Arlington, TN 38002
(901) 290-6377

VICINITY MAP



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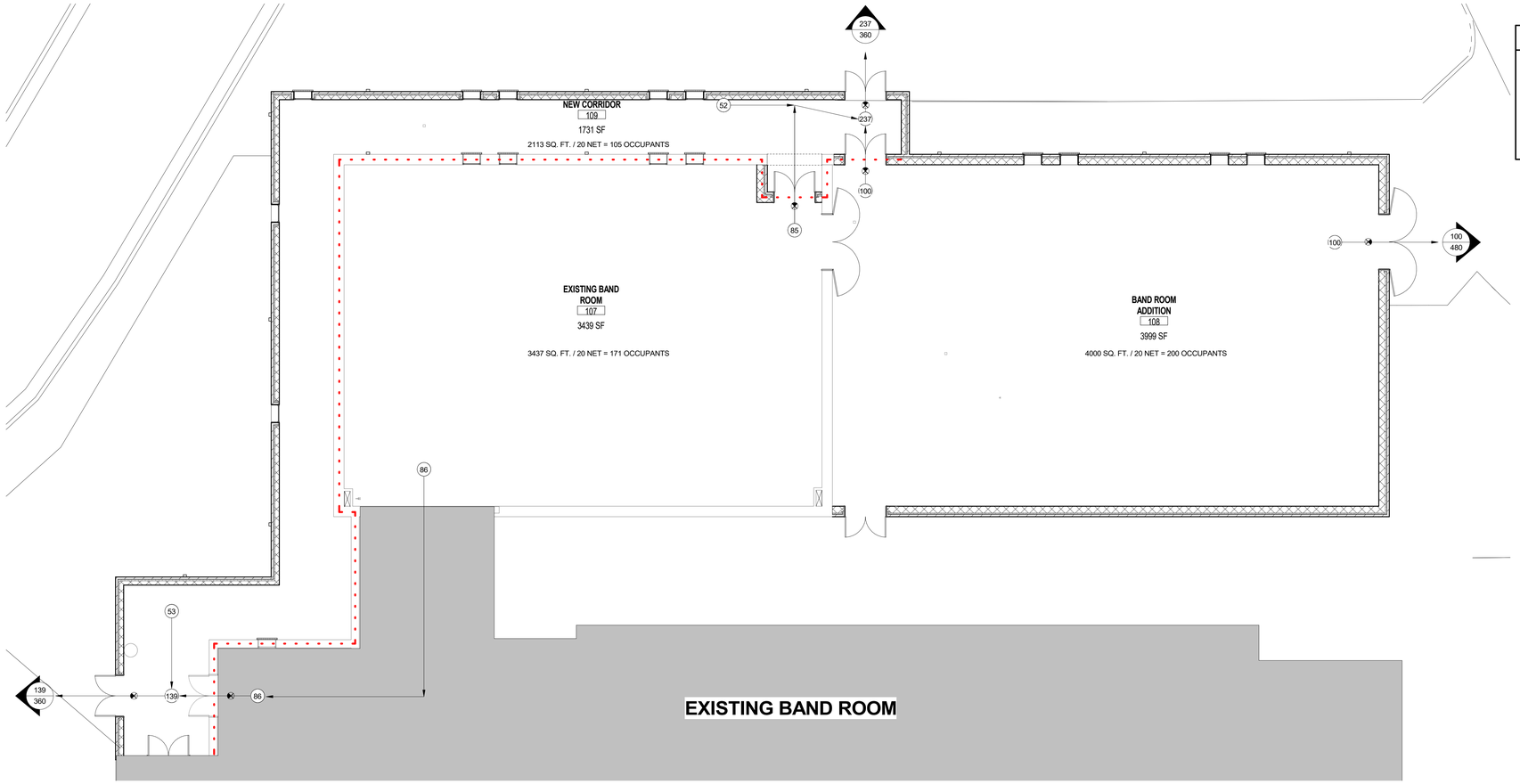
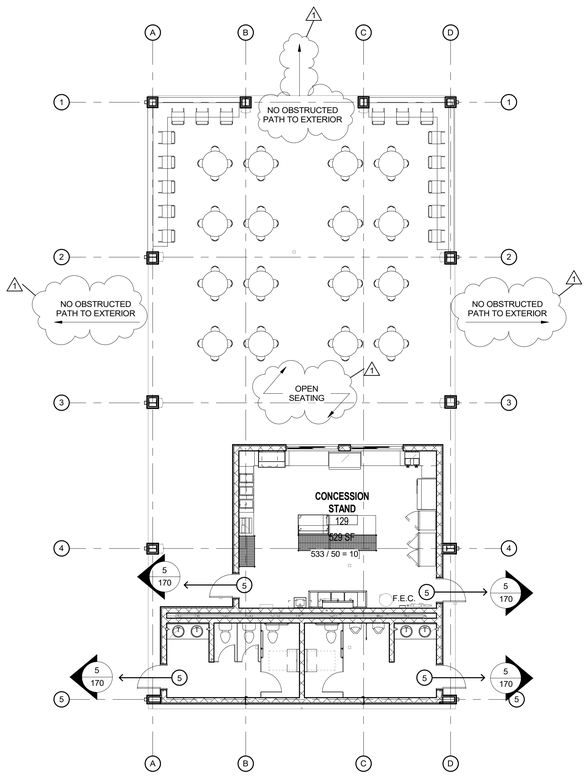
HOUSTON HIGH SCHOOL
BAND ROOM ADDITION & CONCESSION STAND
9755 Wolf River Blvd
Germantown, TN 38139

STEVEN W. LANDERS
REGISTERED ARCHITECT
ARCHITECT
10/11/19
STATE OF TENNESSEE

10/30/2019 9:25:43 AM



1 BAND ROOM LIFE SAFETY PLAN
1/8" = 1'-0"



2 CONCESSION STAND LIFE SAFETY PLAN
1/8" = 1'-0"

LIFE SAFETY GENERAL NOTES

1. ALL RATED PARTITIONS SHALL EXTEND TIGHT FROM FLOOR TO DECK, UNDERSIDE OF RATED CONSTRUCTION OR TO HORIZONTAL RATED CEILING, AND COMPLETELY AROUND AND OVER WINDOWS AND DOOR OPENING, IF REQUIRED.
2. ALL RATED PARTITIONS SHALL HAVE THE APPROPRIATE RATING STENCIL, PAINTED WITH 3" LETTERS IN THE CONCEALED SPACE ABOVE THE CEILING. MAXIMUM SPACING SHALL BE 8'-0" ON BOTH SIDES OF PARTITION, IF REQUIRED.
3. ALL PENETRATIONS THROUGH RATED PARTITIONS SHALL BE INSTALLED IN A MANNER THAT WILL NOT REDUCE THE RATING OF THE PARTITION. SEE MECHANICAL PLANS FOR THE FIRE DAMPER AND PIPE PENETRATION DETAILS, IF REQUIRED.
4. FIRE EXTINGUISHER CABINETS SHALL BE OF APPROPRIATE CONSTRUCTION TO MAINTAIN THE SURROUNDING WALL RATING. COORDINATE LOCATION W/ MECHANICAL, ELECTRICAL, AND OTHER TRADES.
5. ANNULAR SPACES AROUND PENETRATIONS THROUGH FLOOR ASSEMBLIES MUST BE SEALED TO RESIST THE FREE PASSAGE OF FIRE AND SMOKE.

LIFE SAFETY SYMBOLS LEGEND

- SMOKE TIGHT PARTITION
- CLASSROOM: 20 SF/OCCUPANT / AREA: 150 SF / OCCUPANT LOAD: 15 — ROOM TYPE AND SQUARE FOOT / OCCUPANT; ROOM AREA; OCCUPANT LOAD OF ROOM
- **MEANS OF EGRESS SYMBOL** (50 / 160) — TOTAL OCCUPANTS EXITING; EXIT CAPACITY PER DOOR
- 3 — OCCUPANT LOAD AND DIRECTION OF TRAVEL
- TRAVEL DISTANCE PATH
- EXIT SIGN (LIGHTED FACE SHADED)
- FEC — FIRE EXTINGUISHER CABINET
- FE — FIRE EXTINGUISHER, WALL MOUNTED

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HOUSTON HIGH SCHOOL
BAND ROOM ADDITION & CONCESSION STAND
9755 Wolf River Blvd
Germantown, TN 38139

STEVEN W. LANDWEHR — REGISTERED ARCHITECT — AGREEMENT NO. 102570 — STATE OF TENNESSEE

LIFE SAFETY PLANS

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1

PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
October 11, 2019

SHEET NUMBER
LS1.1

10/29/2019 6:01:48 PM

GERMANTOWN STANDARD NOTES

GENERAL NOTES

1. Verify the exact location of all property lines and limits of construction. Grading, clearing, and the erection and/or removal of fences or other structures along property lines shall be fully coordinated with adjacent property owners.
2. Notify the City of Germantown Engineering Department (Ph. 901-757-7281), 24 hours prior to the start of any construction activities.
3. Contractor shall maintain access to all properties at all times.
4. When a change from approved design is determined to be needed by the contractor, the project design engineer should be notified by the contractor as soon as possible to evaluate the requested change or problem with the plans. The project design engineer should then submit a proposal to the City for review and approval of the design change. After the contractor receives revised drawings signed by the City Engineer, work may proceed with the approved changes and the as-built drawings shall reflect the design changes.
5. Locations of existing underground utilities are approximate. The contractor shall be responsible for contacting the appropriate utility company to determine the exact location of all utilities and underground structures prior to the initiation of any construction. Contractor shall also assume full responsibility for damage to any utilities encountered within construction limits. For site location of existing utilities involving MLG&W, phone (communications), and/or Texas Gas Company, please call 1-800-351-1111. For underground signal cables and detectors, call 528-2844 72 hours prior to construction. For water and sewer call Germantown Public Services at 757-7350.
6. Stake all sewer line work on 50'stations (see sewer notes).
7. Stake all curb and gutter work on 25'stations.
8. All disturbed grades or any areas in cut or fill where existing vegetation has been removed shall be seeded, mulched, fertilized, and/or sodded as required to prevent erosion or mud/silt runoff. Erosion control must be in place and functional prior to any construction activities.
9. All construction methods, materials and procedures shall be per City of Germantown Standards unless otherwise approved by the City.
10. Contractor shall verify existing conditions as shown on the plans and any significant discrepancies in existing conditions should be immediately reported to the project design engineer and the City Inspector.
11. No new trees, shrubs, permanent structures or other utilities (except for crossings), shall be allowed within a water, sewer or drain easement.
12. It is the Contractor's responsibility to insure that all required permits, approvals and required bonds and fees are obtained prior to the start of construction.
13. Saw-cut all existing, disturbed asphalt edges and coat sawed edges with "tack" during asphalt-patch street-cut work.
14. Saw-cut all existing, disturbed concrete structures and asphalt pavement for tie-ins or modifications.
15. All existing asphalt pavement, utilities, utility structures, fences, walls, concrete curbs, sidewalks or other City property or utilities damaged as a result of construction activity shall be repaired/replaced by the contractor at no cost to the City.
16. The Contractor shall be responsible for all construction related surveying, horizontal and vertical staking, layout work, soil testing, soil cement testing and concrete testing.
17. It is the Contractor's responsibility to make sure that all new public utilities (water, sewer, and drain) are installed within dedicated public or private utility easements.
18. Use trench boxes where necessary for safety. Comply with all applicable O.S.H.A. safety regulations.
19. Maximum finish grade slopes shall be 1 foot vertical for 3 feet horizontal unless noted otherwise.
20. The contractor is required to keep all public streets clear and free of dirt, mud and construction debris.
21. Construction activity is allowed only between the hours of 7:00 AM to 6:00 PM Monday through Saturday. No work is allowed on Sunday or holidays.
22. Unless specifically stated otherwise, all notes on this sheet apply to both public and private improvements shown on the plans or described in notes or specifications.
23. Contractor shall be responsible for maintaining adequate dust control as determined by the project engineer or the City. The Contractor shall respond as soon possible to complaints from residents or motorists concerning dust problems.
24. Note that the City Fire Prevention and Protection Code requires approved fire hydrant availability and at least a base asphalt driving surface around a building before combustible materials can be installed on a building unless specifically otherwise approved by the Fire Marshall.
25. NOTE: These notes and specifications are not the complete City of Germantown construction standards and specifications. These are SELECTED notes and specifications chosen to represent the ones most likely to be needed and used by the contractor for this type of project. Consult with the City Inspector for any other notes or specifications that may be applicable for this project, and that may not be included in these documents.
26. All exposed concrete shall be cured and cold weather-protected per City of Memphis specifications. The method of curing chosen by the contractor and the method of cold weather protection for concrete must be pre-approved by the City of Germantown.

GRADING & DRAINAGE NOTES:

1. Minimum compaction requirements for fill in all areas shall be achieved by placing the fill in 6" thick loose lifts and compacting to minimum of 95 percent of standard proctor density with moisture content of cohesive fill material maintained within two percent of optimum as defined by the standard proctor test. Compaction requirements for lawn areas (outside of paved or buildable areas) shall be 85% of standard proctor.
2. GEOTECHNICAL TESTING AND FREQUENCY: Test fill materials to verify suitability for use, gradation of material, moisture-density relation by ASTM D698 standard proctor method, Waterberg limits, bearing value, and percent of organic materials. Test frequency will be at least 1 (one) test for each 2500 s. f. of filled area. Each lift will be tested to verify compaction meets requirements. Reports of testing results will be sent to the City with copies of all proctors. Test every building pad to assure minimum compaction requirements.
3. All the proposed concrete drainage pipes shown shall be reinforced concrete minimum Class- III
4. TRENCH BACKFILL: All trenches excavated for the installation of drainage in proposed paved areas shall be compacted as follows:

A. Backfill under, around and over pipe: Immediately after laying pipe, backfill the trench with approved fill to an elevation of 12" above the top of pipe, making certain that the fill is compacted around the haunches of the pipe. Grade at 12"above pipe to be compacted to 70% relative density (ASTM D4254). From 12"above top of pipe to finished grade or pavement sub grade, backfill with a clean suitable fill material in loose lifts of not more than 8" in thickness.

B. Backfill to be compacted to 95% of material's maximum dry density as determined by the standard proctor compaction test (ASTM D698). The material's moisture content will be maintained to within 2% of its optimum moisture.

NOTE: Water settling, puddling, and/or jetting of backfill materials as a compaction. These methods **are not acceptable**.

5. TRENCH BACKFILL TESTING: In-place density tests should be performed at fill grade (12" above top of pipe) and at every 8" lift of fill to finish grade for every 50 ineal feet of pipe.
6. SITE PREPARATION: All topsoil, vegetation, roots, and any soft, unsuitable soils shall be stripped from the ground surface and either hauled off or stockpiled as directed by the Engineer for later use.
7. Prior to placement of base material in a roadway, the area to be paved shall be proof-rolled. Any sub grade failing the proof-roll shall be tested, and if test results fall below the specified level, the sub grade in that area shall be re-worked to achieve the density specified. All such rework shall be at the expense of the contractor or developer.
8. When field test indicate that installed compacted material does not meet requirements, the contractor will provide additional compaction until specified density is achieved, or remove and replace defective material as directed by soils engineer at no cost to the City.
9. When construction installation is complete, provide as-built information to City.
10. Joints for radial, elliptical and arched reinforced concrete pipe shall be poured Portland Cement Mortar joints using continuous diapers attached to the pipe with steel wires or bands of adequate strength to hold the loaded diaper without stretching or slipping.
11. Joints for straight reinforced concrete pipe shall be rubber wedge-shaped, sliding seal, pre-lubricated (ASTM C443), or flexible plastic rope (AASHTO M 198-Type B),or flexible butyl rope (AASHTO M 198-Type B), or Portland Cement Mortar.
12. Pipe bedding shall conform to the requirements given herein for Class A, B, or C bedding, whichever is shown on the plans. If the class of bedding is not shown, a minimum of Class C bedding shall be provided.
13. CLASS A BEDDING: (Concrete Cradle) Consist of a continuous concrete cradle up to spring line constructed in conformity with the details shown on the plans or as directed by the Engineer.
14. CLASS B: (Crushed Limestone) Consist of bedding the drain pipe on a six inch thickness of crushed limestone and sufficient additional crushed limestone which is accurately placed by a spillpike to fit the lower part of the pipe exterior for at least 10 percent of its overall height. After pipe installation, crushed limestone shall then be rammed under the haunches and tamped in layers not over 6 inches in loose thickness around the pipe to the spring line. The remaining depth of trench shall then be backfilled and compacted as specified in **TRENCH BACKFILL** notes herein. When bell and spigot pipe is to be placed, recesses shall be dug in the bedding material of sufficient width and depth to accommodate the bell without its resting on the bottom of the recess. The width of the recess shall not exceed the width of the bell by more than 2 inches.
15. CLASS C: (Natural Sub grade) Consist of bedding the drain pipe on a natural earth sub grade shaped by a template to fit the lower part of the pipe exterior for at least 10% of its overall height. After pipe installation, select earth material shall then be rammed and tamped in layers not over 6 inches in loose thickness around the pipe to the spring line. The remaining depth of trench shall then be backfilled and compacted as specified in TRENCH BACKFILL notes herein. When bell and spigot pipe is placed, recesses shall be dug in the sub grade of sufficient width and depth to accommodate the bell without its resting on the bottom of the recess. The width of the recess shall not exceed the width of the bell by more than 2 inches
16. SUBGRADE PREP FOR ROADS: Prior to the installation of soil cement or other roadway base material, the sub grade shall be proof-rolled to determine soft areas not having adequate compaction. All areas failing a proof roll shall be excavated to remove unsuitable materials in the presence of a certified soils engineer or technician who will determine the limits of excavation horizontally and vertically, and the methods and materials of backfilling. The technician will then approve final compaction in all areas that had originally failed a proof roll.
17. Begin laying each pipe run at the lowest point with the bell end upgrade.
18. The maximum allowable joint width measured on the inside surface of concrete pipe shall not be more than ¾ inch for pipe sizes 15 inches through 21 inches in inside diameter; 1 inch for pipe sizes 24 inches through 45 inches in inside diameter; and 1-1/4 inch for pipe sizes 48 inches and larger.
19. Drain manholes shall be 5'-0" in diameter unless noted otherwise and shall have 3:1 benches and smooth, rounded inverts conforming to the shape of the outlet pipe.
20. The placing of concrete and forming of inverts as indicated for brick manholes shall apply in like manner for precast manholes.
21. All brick used for inlets and manholes shall be concrete brick.

EROSION CONTROL NOTES

1. All erosion control structures (BMP's) shall be in place, functional and inspected by the City prior to grading, excavation, topsoil removal, tree removal or pipe-laying operations.
2. All erosion control structures shall be maintained and monitored throughout the entire time of construction operations and until vegetation is established on all bare, disturbed areas.
3. All twice weekly inspection reports must be performed by a certified Level 1 TNEPSC inspector.
4. If NPDES permitted, inspect site at least twice weekly (at least 72 hours apart), and document on official forms. Daily checking is required during periods of prolonged rainfall. The permittee shall maintain records of inspections, maintenance and repairs per TDEC guidelines.
5. Copies of all twice-weekly inspections, a copy of the SWPPP and the Notice of Coverage (NOC)should be maintained on-site. As a reminder the NOC should be posted near the main entrance of the construction site that is accessible to the public. Additional information regarding accessibility of records can be found in Subsection 6.2.1 of the TN Construction General Permit.
6. Keep construction debris, mud/silt from entering ditch channels or leaving the jobsite.
7. Erosion "blankets" or staked sod should be used on slopes to prevent erosion rills from forming.
8. Erosion controls are not limited to what is shown on approved erosion control plans. Additional erosion control structures or measures may be needed as conditions warrant or as directed by the project engineer, City Engineer, Owner/Developer or City Inspector.
9. It is the contractor's responsibility to insure that all required permits have been obtained prior to beginning any construction or other activity on the site and for satisfying the requirements of the State of Tennessee Department of Water Pollution Control as set forth in the Tennessee Erosion Control Handbook.
10. All newly cut or fill areas lacking adequate vegetation shall be fertilized, mulched, seeded, and/or sodded to effectively control soil erosion. Stake sod on slopes 3:1 or greater
11. A temporary gravel construction entrance shall be installed where contractor's vehicles and equipment enters the new development unless otherwise waived by the City. This shall be installed per details on the plans. If there is no detail use 2" to 3" size stone (TDOT standard, AASHTO M-43 size 1 gradation, 3.5 to 1.5 inch stone size), 6" thick on geotextile fabric underlayment a minimum of 20' wide and 50' deep. Do not use CR610 limestone for gravel. Large, angular rock works best for removing mud from tires. Additional stone may have to be added periodically to maintain the proper functioning of the pad. If the stone pad does not adequately remove mud from vehicle wheels, the wheels should be hosed (water), off before the vehicle enters a public street. The washing should be done in an area covered with crushed stone, and the wastewater should drain to a sediment trap or sediment barrier.
12. Reduce run-off velocity of storm water in areas of concentrated flow and capture larger sediment particles by using stone check dams for drainage areas not exceeding one acre and rock check dams for drainage areas not exceeding five acres.
13. Use silt fabric fencing with steel stakes (max.4' apart), with wire mesh backing in areas where large amounts of silt can be expected to accumulate.
14. Use of straw or hay bales is not permitted.
15. All silt/sediment is to be removed from erosion control structures when they reach ½ (50%) capacity.
16. As soon as finish grading is complete, install a continuous silt fence along the backside of all public or private roadway concrete curb and gutters. The silt fence shall be maintained by the developer and/or permit holder until vegetation is established.
17. All erosion control methods, procedures and structure designs shall meet the requirements of all state and local authorities having jurisdiction over storm water runoff.
18. Tree protection fencing, where required, should be in place prior to any construction activity.
19. Wherever possible, install tree protection fencing at the drip line of trees.
20. Contractor and/or developer must receive approval from the City Engineer for any changes in the approved tree protection plan or erosion control plan.
21. Provide the name and phone number of the person or persons responsible for erosion control, tree protection, and/or mud/dirt in the street removal to the City Inspector prior to the start of construction.
22. If applicable, provide the City Inspector with the name and phone number of the designated EPSC Inspector and the NPDES tracking number.
23. If the construction site is NPDES permitted, a copy of the NOC and the location of the SWPPP must be posted at the jobsite in a weatherproof container such as a mailbox or PVC pipe section with capped ends.

WATER NOTES

1. Contact the City of Germantown Engineering Department prior to the start of any work on the water system (Phone no. 757-7281).
2. Contact the City of Germantown Water Department to locate existing water and/or sewer lines prior to construction (Phone no. 757-7350).
3. All methods and materials used shall conform with the standard specifications of the City of Germantown and must meet requirements of the State of Tennessee.
4. New water lines must be disinfected and tested for bacteria contamination per City of Germantown standards. The City will collect the sample, deliver it to the testing laboratory, and pay for the test.
5. After passing the bacteria test, the new water lines (mains, services and fire hydrants) shall be pressure-tested at 200 psi for two hours during which time the leakage shall not exceed that permitted by AWWA Specification C600-77 for mechanical joint and push-on joint pipe. Obtain a copy of AWWA Specification C600-77, and keep it on the job in good condition for use in computing the permissible leakage in each section to be tested.
6. There shall be a minimum 5-foot horizontal separation between water service lines and sewer service lines.
7. The location where a water service line crosses a sewer curb shall be marked on the face of the curb with a stamped or chiseled "W" and a black, 4" tall stenciled-painted "W" on a 6"x 6" painted white background.
8. See City of Germantown standard detail for service line installations.
9. See City of Germantown standard detail for fire hydrant installations.
10. See details for concrete thrust block installations (these must be poured-in-place). Thrust blocks shall be installed at all "Ts", bends (horizontal and vertical) and fire hydrants.
11. All service lines 3" and smaller shall be one-piece, soft copper unless otherwise noted.
12. Developer/Owner or contractor is responsible for all installations on the street side of the meter, unless otherwise noted.
13. Meters (2" and smaller) are paid for by Owner/Developer and installed by the City (unless otherwise noted). Meters and meter boxes/vaults over 2" in size are furnished and installed by the Owner/Developer.
14. Irrigation systems must have their own meters with a backflow preventer.
15. Meter boxes (for 2" and smaller meters) are paid for by Owner/Developer, delivered to job site by the City, and installed flush with the finish grade by the contractor.
16. All water mains 4" and larger to be maintained by the City shall be ductile iron, minimum pressure class 350 minimum, AWWA Specification C111 mechanical or push-on type with plain rubber gaskets.
17. Fittings for ductile iron pipe shall be AWWA Specification C110 cast iron or ductile iron short body pattern, class 250, bituminous coated inside and outside, with ends as required for the types of joints specified above for the various pipe locations and services.
18. Tees for connecting fire hydrants to mains shall be mechanical joint, anchoring type, each with a 6" gate valve outlet and a locked-on rotating mechanical joint gland ring.
19. All joints within bored casing pipes shall be installed with "Field Lok" joint gaskets approved by the City.
20. Note: Gate valves MUST open counter-clockwise and conform to AWWA Specification C509 with manufacturer approved by the City.
21. Valve Boxes shall be standard cast iron two-piece 5-1/3" inside shaft diameter screw-adjustable type, each consisting of a cover marked "WATER", an upper telescoping section and a lower section. Where necessary to provide extra depth, provide cast iron extension pieces as required.
22. Fire hydrants shall be Mueller "Improved," M & H "Traffic type- Style 129, Kennedy, Waterous, Clow or U.S. Pipe conforming to AWWA Specification C502. Substitutions are allowed ONLY will specific approval from the Germantown Water Department.
23. Fire hydrants shall be of the lubricated dry top break-away traffic-type, each complete with: 5 1/4" valve opening; 6" AWWA Specification C111 mechanical joint inlet connection; 3 foot bury (see detail drawing), unless otherwise indicated; two 2-1/2" National standard fire hose thread nozzles; one 4" City of Memphis, TN Standard pumper connection nozzle with 15/16" square cross section 1-1/8" high operating nut and CLOCKWISE direction of opening.
24. Wedge Type Retainer Glands: These shall be "Megalug" as manufactured by EBAA Iron, Inc., Eastland, Texas, or as approved, consisting of a specifically designed ductile iron mechanical joint follower gland with multiple wedging action restraining mechanisms with a minimum working pressure of 250 psi. Gland shall be suitable for use with a standard mechanical joint bell and be head bolts conforming to ANSI/AWWA A21.11. Twist off nuts shall be used to indicate proper torque of the restraining wedges. Glands shall be installed in accordance with manufacturers written instructions and directions. This type of anchorage MAY be used at any location instead of concrete anchorage subject to City approval, and SHALL be used where concrete anchorage is not practicable.
25. Service lines shall have a Mueller H-15000 series corporation stop with straight coupling nut at the tap on the main and a Mueller No. H-15175 series inverted Key curb stop at the meter location with two Mueller H-10890 meter couplings and gaskets. No substitutions from the Mueller brand are allowed without specific approval from the Germantown Water Department.
26. Where trench conditions are unsuitable for pipe support, lay pipe on washed gravel bedding as authorized by the City. The City shall approve gradation of gravel bedding material.
27. Minimum pipe cover on mains and hydrant leads shall be 36".
28. TRENCH BACKFILL: Under areas proposed to be paved, except for sand backfill, compact fill material around the haunches of the pipe, fill the trenches from 6" above pipe tops in 8" maximum thickness loose layers up to paving subgrade. Compact each backfill layer using pneumatic or other approved mechanical tampers until the backfill is compacted to 95% of the materials maximum dry density as determined by the standard proctor compaction test (ASTM D698). The material's moisture content will be maintained to within 2% of its optimum moisture. At the end of each day's work, do not leave more than 200 feet of trench without compacted backfill, unless otherwise approved by the City of Germantown. PUDDLING, JETTING OR WATER SETTLING WILL NOT BE PERMITTED.
29. After completion of all water line work and before the work will be accepted, make a final check of each valve installed and hydrant installed or relocated, and of each existing valve that has been operated in connection with the work under this project. Make this final valve check in the presence of the City inspector. Demonstrate that each valve is in fully open position and that each Fire Hydrant operates properly.
30. All valve boxes (in pavement or off pavement), shall have concrete collars installed as shown on the fire hydrant detail.

SEWER NOTES

1. Before beginning construction, notify the City of Germantown engineering department at 757-7281.
2. All methods, materials, installations and specifications shall meet or exceed City of Germantown standards. Sewer mains shall be SDR 26 or Truss pipe materials.
3. Do not lay any sewer lines until the City Inspector is given Cut Sheets for all sewer lines.
4. Provide stakes for sewer line installations every 50' on center.
5. "As-built" information must be submitted on the original reproducible drawing that was approved by the City Engineer and shall include depths at ends of service lines. See sample as-built drawing in "Redbook".
6. Horizontal "as-built" information must submitted to the City and must include "Pluses" for manholes and services.
7. The location where services cross street curbs shall be marked by stamping a 4" tall letter "S" in the concrete during pouring and stencil-painting a 4" tall, black "S" on a 6" X 6" white background on the face of the curb.
8. The sewer service line and any water service line shall have a 5' horizontal separation.
9. Install all services per City typical service connection detail.
10. Install all pipe bedding and trench backfilling per City typical pipe bedding detail (PVC and Truss). Water settling, puddling and/or jetting of backfill materials as a compaction method are not acceptable.
11. The Developer or Contractor shall furnish a certified testing technician to conduct all required trench backfill testing per City standards or as required in these "SEWER NOTES".
12. TESTING: In-place trench backfill compaction density test shall be performed at fill grade (12" above top of pipe) and at every six (6) inch lift of fill to finished grade for every 50 lineal feet of pipe.
13. TRENCH BACKFILL: Immediately after laying pipe, backfill the trench with sand to a minimum elevation of 12" above top of pipe, making certain that the fill is compacted around the haunches of the pipe. Grade at 12" above the pipe to be compacted to 70% relative density (ASTM D4254). From 12" above top of pipe to finished grade or pavement subgrade, backfill with a clean, suitable fill material in loose lifts of not more than 6" in thickness. Backfill to be compacted to 95% of material's maximum dry density as determined by the standard proctor compaction test (ASTM D698). The material's moisture content will be maintained to within 2% of its optimum moisture.
14. Service lines shall extend at least past the Right-of-way line and/or sidewalk (see service standard detail), unless otherwise noted.
15. Conduct all PVC and Truss pipe sewer system tests per City standards including, but not limited to, manhole vacuum test, low pressure air test on mains and services and 5% deflection test using a 9-sided mandrel.
16. Pre-cast structures must be pre-approved by the City Engineer.
17. All manhole top elevations (off street), in open areas shall be 1.5' above finish grade.
18. All manhole top elevations shall be 1.0' above the 100-year flood elevation.
19. All manhole top elevations in residential yards shall be 0.5" above finish grade.
20. Contractor must maintain uninterrupted sewer service on all existing, active sewer systems. Where necessary, provide ample temporary wastewater pumping and/or bypassing pre-approved by the City Engineer.
21. All sewer mains and services having less than 1.5' of vertical clearance with water and drain pipes shall be ductile-iron pipe Class 50 or concrete encased extending 10' on each side of crossing. All ductile-iron pipe shall be polyethylene-lined or shall be treated with Protecto 401 or an approved equivalent.
22. All manholes in reverse-crown streets, alleys or drives (Public or Private) shall be provided with waterproof gaskets and plugs for vent holes in manhole tops to prevent drainage inflow into sewer system.
23. All manholes shall be 4 feet in diameter unless otherwise noted.
24. Brick manholes up to 12 feet deep shall have 9" thick walls, 12 feet to 20 feet deep shall have 13" thick walls and over 20 feet deep shall have 17" thick walls.
25. Precast manholes over 20' deep shall have a steel reinforced concrete footing per City standard detail.
26. No other utilities, services, trees, shrubs or permanent structures shall be located within Public Utility Easements.
27. The City, prior to construction, shall approve methods and materials used to install a new service on an existing sewer main.
28. All sewer manhole benches, whether pre-cast or brick, must have 3:1 slopes on benches at manhole bottoms.
29. All sewer manhole bottom inverts must be shaped to a "half pipe" rounded form without flat bottoms and should be no wider than the outflow pipe diameter.
30. Manhole bottom inverts must be shaped (in plan view) with "sweeping" "T" intersections, not 90 degree-shaped intersections. Other invert angles should be shaped to achieve flows of least resistance using curves rather than straight angles (plan view)
31. Manhole inverts and benches must have a smooth surface. Achieve a smooth surface by using a wide brush to smooth all surfaces while cement mortar is still "wet" or not set..
32. On manholes deeper than 4 feet install manhole steps at 16" on center maximum vertically and stagger steps 12" on center laterally. Manhole steps to begin 18" above the bench and one additional step shall be placed on the side opposite the ladder 3 ½ feet from the top at all conical top sections (back step).
33. Precast manholes must be coated on the outside with two coats of approved bituminous waterproofing material with a total minimum dry film thickness of 12 mils. Any waterproof coating damaged during installation or backfill operations shall be cleaned of all dirt and two coats of waterproofing reapplied.
34. Brick manholes shall be coated on interior and exterior surfaces (except interior surface of sloping top cone section, with ½" thick plaster mortar.
35. The placing of concrete and the forming of inverts as indicated for brick manholes shall apply in like manner for precast manholes.
36. As part of final inspection requirements, the contractor shall run a video camera through all new sewer mains and shall provide the City with a digital DVD of the video inspection containing manhole numbers and on-screen footage counts between manholes. All defects discovered by the video inspection shall be corrected/repaired by the contractor and the pipe lines repaired shall be re-videoed for repair approvals. Video equipment shall be "IBAK T66 camera tractor" or equal and equipment must be pre-approved by the City.

PROJECT SPECIFIC NOTES

DEMOLITION NOTES

1. THE DEMOLITION PLAN IS INTENDED AS A GUIDE ONLY. THE CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE SITE AND BE PREPARED TO REMOVE ANY EXISTING IMPROVEMENTS THAT CONFLICT WITH THE PROPOSED IMPROVEMENTS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY DEMOLITION AND SHALL DISPOSE OF MATERIAL OFF SITE IN AN APPROPRIATE DUMPING FACILITY. ALL DEMOLITION AND DISPOSAL SHALL BE INCLUDED IN BASE CONTACT PRICE.
3. EXISTING CURB, SIDEWALK AND PAVEMENT SHOWN TO BE REMOVED SHALL BE SAW-CUT AND/OR REMOVED TO THE NEAREST CONSTRUCTION JOINT AT THE OUTER LIMITS OF THE DEMOLITION AREA.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROTECT ALL EXISTING FACILITIES WITHIN THE CONSTRUCTION AND/OR DEMOLITION LIMITS WHICH ARE SHOWN TO REMAIN, AS WELL AS ANY DISCOVERED FACILITIES OR UTILITIES WHICH ARE STILL ACTIVE.

GRADING & DRAINAGE NOTES:

1. SOFT, WEAK, AND/OR UNSUITABLE SOILS SHOULD BE UNDERCUT AT THE DIRECTION OF THE GEOTECHNICAL ENGINEER AND REPLACED WITH APPROVED ENGINEERED FILL OR STABILIZED IN PLACE. ALL UNDERCUT OPERATIONS SHALL BE AS DIRECTED BY THE GEOTECHNICAL ENGINEER. THE GEOTECHNICAL ENGINEER SHALL BE RESPONSIBLE FOR MEASURING UNDERCUT QUANTITIES.
2. MINIMUM COMPACTION REQUIREMENTS FOR FILL, INCLUDING TRENCHES, MAY BE ACHIEVED BY PLACING THE FILL IN 6" THICK, LOOSE LIFTS AND COMPACTING TO A MINIMUM OF 98 PERCENT OF MAXIMUM DRY DENSITY AS DETERMINED BY STANDARD PROCTOR TEST (ASTM D698). THE UPPER ONE FOOT (1') OF AREAS SUPPORTING SLAB-ON-GRADE SHALL BE COMPACTED A MINIMUM OF 100% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY STANDARD PROCTOR TEST (ASTM D698). MOISTURE CONTENT SHALL BE CONTROLLED TO WITHIN A RANGE OF 2% BELOW AND 3% ABOVE OPTIMUM MOISTURE CONTENT AS DETERMINED BY STANDARD PROCTOR TEST AT TIME OF PLACEMENT AND COMPACTION.
3. ALL PROPOSED FILL MATERIAL SHALL BE TESTED TO VERIFY SUITABILITY FOR USE, GRADATION OF MATERIAL, MOISTURE-DENSITY RELATION PER D698 MODIFIED PROCTOR METHOD, ATTERBURG LIMITS, BEARING VALUE, AND PERCENT OF ORGANIC MATERIALS. EACH LIFT WILL BE TESTED TO VERIFY THAT COMPACTION MEETS SPECIFICATIONS. TEST RESULTS SHALL BE SENT TO THE CONTRACTOR, ARCHITECT, CIVIL ENGINEER AND STRUCTURAL ENGINEER.
4. IF FIELD TESTS INDICATE INSTALLED COMPACTED MATERIAL DOES NOT MEET THE SPECIFICATIONS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACHIEVING THE SPECIFIED COMPACTION AND/OR REMOVE THE DEFECTIVE MATERIAL AND REPLACE IN ACCORDANCE WITH SPECIFICATIONS AS DIRECTED BY THE GEOTECHNICAL ENGINEER AT NO ADDITIONAL COST TO THE OWNER.
5. IF ANY ACTIVE DRAINAGE LINES ARE UNCOVERED THAT ARE NOT SHOWN ON THE CONSTRUCTION PLANS, THE CIVIL ENGINEER IS TO BE NOTIFIED IMMEDIATELY AND ANY CONSTRUCTION AFFECTED BY SUCH, INCLUDING INSTALLATION OF PROPOSED DRAINAGE OR DEMOLITION OF EXISTING DRAINAGE WHICH COULD BE NECESSARY TO ADDRESS THE PROBLEM, MUST CEASE UNTIL WRITTEN DIRECTION IS GIVEN BY THE OWNER.
6. ALL DRAINAGE PIPE DESIGNATED RCP SHALL BE CLASS III REINFORCED CONCRETE PIPE. ALL DRAINAGE PIPE DESIGNATED HDPE OR PVC SHALL BE SDR 26 PVC PIPE, A-2000 PVC DRAIN PIPE, ADS N-12 WT DRAINAGE PIPE OR AN EQUAL APPROVED BY THE PROJECT ENGINEER. ALL PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ALL MANUFACTURER GUIDELINES AND REQUIREMENTS, INCLUDING PREFERRED BEDDING MATERIALS AND INSTALLATION PROCEDURES, NOT LIMITED TO BUT INCLUDING SPECIFIED COMPACTION AND INSTALLATION METHODS.

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HOUSTON HIGH SCHOOL
MUSTANG FIELDHOUSE
GERMANTOWN, TENNESSEE

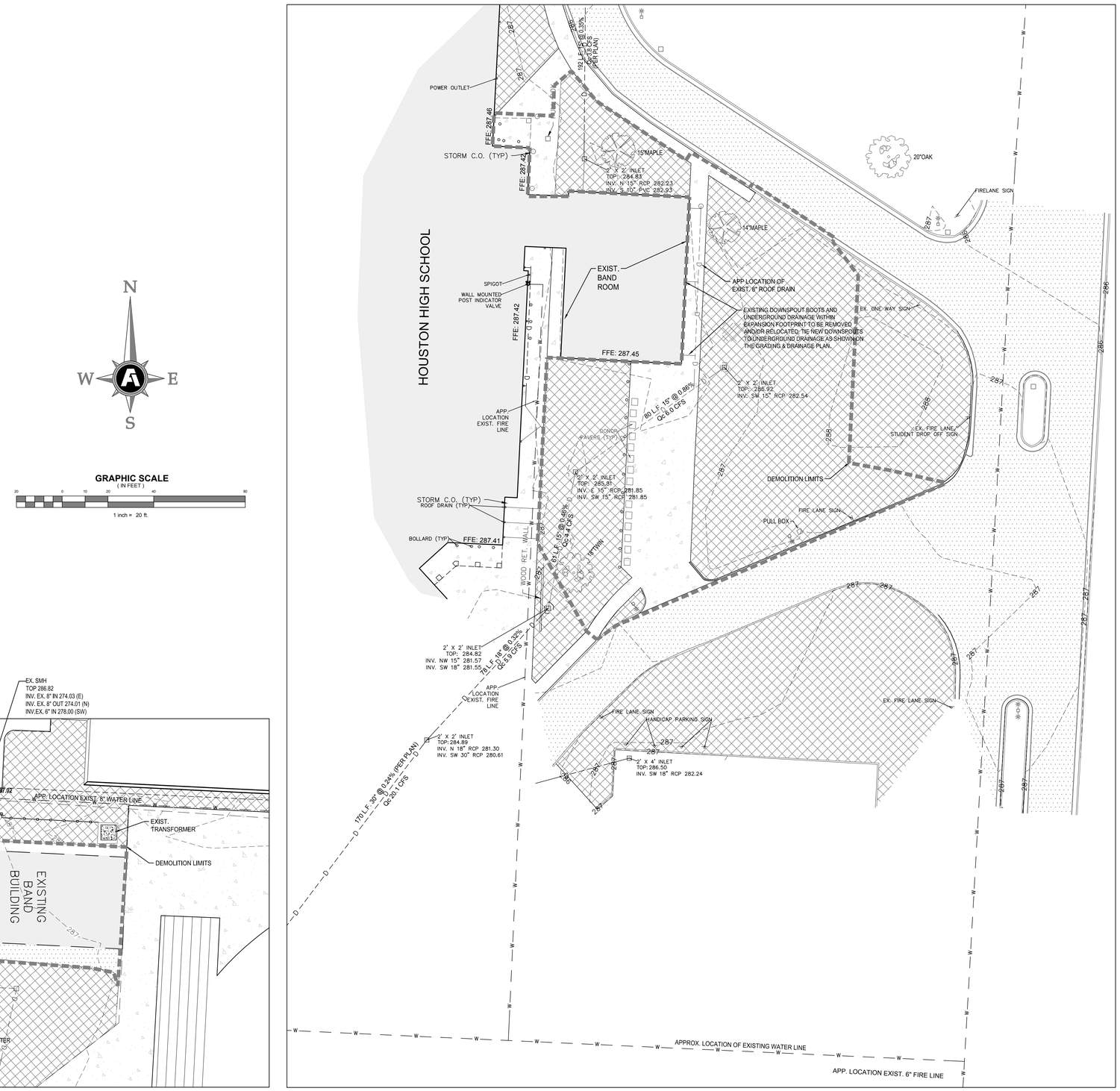
Rev.	Date	Revision Description
1	10-30-2019	ADDENDUM NO.2

MICHAEL D. ROGERS — REGISTERED ENGINEER — AGRICULTURE — STATE OF TENNESSEE

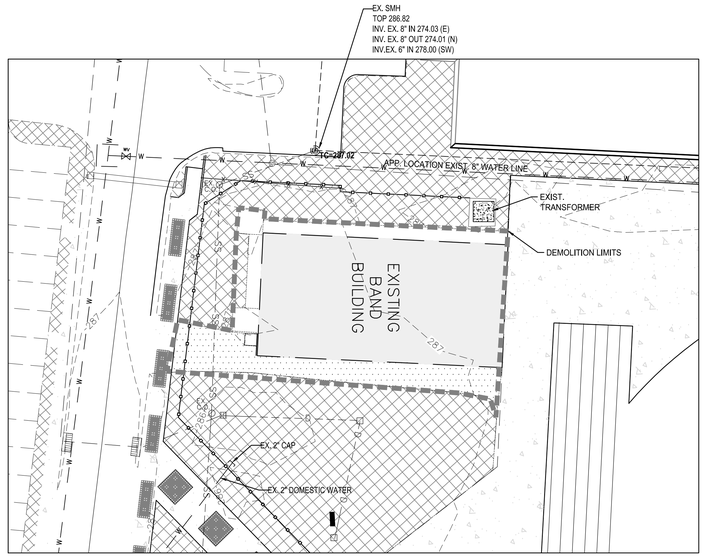
Issue Date:	2019-10-30
F&A Project No:	FLEMARCH.0015.LD
Drafted By:	DAN
Checked By:	MDR

Sheet Title:
GENERAL CONSTRUCTION NOTES

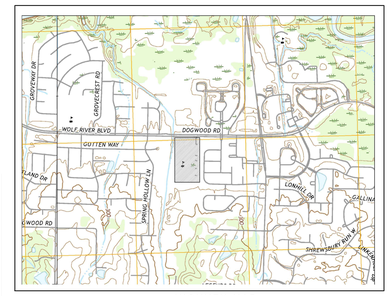
Sheet No.
C-0001



BAND ROOM EXPANSION



CONCESSION STAND AND RESTROOMS



VICINITY MAP
NOT TO SCALE

LEGEND

- EXIST. BUILDING
- EXIST GREEN SPACE
- EXIST. CONCRETE WALKWAYS
- EXIST. CONCRETE PAVEMENT
- EXIST. ASPHALT PAVEMENT

GRAPHIC SCALE
(IN FEET)
20 0 10 20 40 80
1 inch = 20 ft.

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HOUSTON HIGH SCHOOL BAND ROOM EXPANSION

GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10/30/2019	ADDENDUM NO. 2

MICHAEL D. ROOKS
REGISTERED ENGINEER
STATE OF TENNESSEE

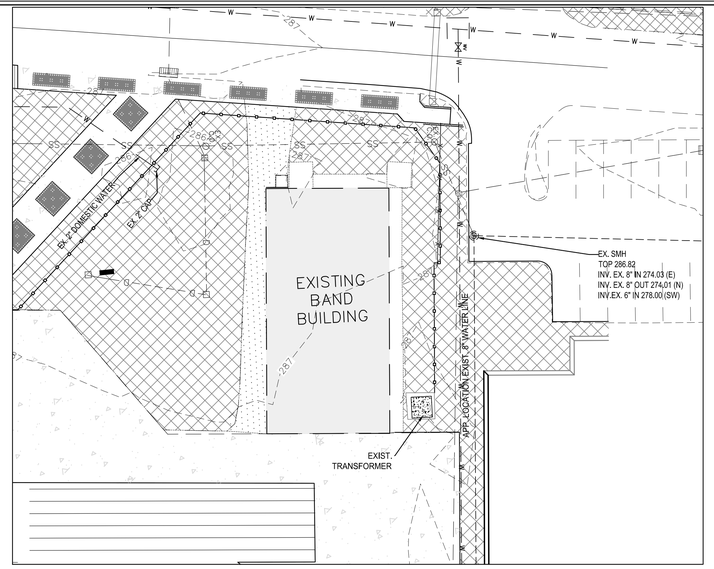
Issue Date:	2019-10-30
F&A Project No:	FLEMARCH0015LD
Drafted By:	MRS
Checked By:	MDR

Sheet Title:

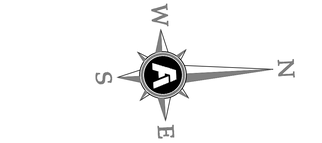
EXISTING CONDITIONS & DEMOLITION PLAN

Sheet No.
C-0002

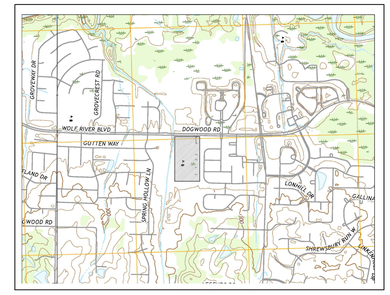
Copyright 2019 Fisher & Arnold, Inc., all rights reserved
File name: Z:\FLEMARCH0015LD\Submittals\Addendum 2\FLEMARCH0015LD-Addendum2-Sheet5-sv1.dwg
Layout Name: C-0002 Existing Conditions & Demolition Plan
Plotted: Tuesday, October 29, 2019 - 4:40 pm



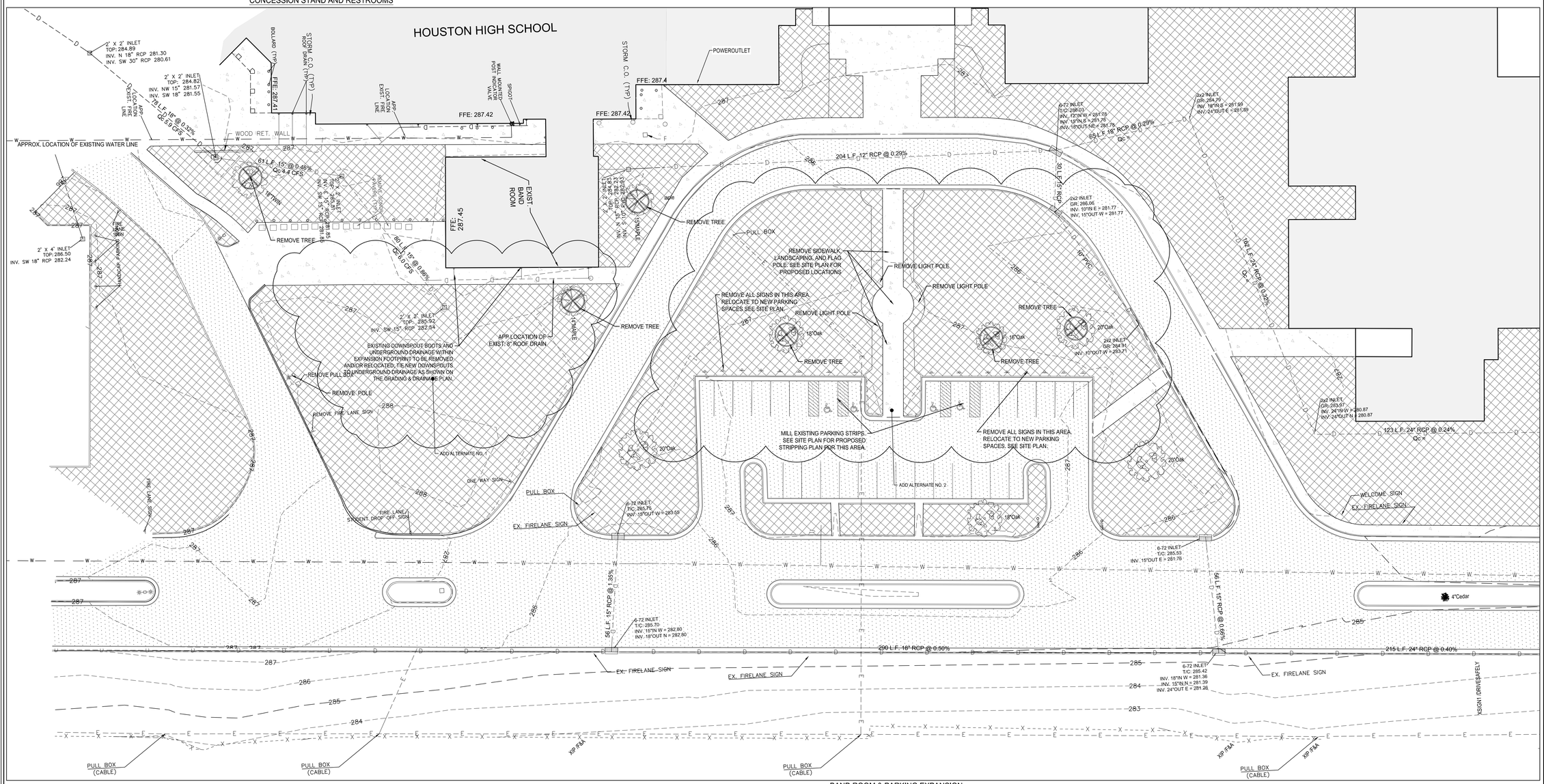
CONCESSION STAND AND RESTROOMS



GRAPHIC SCALE
(IN FEET)
20 0 10 20 40 80
1 inch = 20 ft.



VICINITY MAP
NOT TO SCALE



BAND ROOM & PARKING EXPANSION

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HOUSTON HIGH SCHOOL BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description

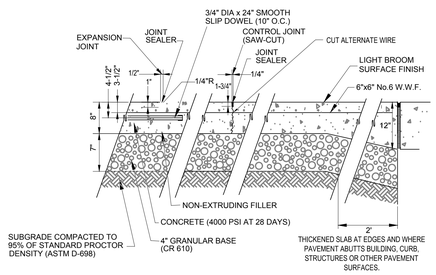
MICHAEL D. ROGERS
REGISTERED ENGINEER
STATE OF TENNESSEE

Issue Date:	2019-10-29
F&A Project No:	FLEMARCH0015.LD
Drafted By:	MRS
Checked By:	MDR

Sheet Title:
EXISTING CONDITIONS & DEMOLITION PLAN (ADD ALTERNATES)

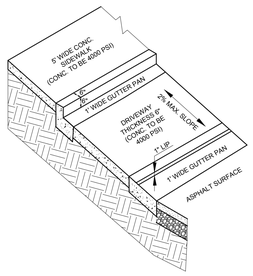
Sheet No.
C-0002.1

Copyright 2019 Fisher & Arnold, Inc., all rights reserved
File Name: P:\2019\FLEMARCH0015\Drawings\C-0002.1 Existing Conditions.dwg
Layout Name: C-0002.1 Existing Conditions & Demolition Plan (Add Alternates)
Plotted: Tuesday, October 29, 2019 - 5:05 pm



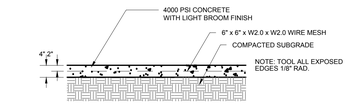
CONCRETE PAVEMENT SECTION

N.T.S.

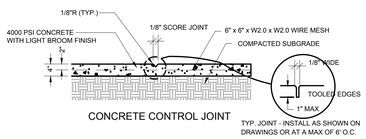


TRUCK PARKING SECTION

NTS

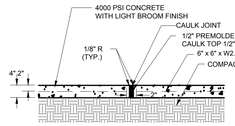


4" CONCRETE SIDEWALK



CONCRETE CONTROL JOINT

TYP. JOINT - INSTALL AS SHOWN ON DRAWINGS OR AT A MAX OF 6' O.C.



4" CONCRETE EXPANSION JOINT

NOTES:

1) INSTALL CONTROL AND EXPANSION JOINTS AS INDICATED ON DRAWINGS OR IN ALL LOCATIONS WHERE CONCRETE FLATWORK ABUTS FOUNDATION WALLS, CURBS, WALLS, INLET BOXES, STRUCTURAL FOOTINGS, OR OTHER FIXED OBJECTS.

2) EXPANSION JOINTS TO BE PLACED AT MAX. 50' SPACING O. C. OR WHERE CONCRETE POURS ARE SUSPENDED. AVOID PLACING EXPANSION JOINTS WHERE SINGLE JOINTS BEND OR CHANGE DIRECTION, AND LOCATIONS WHERE THREE OR MORE JOINTS INTERSECT. INSTALL CONTROL JOINTS IN THESE SITUATIONS.

3) PROVIDE A 4" SMOOTH TROWELLED EDGE ON ALL CONCRETE EDGES INCLUDING EXPANSION AND CONTROL JOINTS.

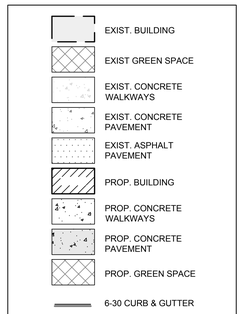
CONCRETE WALK DETAILS

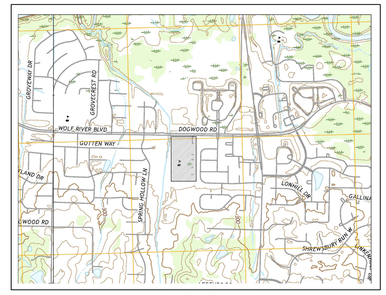
SCALE: NTS

GRAPHIC SCALE
(IN FEET)

20 0 10 20 40 80

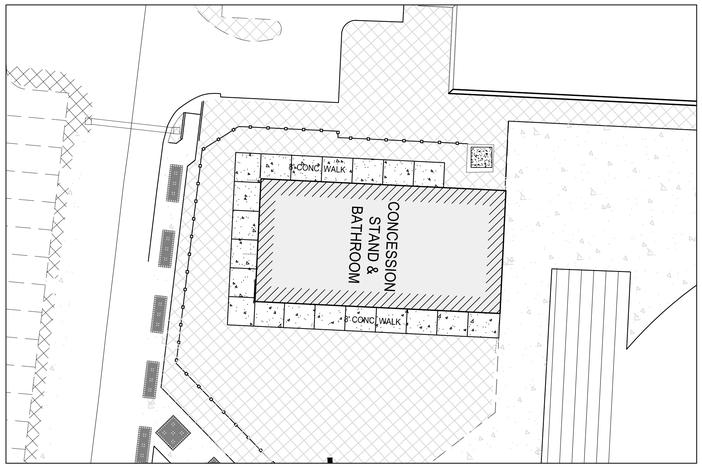
1 inch = 20 ft.



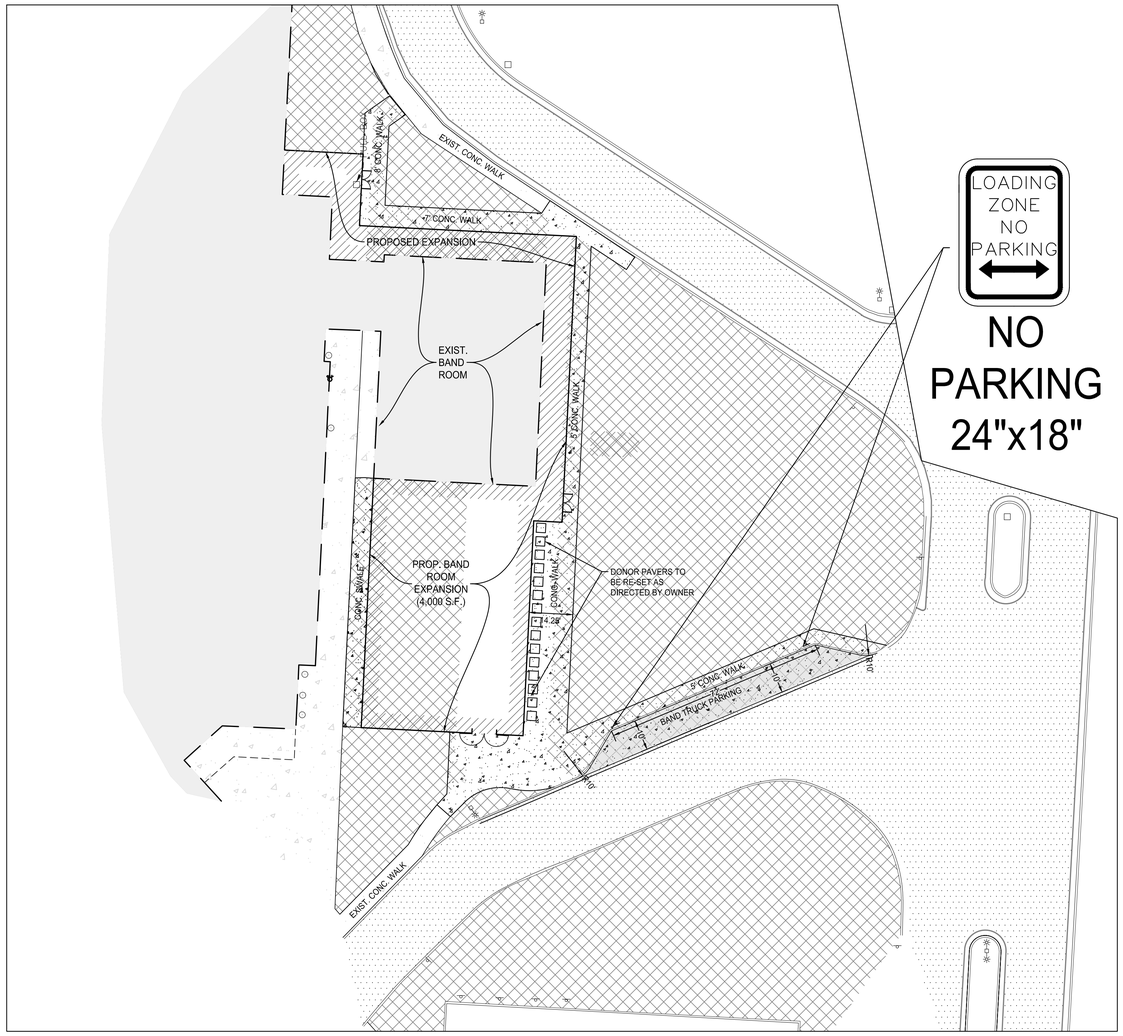


VICINITY MAP

NOT TO SCALE



CONCESSION STAND AND RESTROOMS



BAND ROOM EXPANSION

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HOUSTON HIGH SCHOOL
BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10/30/2019	ADDENDUM NO. 2

MICHAEL D. ROGERS — REGISTERED ENGINEER — STATE OF TENNESSEE

Issue Date:	2019-10-30
F&A Project No:	FLEMARCH.0015.LD
Drafted By:	MRS
Checked By:	MDR

Sheet Title: SITE PLAN

Sheet No. C-0003

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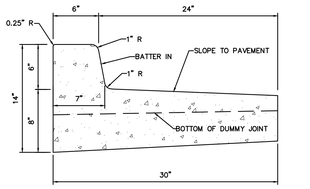
File name: Z:\FLEMARCH\0015\Subdivision\plans\Item15-sp1.dwg
Layout Name: C-0003 Site Plan
Plotted: Tuesday, October 29, 2019 - 4:56 pm

NOTES

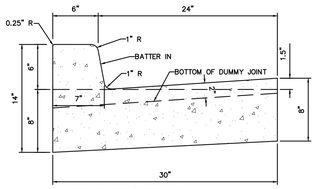
STANDARD 6-30 CURB & GUTTER WILL BE CONSTRUCTED EXCEPT IN THOSE LOCATIONS SPECIFIED AS MODIFIED 6-30 CURB & GUTTER. TRANSITION FROM ONE TO THE OTHER A MINIMUM OF FIVE (5) LINEAR FEET.



NOTE: CONCRETE TO BE CLASS 'A' (6 bag min.)

NOTES:
1. Pre-cut exp. joint's material shall be used in all exp. joints.
2. Dummy joints shall be installed at 10ft. intervals,maximum.
3. Exp. joints shall be installed at 40ft. maximum.
4. Exp. joints shall be installed at ends of radius.
5. Exp. joints shall be located a minimum of 5ft. from inlet structures.

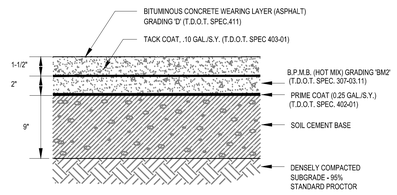
STANDARD 6-30 CURB AND GUTTER DETAIL
N.T.S.



NOTE: CONCRETE TO BE CLASS 'A' (6 bag min.)

NOTES:
1. Pre-cut exp. joint's material shall be used in all exp. joints.
2. Dummy joints shall be installed at 10ft. intervals,maximum.
3. Exp. joints shall be installed at 40ft. maximum.
4. Exp. joints shall be installed at ends of radius.
5. Exp. joints shall be located a minimum of 5ft. from inlet structures.

MODIFIED 6-30 CURB AND GUTTER DETAIL
N.T.S.

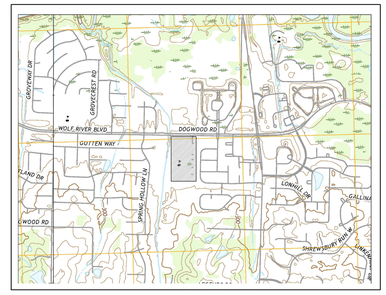


ASPHALT PAVEMENT SECTION
N.T.S.

GRAPHIC SCALE
(IN FEET)
20 0 10 20 40 80
1 inch = 20 ft.

LEGEND

- EXIST. BUILDING
- EXIST GREEN SPACE
- EXIST. CONCRETE WALKWAYS
- EXIST. CONCRETE PAVEMENT
- EXIST. ASPHALT PAVEMENT
- PROP. BUILDING
- PROP. CONCRETE WALKWAYS
- PROP. CONCRETE PAVEMENT
- PROP. GREEN SPACE
- 6-30 CURB & GUTTER
- 6-30 CURB & GUTTER (MODIFIED)



VICINITY MAP
NOT TO SCALE

⚠1 ADD ALTERNATE 1 – BAND ROOM PARKING LOT
ADD ALTERNATE 2 – MAIN ENTRANCE PARKING EXPANSION

BAND ROOM & PARKING LOT EXPANSION

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HOUSTON HIGH SCHOOL BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10/30/2019	ADDENDUM NO. 2

MICHAEL D. ROGERS — REGISTERED LANDSCAPE ARCHITECT — STATE OF TENNESSEE

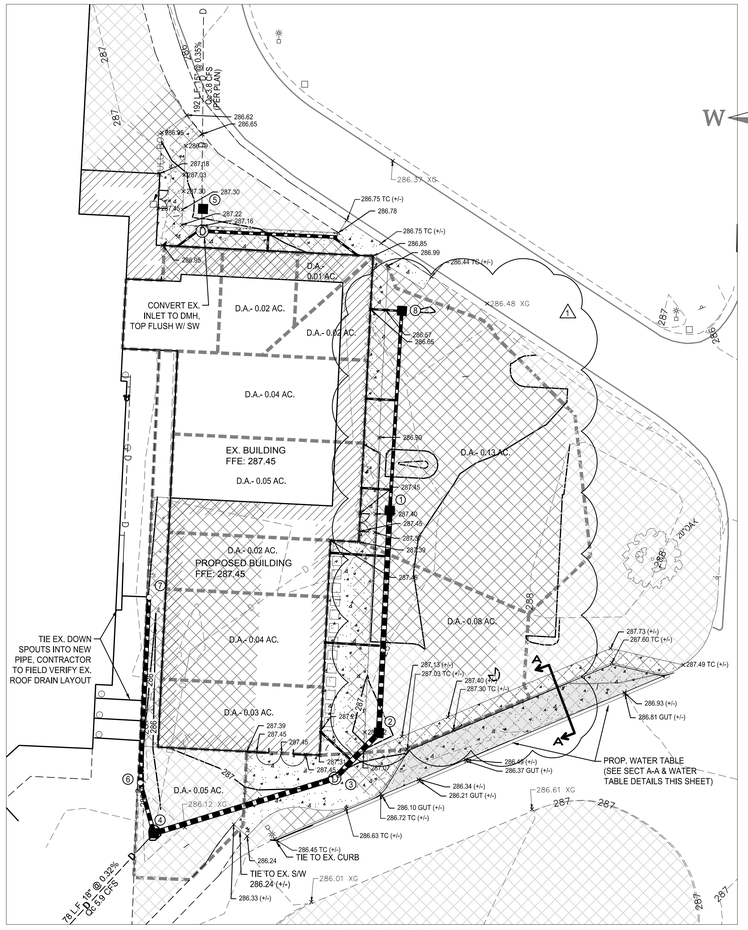
Issue Date:	2019-10-29
F&A Project No:	FLEMARCH.0015.LD
Drafted By:	MRS
Checked By:	MDR

Sheet Title:

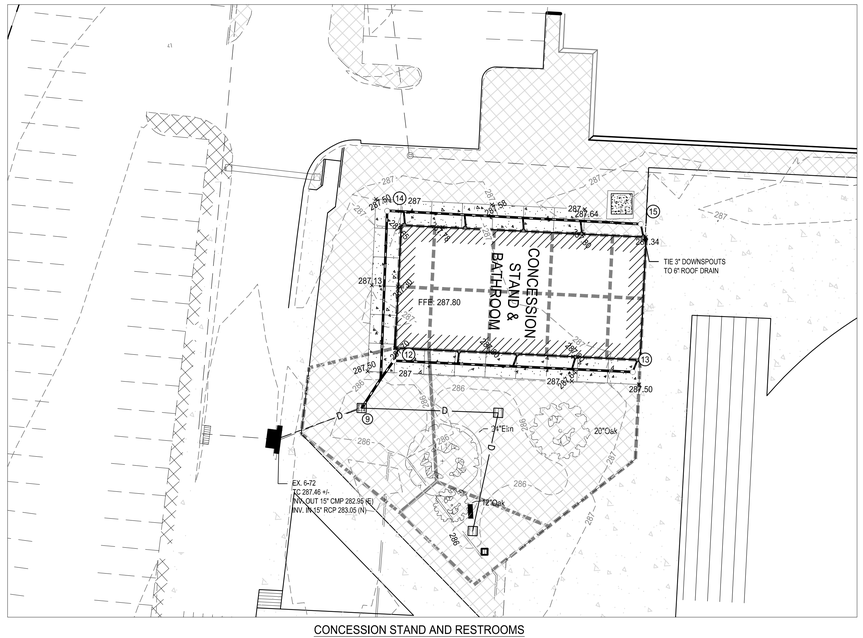
SITE PLAN (ADD ALTERNATES)

Sheet No.
C-0003.1

Copyright 2019 Fisher & Arnold, Inc., all rights reserved
File Name: 2019 FLEMARCH.0015.LD Germantown HS Rem15-sp2.dwg
Layout Name: C-0003.1 Site Plan (Add Alternates)
Plotted: Tuesday, October 29, 2019 - 5:01 pm



BAND ROOM EXPANSION

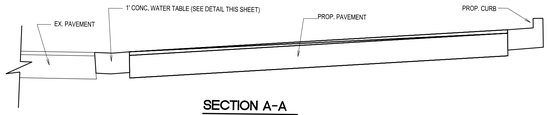

CONCESSION STAND & BATHROOM
FFE 287.80
287.64
287.34
TIE 3" DOWNSPOUTS TO 8" ROOF DRAIN
287.13
287.50
287.50
287.50

STORM STRUCTURE TABLE					
	NO.	TYPE	TOP/THR./INV.	D.A. (Ac.)	QD(cfs)
*	1	#10 INLET	GR. 286.07	0.06	0.4
	2	#3070 INLET	THR. 286.40	0.04	0.2
	3	DMH (4'DIA.)	TOP 286.92	--	--
	4	#3070 INLET	THR. 284.82	0.05	0.3
	5	#3070 INLET	THR. 286.90	0.01	0.1
	6	C.O.	TOP 286.88	--	--
	7	C.O.	TOP 287.20	--	--
*	8	#3070 INLET	THR. 286.07	0.11	0.7
**	16	#10 INLET	GR. 285.83	0.16	1.0
**	17	#10INLET	GR. 285.80	0.21	1.3
**	18	EX. 6-72 INLET	EX. T/C 286.06	0.08	0.5

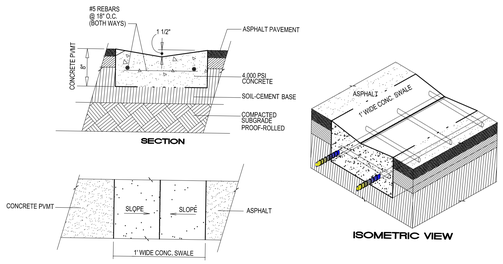
* REVISED FOR ADD ALTERNATE NO. 1
** REVISED FOR ADD ALTERNATE NO. 2

STORM PIPE TABLE													
FROM	FL	AS-BLT FL	TO	FL	AS-BLT FL	SIZE (IN.)	MATERIAL	LENGTH	SLOPE (%)	ACRES	QD	QC(cfs)	VEL.(fps)
1	282.61		2	282.42		12	HDPE	31	0.61%	0.34	2.0	2.8	3.6
2	282.42		3	282.29		12	HDPE	21	0.62%	0.41	2.5	2.8	3.6
3	282.19		4	281.82		12	HDPE	62	0.60%	0.41	2.5	2.8	3.5
4		281.55	EX. INL.		281.30	EX. 18	EX. RCP	78	0.32%	0.90	5.4	6.0	3.4
5		282.38	EX. INL.		281.78	EX. 12	EX. PVC	204	0.29%	0.08	0.5	1.9	2.4
6	281.99		4	281.82		12	HDPE	17	1.00%	0.44	2.6	3.6	4.5
7	282.70		6	282.09		12	HDPE	61	1.00%	0.44	2.6	3.6	4.5
* 8	283.34		1	282.71		12	PVC	105	0.60%	0.24	1.4	2.8	3.5
9		283.16	EX. INL.		282.92	EX. 15	EX. PVC	28	0.86%	0.20	1.2	6.0	4.9
12	284.10		9	283.81		6	HDPE	19	1.53%	0.07	0.4	0.6	2.9
13	284.88		12	284.10		6	HDPE	78	1.00%	0.03	0.2	0.6	2.9
14	284.54		FITTING	283.99		6	HDPE	55	1.00%	0.04	0.2	0.6	2.9
15	285.37		14	284.54		6	HDPE	83	1.00%	0.04	0.2	0.6	2.9
** 16	283.08		17	282.27		12	HDPE	81	1.00%	0.16	1.0	3.6	4.5
** 17	282.17		18	282.02		12	HDPE	15	1.00%	0.37	2.2	3.6	4.5
** 18		281.77	EX. INL.		281.78	15	EX. RCP	30	-0.03%	0.48	2.9	1.1	0.9

* REVISED FOR BOTH ADD ALTERNATE NO. 1
** REVISED FOR ADD ALTERNATE NO. 2



SECTION A-A
N.T.S.

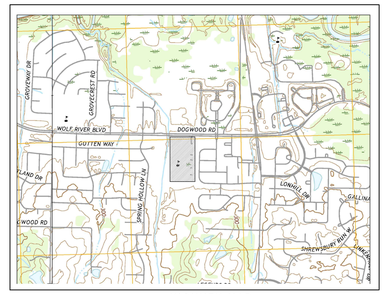


DETAIL OF 1' WIDE CONCRETE WATER TABLE
N.T.S.

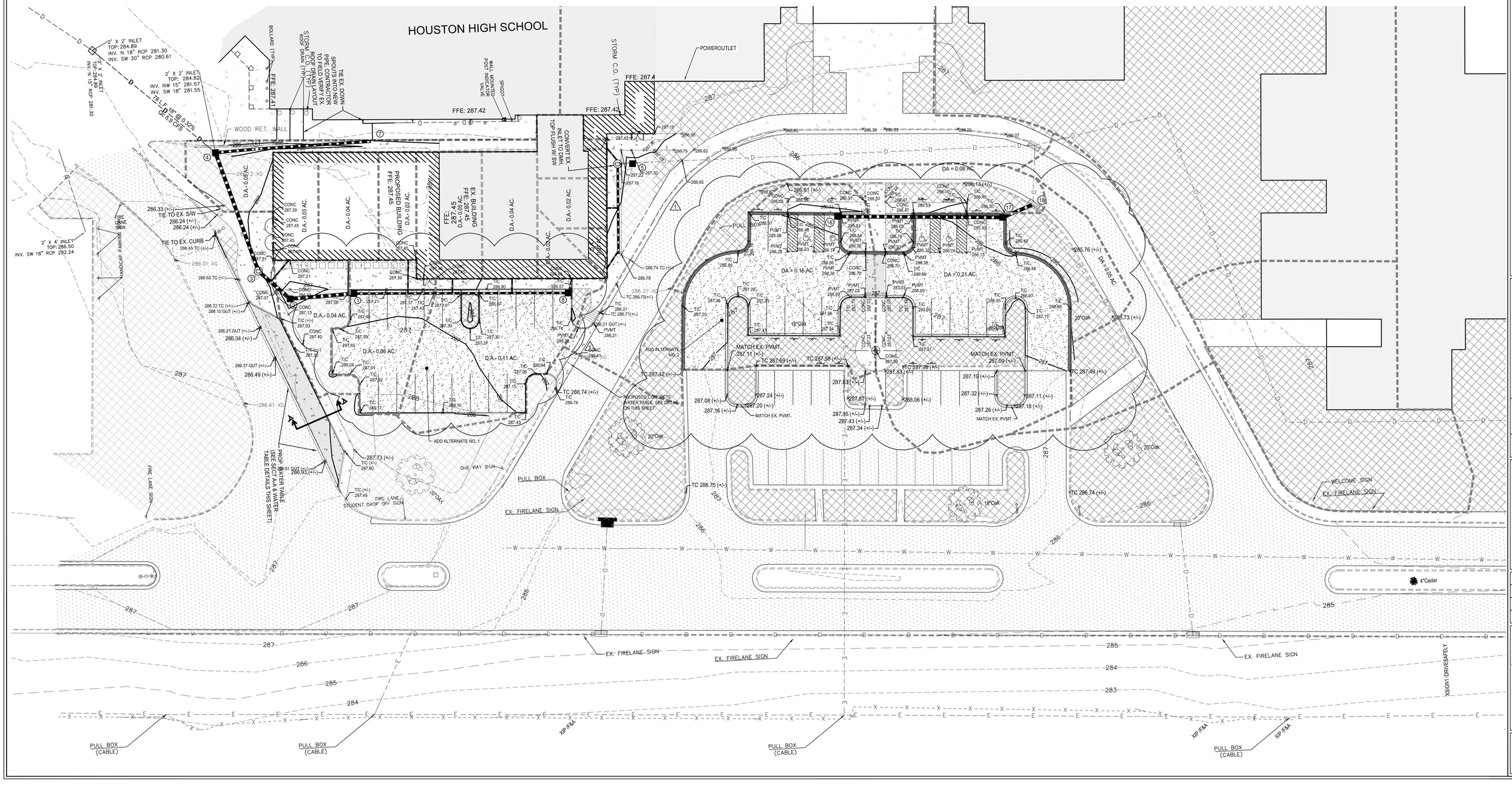
GRAPHIC SCALE
(IN FEET)
20 0 10 20 40 80
1 inch = 20 ft.

SPOT ELEVATION NOTATION
ALL SPOT ELEVATIONS SHOWN HEREON ARE FINISHED GRADE ELEVATIONS UNLESS NOTED OTHERWISE WITH THE FOLLOWING CODE:
XG - EX. GRADE
TC - TOP OF CURB
GUT - GUTTER

1 ADD ALTERNATE 1 – BAND ROOM PARKING LOT
ADD ALTERNATE 2 – MAIN ENTRANCE PARKING EXPANSION



VICINITY MAP
NOT TO SCALE



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Filename: Z:\FLEMARCH\0015\Subdivision\Plans\Plans15-gr2.dwg
Layout: Layout1 Grading & Drainage Plan (Add Alternates)
Plotted: Tuesday, October 29, 2019 – 4:57 pm

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HOUSTON HIGH SCHOOL BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

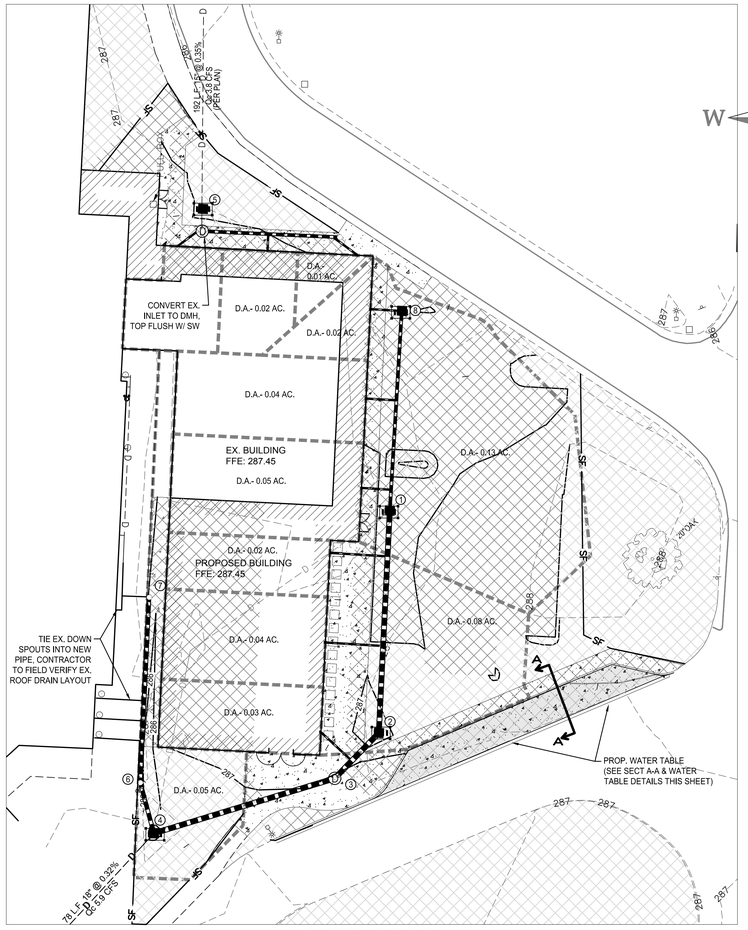
Rev.	Date	Revision Description
2	10/30/2019	ADDENDUM NO. 2

MICHAEL D. ROGERS
REGISTERED ENGINEER
AGRICULTURAL
STATE OF TENNESSEE

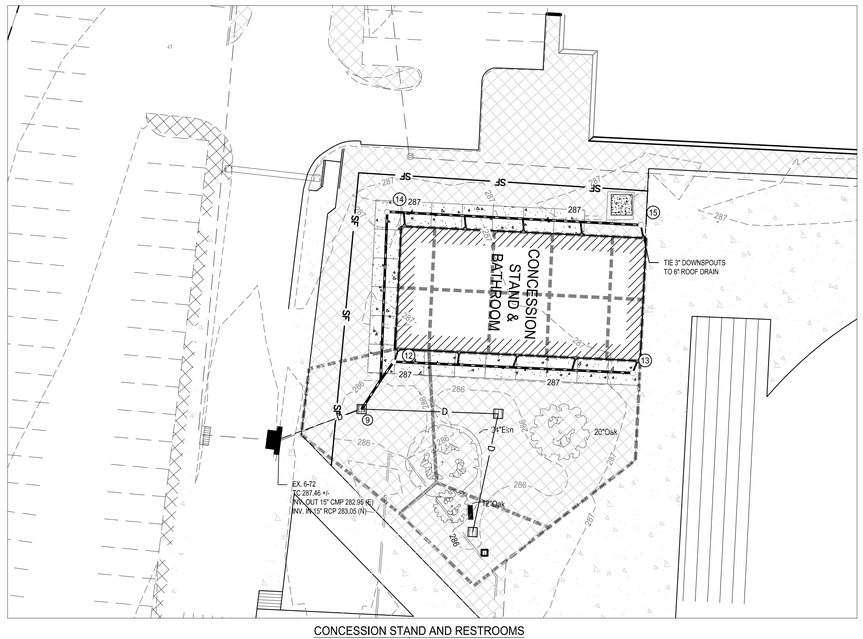
Issue Date:	2019-10-30
F&A Project No:	FLEMARCH0015.LD
Drafted By:	MRS
Checked By:	MDR

Sheet Title:
GRADING & DRAINAGE PLAN (ADD ALTERNATES)

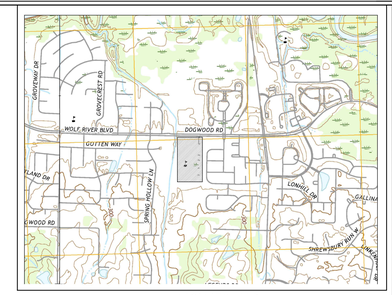
Sheet No.
C-0004.1



BAND ROOM EXPANSION



CONCESSION STAND AND RESTROOMS



VICINITY MAP
NOT TO SCALE

GRAPHIC SCALE
(IN FEET)

20 0 10 20 40 80

1 inch = 20 ft.

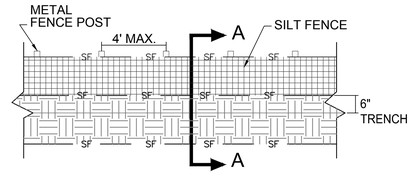
LEGEND

—SF— SILT FENCE

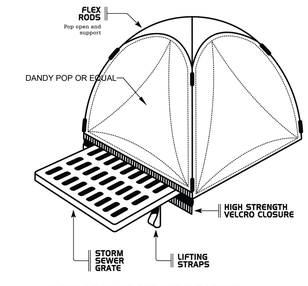
INLET SEDIMENT BARRIER

SEQUENCE OF EROSION CONTROL MEASURES

1. INSTALL STABILIZED CONSTRUCTION ACCESS.
2. INSTALL ALL SILT FENCE FOR THE SITE BEFORE ANY GRADING.
3. INSTALL INLET PROTECTION FOR PROPOSED 6-72 INLETS ADJACENT TO THE PROPOSED AND EXISTING BUILDING.

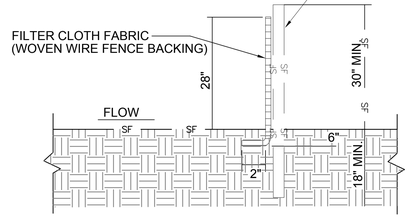


TYPE 'C' SILT FENCE/SEDIMENT BARRIER
N.T.S.

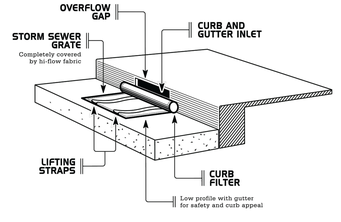


SURFACE INLET SEDIMENT BARRIER
NOT TO SCALE

BARRIERS ALONG ALL PERIMETER OF PROPERTY SHALL HAVE A METAL FENCE BACKING FOR ADDITIONAL SUPPORT OF FILTER FABRIC.



SECTION A-A



SEDIMENT BARRIER FOR CURB INLETS
NOT TO SCALE

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HOUSTON HIGH SCHOOL BAND ROOM EXPANSION

GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10/30/2019	ADDENDUM NO. 2

Issue Date:	2019-10-30
F&A Project No:	FLEMARCH
Drafted By:	MRS
Checked By:	MDR

Sheet Title:

EROSION CONTROL PLAN

Sheet No.
C-0005

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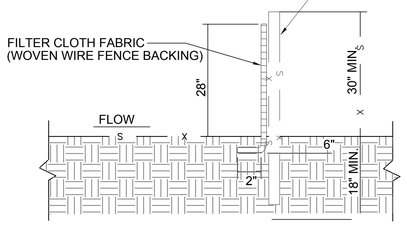
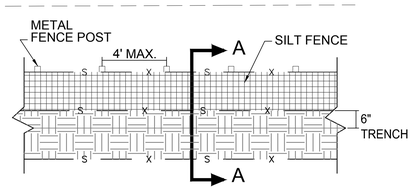
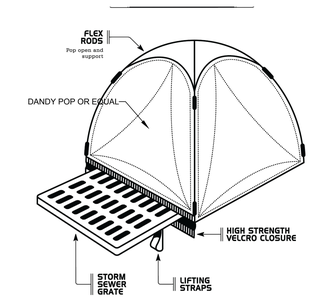
File name: 21-FLEMARCH-CIVIL-Houston Plans\Item15-ec1.dwg
Layout: C-0004 Grading & Drainage Plan
Plotted: Tuesday, October 29, 2019 - 4:41 pm

BARRIERS ALONG ALL PERIMETER OF PROPERTY SHALL HAVE A METAL FENCE BACKING FOR ADDITIONAL SUPPORT OF FILTER FABRIC.

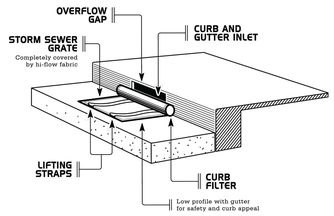


SECTION A-A





SURFACE INLET SEDIMENT BARRIER
NOT TO SCALE



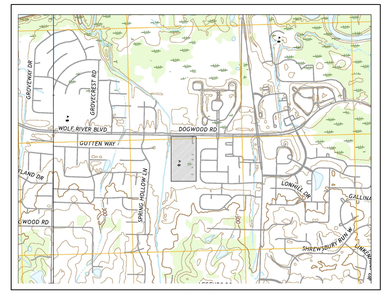
SEDIMENT BARRIER FOR CURB INLETS
NOT TO SCALE

GRAPHIC SCALE
(IN FEET)
20 0 10 20 40 80
1 inch = 20 ft.

LEGEND

SF —— SILT FENCE

INLET SEDIMENT BARRIER



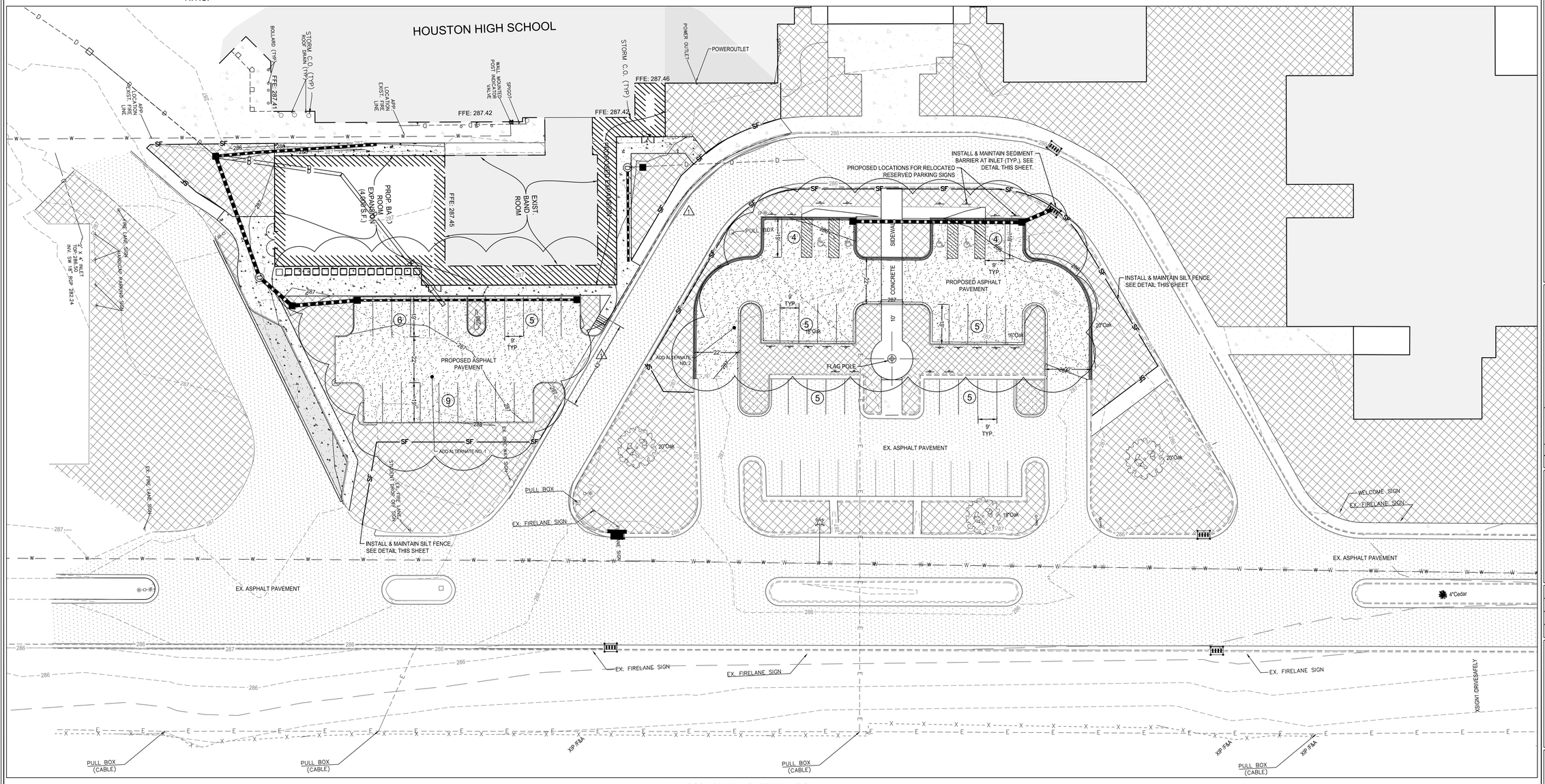
VICINITY MAP
NOT TO SCALE

1 ADD ALTERNATE 1 – BAND ROOM PARKING LOT
ADD ALTERNATE 2 – MAIN ENTRANCE PARKING EXPANSION

SEQUENCE OF EROSION CONTROL MEASURES

1. INSTALL STABILIZED CONSTRUCTION ACCESS.
2. INSTALL ALL SILT FENCE FOR THE SITE BEFORE ANY GRADING.
3. INSTALL INLET PROTECTION FOR EXISTING AND PROPOSED 6-72 INLETS ADJACENT TO THE EASTERN PROPOSED PARKING LOT.

TYPE 'C' SILT FENCE/SEDIMENT BARRIER
N.T.S.



BAND ROOM & PARKING LOT EXPANSION

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File Name: C:\Projects\2019\FLEMARCH.0015.LD\Sheets\Sheet15-ec2.dwg
Layout Name: C-0005.1 Erosion Control Plan (Add Alternates)
Plotted: Tuesday, October 29, 2019 - 5:00 pm

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HOUSTON HIGH SCHOOL
BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
2	10/30/2019	ADDENDUM NO. 2

MICHAEL D. ROSS
REGISTERED ENGINEER
STATE OF TENNESSEE

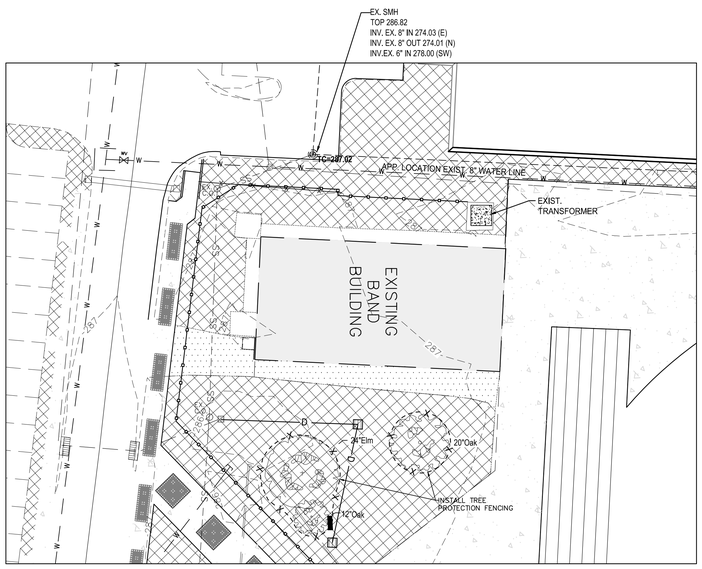
Issue Date:	2019-10-30
F&A Project No:	FLEMARCH.0015.LD
Drafted By:	MRS
Checked By:	MDR

Sheet Title:
EROSION CONTROL PLAN (ADD ALTERNATES)

Sheet No.
C-0005.1

GRAPHIC SCALE
(IN FEET)
20 0 10 20 40 80
1 inch = 20 ft.

N
W E
S



CONCESSION STAND AND RESTROOMS

BAND ROOM EXPANSION

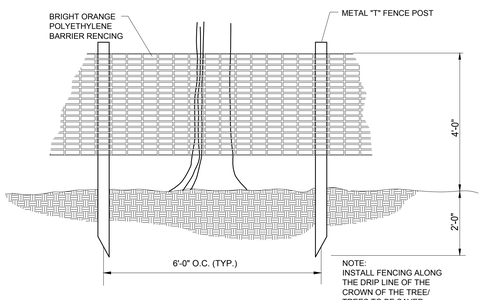
LEGEND

10" OAK — TREE TO BE PRESERVED

10" OAK — TREE TO BE REMOVED

TREE LIST			
	PRESERVED	REMOVED	PLANTED
NO.	11	5	25
TOTAL CALIPER	239"	83"	60.0"

Tree Type	Size
~~MAPLE~~	~~14~~
~~MAPLE~~	~~15~~
OAK	20
OAK	20
~~TREE~~	~~18~~
OAK	20
OAK	20
~~OAK~~	~~18~~
~~OAK~~	~~16~~
OAK	20



TREE PROTECTION DETAIL
N.T.S.

TREE NOTES:
1. TREES THAT ARE INDICATED TO REMAIN MUST BE PROTECTED WITH CONSTRUCTION FENCE TO THE DRIP LINE. ALL FENCING MUST BE IN PLACE PRIOR TO ANY CLEARING, GRADING, OR CONSTRUCTION.
2. VERIFY ALL TREE LOCATIONS ALONG PROPERTY LINE.
3. CONTRACTOR SHALL FLAG ALL TREES TO REMAIN.
4. ANY VISIBLE DAMAGE TO TREES SHOWN TO BE PROTECTED MUST BE BROUGHT TO THE ATTENTION OF THE CITY OF GERMANTOWN AND DEVELOPER FOR INSTRUCTIONS ON CARE FOR SAID DAMAGED TREE.

TREE SUMMARY

NOT TO SCALE

CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT TREE REMOVAL OPERATIONS DO NOT CAUSE INJURY TO EXISTING TREES TO REMAIN. THE ROOT SYSTEMS FOR TREES BEING REMOVED ARE TO REMAIN IN PLACE WHERE THE REMOVED TREES ARE IN CLOSE PROXIMITY TO EXISTING TREES TO REMAIN (SPECIFICALLY THOSE TREES IN CLOSE PROXIMITY TO THE PRESERVED 15" OAK, 24" ELM, 12" OAK, AND 20" OAK). REMAINDER OF STUMPS TO BE GROUND TO JUST BELOW EXISTING GRADE.

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File name: Z:\FLEMARCH\0005 D Subdivision plans\Plan15-tp1.dwg
Layout Name: C-0006 Tree Plan
Plotted: Tuesday, October 29, 2019 - 4:41 pm

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HOUSTON HIGH SCHOOL
BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

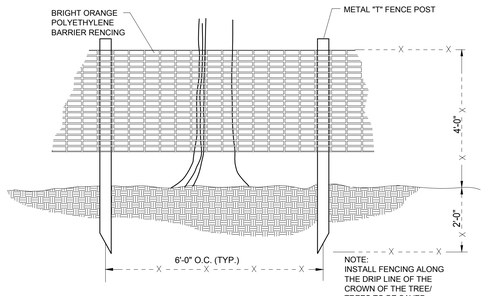
Rev.	Date	Revision Description
1	10/30/2019	ADDENDUM NO. 2

MICHAEL D. ROGERS
REGISTERED ENGINEER
STATE OF TENNESSEE

Issue Date:	2019-10-30
F&A Project No:	FLEMARCH
Drafted By:	MRS
Checked By:	MDR

Sheet Title:
TREE PLAN

Sheet No.
C-0006



TREE PROTECTION DETAIL

N.T.S.

TREE NOTES:

1. TREES THAT ARE INDICATED TO REMAIN MUST BE PROTECTED WITH CONSTRUCTION FENCE TO THE DRIP LINE. ALL FENCING MUST BE IN PLACE PRIOR TO ANY CLEARING, GRADING, OR CONSTRUCTION.
2. VERIFY ALL TREE LOCATIONS ALONG PROPERTY LINE.
3. CONTRACTOR SHALL FLAG ALL TREES TO REMAIN.
4. ANY VISIBLE DAMAGE TO TREES SHOWN TO BE PROTECTED MUST BE BROUGHT TO THE ATTENTION OF THE CITY OF GERMANTOWN AND DEVELOPER FOR INSTRUCTIONS ON CARE FOR SAID DAMAGED TREE.

TREE LIST			
	PRESERVED	REMOVED	PLANTED
NO.	11	5	25
TOTAL CALIPER	239"	83"	60.0"

Tree Type	Size
~~MAPLE~~	~~14~~
~~MAPLE~~	~~15~~
OAK	20
OAK	20
~~TREE~~	~~18~~
OAK	20
OAK	20
~~OAK~~	~~18~~
~~OAK~~	~~16~~
~~OAK~~	20

LEGEND

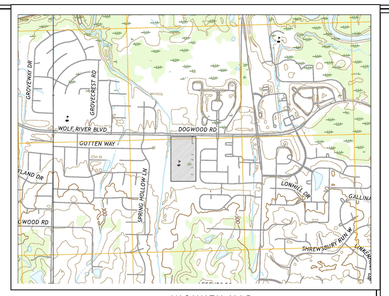
10" OAK — TREE TO BE PRESERVED

10" OAK — TREE TO BE REMOVED

TREE SUMMARY

NOT TO SCALE

CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT TREE REMOVAL OPERATIONS DO NOT CAUSE INJURY TO EXISTING TREES TO REMAIN. THE ROOT SYSTEMS FOR TREES BEING REMOVED ARE TO REMAIN IN PLACE WHERE THE REMOVED TREES ARE IN CLOSE PROXIMITY TO EXISTING TREES TO REMAIN (SPECIFICALLY THOSE TREES IN CLOSE PROXIMITY TO THE PRESERVED 15" OAK, 24" ELM, 12" OAK, AND 20" OAK). REMAINDER OF STUMPS TO BE GROUND TO JUST BELOW EXISTING GRADE.



VICINITY MAP

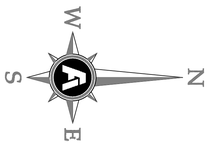
NOT TO SCALE

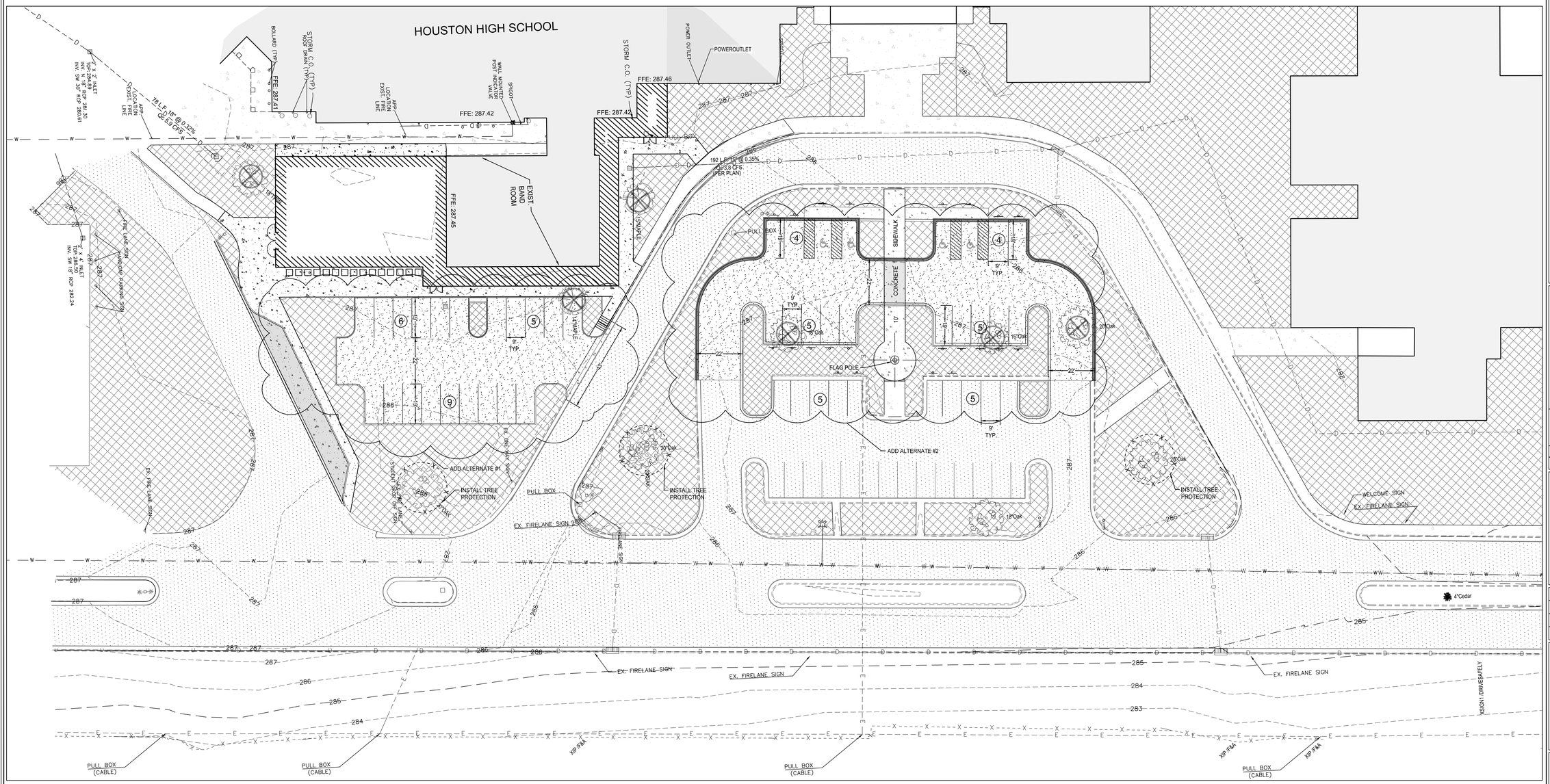
GRAPHIC SCALE

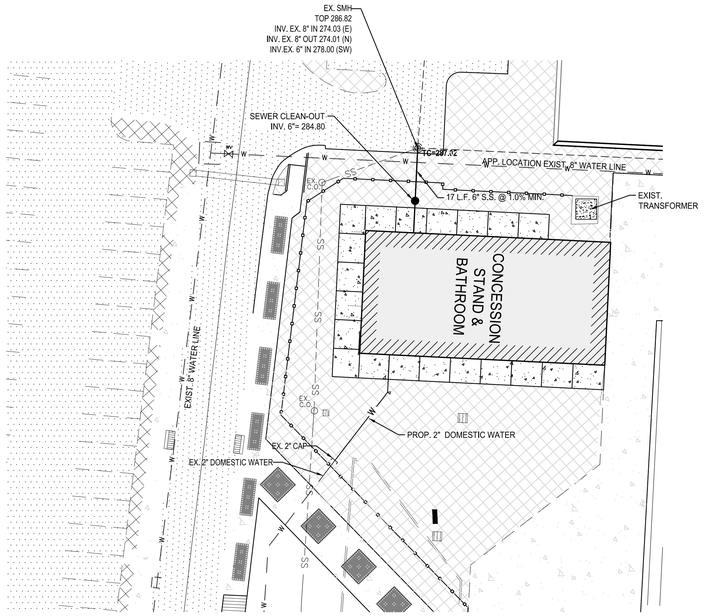
(IN FEET)

20 0 10 20 40 80

1 inch = 20 ft.

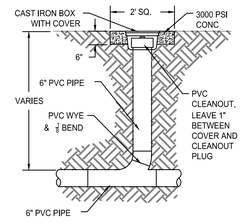



HOUSTON HIGH SCHOOL
BOLLARD (TYP.)
STORM C.O. (TYP.)
ROOF DRAIN (TYP.)
FFE: 287.41
APP. LOCATION EXIST. FIRE LINE
WALL MOUNTED POST INDICATOR VALVE
SPIGOT
FFE: 287.42
FFE: 287.45
EXIST. BAND ROOM
78 LF 18" @ 0.32% CAP 59 CFS
FES 2' X 2' INLET INV. N 18" RCP 281.30 INV. SW 30" RCP 280.61
APP. LOCATION EXISTING LINE
FIRE LANE SIGN
TOP 286.90 INV. NW 18" RCP 282.74
INV. SE 18" RCP 282.74
EX. FIRE LANE SIGN
EX. FIRE LANE SIGN
EX. FIRE LANE SIGN



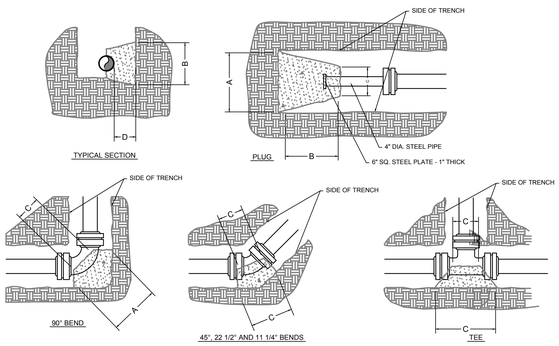
CONCESSION STAND AND RESTROOMS

BAND ROOM EXPANSION



SEWER CLEANOUT, IN TRAFFIC

NOT TO SCALE



NOTE:
THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED EARTH.

90° BEND							
SIZE	2"	4"	6"	8"	10"	12"	18"
A	16"	16"	26"	33"	40"	50"	70"
B	16"	16"	24"	33"	40"	50"	70"
C	9"	9"	12"	12"	15"	16"	22"
D	8"	8"	12"	16"	20"	25"	24"

45° BEND							
SIZE	2"	4"	6"	8"	10"	12"	18"
A	12"	12"	18"	24"	31"	37"	52"
B	12"	12"	18"	24"	31"	37"	52"
C	8"	8"	10"	12"	14"	16"	14"
D	6"	6"	9"	12"	15"	18"	18"

22 1/2° BEND							
SIZE	2"	4"	6"	8"	10"	12"	18"
A	9"	9"	13"	18"	23"	26"	40"
B	9"	9"	13"	18"	23"	26"	40"
C	8"	8"	10"	12"	14"	16"	15"
D	4"	4"	6"	9"	11"	13"	16"

11 1/4° BEND							
SIZE	2"	4"	6"	8"	10"	12"	18"
A	9"	9"	11"	13"	16"	18"	30"
B	9"	9"	11"	13"	16"	18"	30"
C	8"	8"	10"	12"	14"	16"	15"
D	4"	4"	5"	6"	8"	9"	16"

PLUG							
SIZE	2"	4"	6"	8"	10"	12"	18"
A	26"	26"	26"	34"	43"	52"	70"
B	26"	26"	26"	34"	43"	52"	70"
C	12"	12"	12"	12"	12"	12"	30"
D	11"	11"	11"	15"	22"	32"	32"

TEE							
SIZE		2"	4"	6"	8"	10"	12"	18"
A	MAIN	2'-6"	5'-12"	8'-10"	12"	12"	12"	12"
	BRANCH	2'-6"	2'-6"	8'-10"	2'-6"	8'-10"	12"	16'-18"
B		26"	26"	43"	26"	43"	52"	70"
C		12"	12"	12"	12"	12"	12"	30"
D		13"	13"	21"	13"	21"	26"	24"

THRUST BLOCK DETAIL

NOTE: THERE ARE NO SANITARY SEWER OR WATER SYSTEM IMPROVEMENTS FOR ADD ALTERNATE #1 OR ADD ALTERNTE #1.

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HOUSTON HIGH SCHOOL
BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10/30/2019	ADDENDUM NO. 2

MICHAEL D. ROGERS — REGISTERED ENGINEER — 112 — STATE OF TENNESSEE

Issue Date:	2019-10-30
F&A Project No:	FLEMARCH
Drafted By:	MRS
Checked By:	MDR

Sheet Title:

UTILITY PLAN

Sheet No.
C-0007

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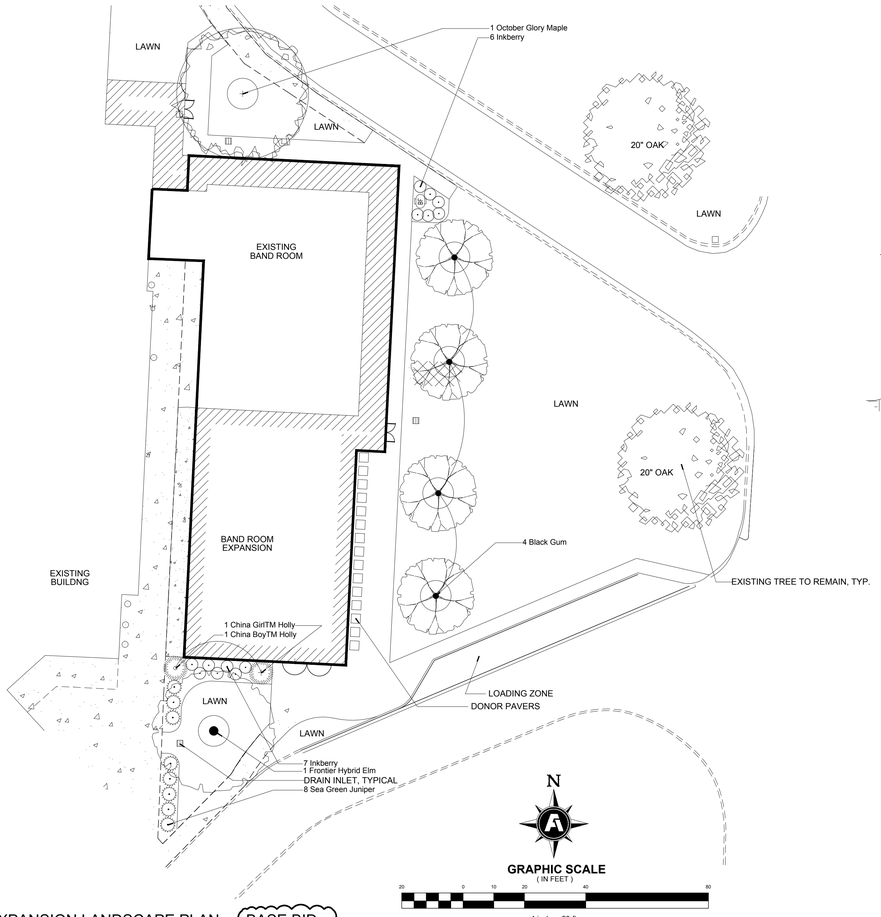
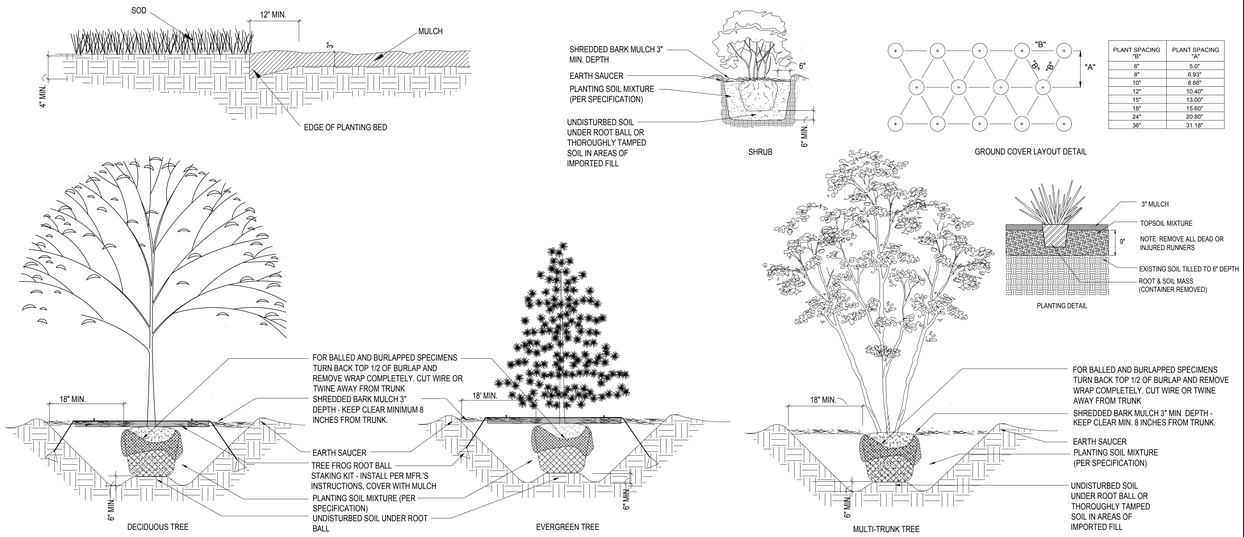
Filename: Z:\FLEMARCH\0015LD\Subdivision\plans\Item15-ut1.dwg
Layout Name: C-0007 Utility Plan
Plotted: Tuesday, October 29, 2019 - 4:42 pm



BAND ROOM EXPANSION LANDSCAPE PLAN - BASE BID

SCALE: 1" = 20'-0"



PLANT SPACING "B"	PLANT SPACING "A"
6"	5.0"
8"	6.93"
10"	8.66"
12"	10.40"
15"	13.00"
18"	15.60"
24"	20.80"
36"	31.18"

TYPICAL PLANTING AND BED EDGING DETAILS

NOT TO SCALE

PLANT SCHEDULE BAND ROOM EXPANSION

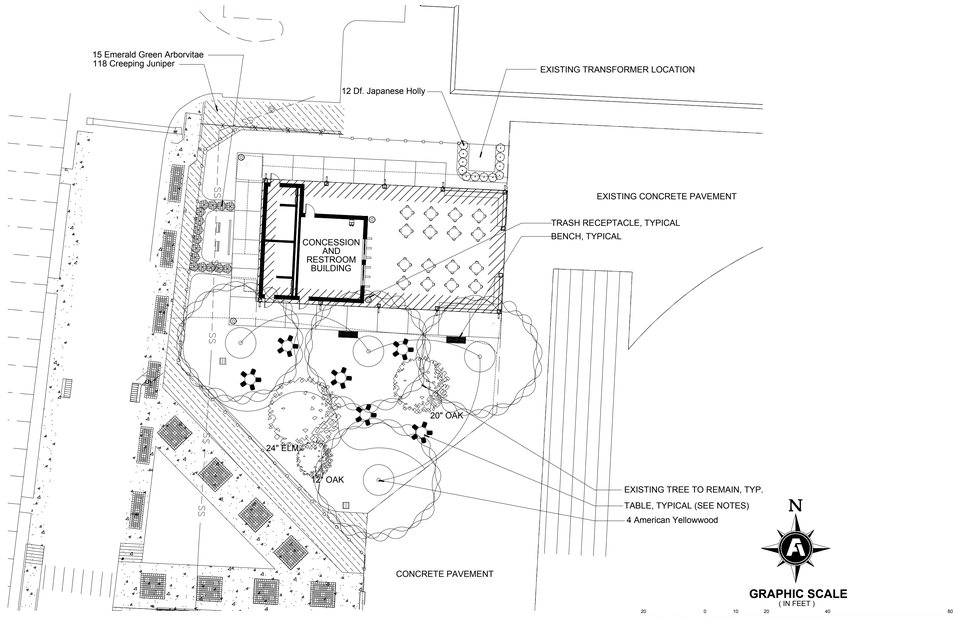
TREES	COMMON NAME	BOTANICAL NAME	CONDITION	CAL	SIZE	REMARKS
4	Black Gum	Nyssa sylvatica `Wildfire`	--	2.5"Cal		Matched specimens, min. 4` clear trunk
1	Frontier Hybrid Elm	Ulmus x `Frontier`	--	2.5"Cal		Matched specimens, min. 3 stems
1	October Glory Maple	Acer rubrum `October Glory` TM	--	2.5"Cal		Matched specimens, min. 4` clear trunk

SHRUBS	COMMON NAME	BOTANICAL NAME	CONDITION	SPR.	HT.	REMARKS
1	China BoyTM Holly	Ilex x meserveae `Mesdob`	--		36"	Dense, full to ground
1	China GirlTM Holly	Ilex x meserveae `Mesog`	--		36"	Dense, matching specimens, full to ground
+ 13	Inkberry	Ilex glabra `Shamrock`	--		24"	Dense, matching specimens, full to ground
8	Sea Green Juniper	Juniperus chinensis `Sea Green`	--	18" spread		Dense, full matching specimens

NOTE: CONTRACTOR SHALL PROVIDE ADDITIONAL PLANTS NOTED WITH "+" FOR SCREENING UTILITIES INSTALLED BUT NOT SHOWN ON THE PLAN. CONTRACTOR TO OBTAIN LANDSCAPE ARCHITECT'S APPROVAL PRIOR TO INSTALLING ADDITIONAL SCREENING PLANTS.

PLANT SCHEDULE - BAND ROOM EXPANSION

NOT TO SCALE



CONCESSION STAND AND RESTROOMS LANDSCAPE PLAN - ADD ALTERNATE #1

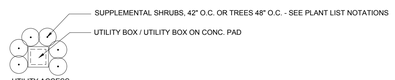
SCALE: 1" = 20'-0"

2

1. AN AUTOMATIC UNDERGROUND IRRIGATION SYSTEM SHALL BE PROVIDED FOR ALL REQUIRED PLANTINGS, WITH MINIMAL DISTURBANCE TO THE ROOT SYSTEMS OF EXISTING TREES TO REMAIN. PIPING AND IRRIGATION HEADS TO BE LOCATED ADJACENT TO NEW WALKS WHEREVER POSSIBLE.
2. IRRIGATION BACKFLOW PREVENTER TO BE LOCATED IN NEW BUILDING RISER ROOM OR SHALL BE SCREENED AS A UTILITY, AS NOTED ON THE PLANT SCHEDULE AND IN THE UTILITY SCREENING DETAIL.

GENERAL NOTES

NOT TO SCALE



NOTE: UTILITY ENCLOSURES NOT SHOWN ON THE PLANS ARE TO BE SCREENED WITH EVERGREEN SHRUBS OR TREES, AS NOTED IN THE SCHEDULE. CONTRACTOR SHALL OBTAIN APPROVAL OF THE LANDSCAPE ARCHITECT REGARDING WHETHER EVERGREEN TREES OR SHRUBS ARE REQUIRED FOR THE UTILITY SCREENING, PRIOR TO INSTALLATION.

UTILITY SCREENING DETAIL

NOT TO SCALE

2

PLANT SCHEDULE CONCESSION BLDG

TREES	COMMON NAME	BOTANICAL NAME	CONDITION	CAL	SIZE	REMARKS
4	American Yellowwood	Cladrastis kentukea	--	2.5"Cal		Matched specimens, min. 4` clear trunk
+ 15	Emerald Green Arborvitae	Thuja occidentalis `Smaragd`	--	2.5"Cal	5-6' ht.	Matched specimens, full to ground

SHRUBS	COMMON NAME	BOTANICAL NAME	CONDITION	SPR.	HT.	REMARKS
+ 12	Df. Japanese Holly	Ilex crenata `Compacta`	--		24"	Dense, full specimens

GROUND COVERS	COMMON NAME	BOTANICAL NAME	CONT	SPACING	REMARKS
118	Creeping Juniper	Juniperus horizontalis `Plumosa Compacta`	18" spread	4` on centers	Dense, full plants

NOTE: CONTRACTOR SHALL PROVIDE ADDITIONAL PLANTS NOTED WITH "+" FOR SCREENING UTILITIES INSTALLED BUT NOT SHOWN ON THE PLAN. CONTRACTOR TO OBTAIN LANDSCAPE ARCHITECT'S APPROVAL PRIOR TO INSTALLING ADDITIONAL SCREENING PLANTS.

PLANT SCHEDULE - CONCESSION BUILDING - ADD ALTERNATE #1

NOT TO SCALE

TREE LIST			
	PRESERVED	REMOVED	PLANTED
NO.	5	3	25
TOTAL CALIPER	96"	47"	62.5"

Tree Type	Size
~~MAPLE~~	~~14~~
~~MAPLE~~	~~15~~
OAK	20
OAK	20
~~TREE~~	~~18~~
OAK	20
OAK	12
ELM	24

TREE SUMMARY

NOT TO SCALE

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HOUSTON HIGH SCHOOL
BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	3-29-2019	REV. SWALK & EXCL. CONCESSION STAND BLDG
2	10-11-2019	ADDENDUM #2

10-30-2019

Issue Date:	2019-08-26
F&A Project No:	FLEMARCH
Drafted By:	IRR
Checked By:	DBB

Sheet Title:

LANDSCAPE PLAN

Sheet No.

L-001

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File Name: L-001 HOUSTON HIGH BAND ROOM EXPANSION planning plans Vrem15-LS01 total project.dwg
Layout Name: LANDSCAPE PLAN
Plotted: Tuesday, October 29, 2019 - 4:02 pm

1. AN AUTOMATIC UNDERGROUND IRRIGATION SYSTEM SHALL BE PROVIDED FOR ALL REQUIRED PLANTINGS, WITH MINIMAL DISTURBANCE TO THE ROOT SYSTEMS OF EXISTING TREES TO REMAIN. PIPING AND IRRIGATION HEADS TO BE LOCATED ADJACENT TO NEW WALKS WHEREVER POSSIBLE.
2. IRRIGATION BACKFLOW PREVENTER TO BE LOCATED IN NEW BUILDING RISER ROOM OR SHALL BE SCREENED AS NOTED ON THE PLAN.
3. CONTRACTOR SHALL RESTORE ANY LAWN AREAS DISTURBED BY CONSTRUCTION OPERATIONS. NEW LAWN AREAS SHALL BE PLANTED WITH TIFWAY 419 SOLID SOD. NEW LAWN AREAS SHALL BE PLANTED WITH TIFWAY 419 SOLID SOD.

GENERAL NOTES

NOT TO SCALE

TREE LIST			
	PRESERVED	REMOVED	PLANTED
NO.	2	3	25
TOTAL CALIPER	38"	54"	47.5"

Tree Type	Size
~~OAK~~	~~18~~
~~OAK~~	~~16~~
~~OAK~~	~~20~~
OAK	18
OAK	20

TREE REMOVAL / RETENTION SUMMARY - PARKING EXPANSION AREAS ONLY

NOT TO SCALE

TREES	COMMON / BOTANICAL NAME	SIZE	CONTAINER	REMARKS
1	Moonglow Sweet Bay Magnolia / Magnolia virginiana `Jim Wilson`	3" Cal.	B&B	1" cal. per stem, min. 8' ht., min. 3 stems

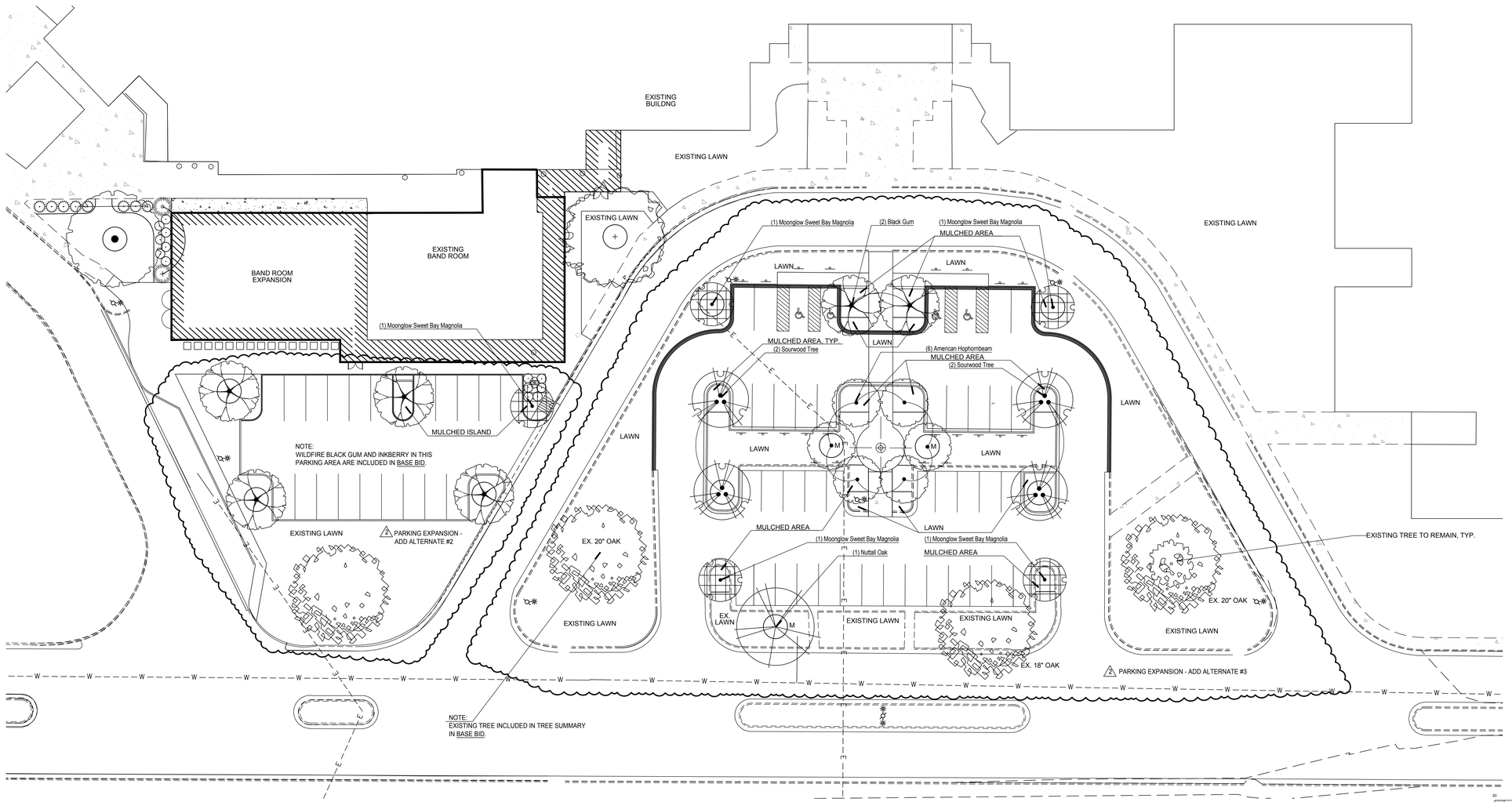
PLANT SCHEDULE - ADD ALTERNATE #2

NOT TO SCALE

	TREES	COMMON / BOTANICAL NAME	SIZE	CONTAINER	REMARKS
M (2)	6	American Hophornbeam / Ostrya virginiana	2.5" Cal.	B&B	Matched specimens, min. 3 stems
	2	Black Gum / Nyssa sylvatica `Wildfire`	2.5" Cal.	B&B	Matched specimens, min. 4' clear trunk
	4	Moonglow Sweet Bay Magnolia / Magnolia virginiana `Jim Wilson`	3" Cal.	B&B	1" cal. per stem, min. 8' ht., min. 3 stems
M	1	Nuttall Oak / Quercus nuttallii	2.5" Cal.	B&B	Matched specimens, min. 4' clear trunk
	4	Sourwood Tree / Oxydendrum arboreum	2.5" Cal.	B&B	Matched specimens, min. 4' clear trunk

PLANT SCHEDULE - ADD ALTERNATE #3

NOT TO SCALE



BAND ROOM AND PARKING LOT EXPANSION LANDSCAPE PLAN - ADD ALTERNATES #2 AND #3

SCALE: 1" = 20'-0"

GRAPHIC SCALE (IN FEET)

20 0 10 20 40 80

1 inch = 20 ft.

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HOUSTON HIGH SCHOOL
BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	3-29-2019	REV. SITWALK & EXCL. CONCESSION STAND BLDG.
2	10/30/2019	ADDENDUM NO. 2

10-30-2019

Issue Date:	2019-08-26
F&A Project No:	FLEMARCH.0016.P1
Drafted By:	IRR
Checked By:	DBB

Sheet Title: PLANTING PLAN

Sheet No. L-001.1

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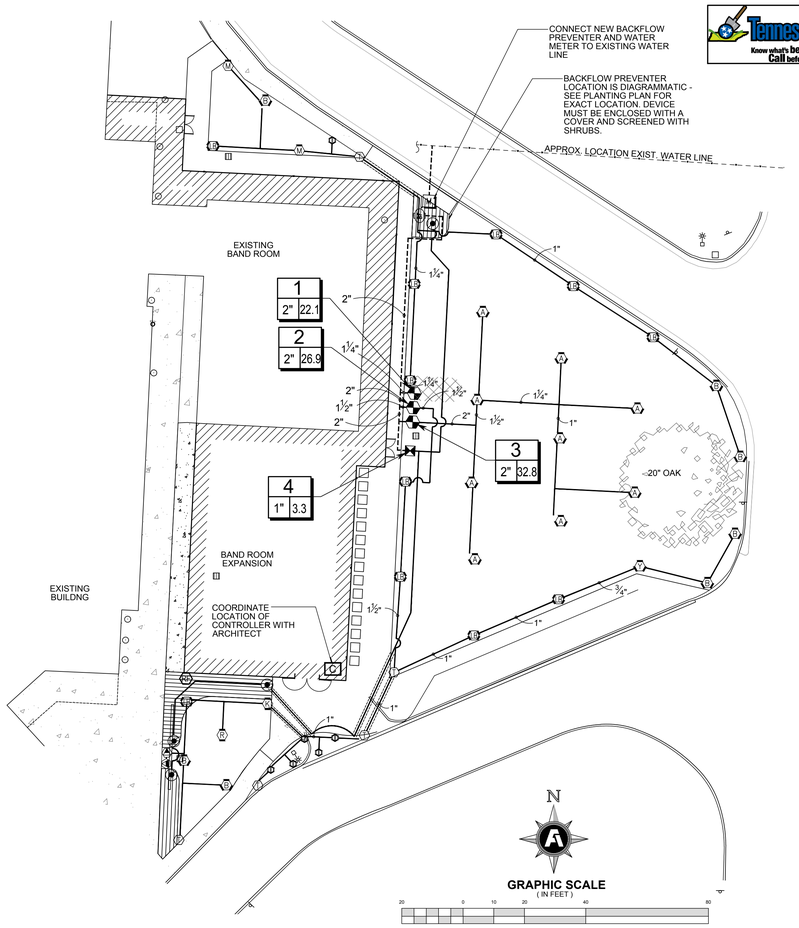
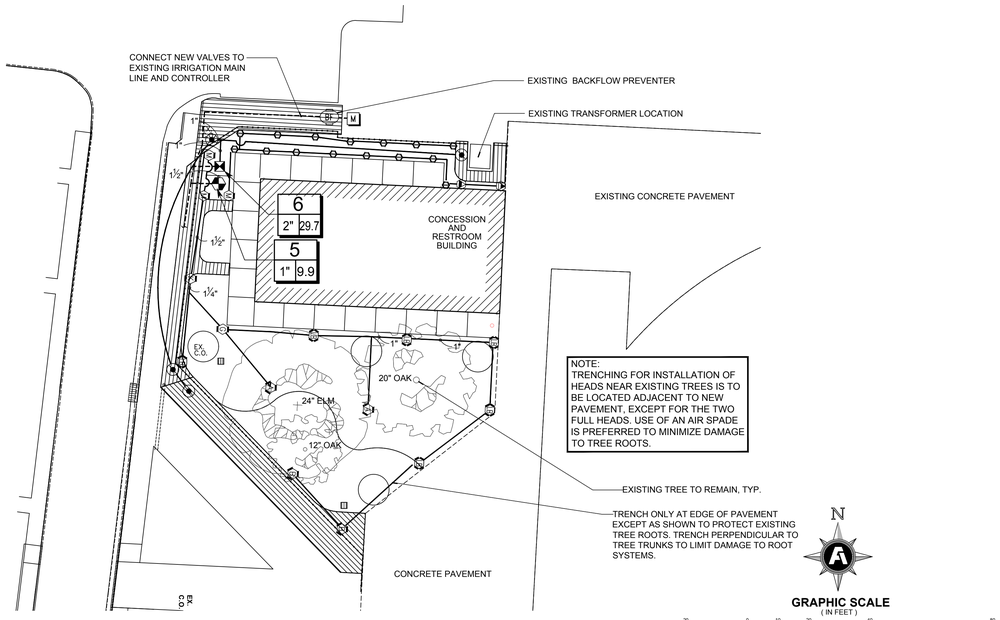
File Name: 23 FLEMARCH.0016 Planning\Drawings\Rem15-LS01 parking expansion.dwg
Layout Name: LANDSCAPE PLAN
Plotted: Tuesday, October 29, 2019 - 3:59 pm



BAND ROOM EXPANSION IRRIGATION PLAN - (BASE BID)

SCALE: 1" = 20'-0"



CONCESSION STAND AND RESTROOMS IRRIGATION PLAN - (ADD ALTERNATE #1)

SCALE: 1" = 20'-0"

IRRIGATION SYSTEM:

1. THE IRRIGATION WATER SUPPLY SHALL CONSIST OF A 1" WATER METER (INSTALLED BY GENERAL CONTRACTOR). A 2" TYPE K COPPER WATER TUBE SERVICE LINE, AND A 2" REDUCED PRESSURE BACKFLOW PREVENTION DEVICE AS SHOWN IN THE PLANS.
2. THE IRRIGATION SYSTEM HAS BEEN DESIGNED TO PROVIDE OPTIMUM DISTRIBUTION OF WATER, WITH ROTORS IN TURF AREAS, AND DRIP IRRIGATION IN BED AREAS.
3. MINIMUM STATIC WATER PRESSURE REQUIRED AT EACH ZONE VALVE FOR THE EFFICIENT OPERATION OF THE IRRIGATION SYSTEM AS DESIGNED IS INDICATED ON THE IRRIGATION SCHEDULE. THE INSTALLER SHALL VERIFY THAT ADEQUATE WATER PRESSURE IS AVAILABLE AT THE SITE PRIOR TO BEGINNING INSTALLATION. NOTIFY THE DESIGNER IN WRITING IF THE STATIC PRESSURE IS INSUFFICIENT.
4. UTILITIES ARE NOT LOCATED ON THE IRRIGATION PLANS. THE IRRIGATION INSTALLER IS RESPONSIBLE FOR LOCATING ALL UTILITIES ON THE PROJECT SITE.
5. LOCATIONS OF ELEMENTS ON THE DRAWINGS ARE SCHEMATIC. EXACT LOCATIONS ARE TO BE VERIFIED IN THE FIELD BY THE INSTALLER. PIPE LINES DRAWN SIDE BY SIDE MAY BE LAID IN THE SAME TRENCH. SOME PIPE LOCATIONS ARE SHOWN IN LOCATIONS OFFSET FROM OPTIMUM LOCATIONS (BACK OF CURB, SIDEWALK, DRIVES, ETC.) TO CLEARLY SHOW THE INTENDED PIPE ROUTING.
7. LATERAL PIPE SIZES FOR TURF IRRIGATION ARE 3/4" UNLESS OTHERWISE NOTED ON THE PLAN.
8. ALL IRRIGATION ZONES SHALL BE CLEARLY LABELED ON A ZONE CHART LOCATED IN OR NEAR THE CONTROLLER.
9. CONTRACTOR TO PROVIDE AS-BUILT PLANS UPON COMPLETION OF PROJECT.
10. EACH CONTROL VALVE SHALL BE IDENTIFIED BY CONTROLLER LETTER ZONE NUMBER, SIZE AND GPH.
11. ALL ROTOR WATERING SHALL TAKE PLACE AFTER 2:00 AM AND BEFORE 7:00 AM.
12. THE CONTRACTOR IS RESPONSIBLE FOR THE IRRIGATION SYSTEM FOR ONE (1) YEAR AFTER THE COMPLETION OF THE SYSTEM.
13. THIS IRRIGATION PLAN IS DIAGRAMMATIC IN NATURE. CONTRACTOR SHALL VERIFY ACTUAL FIELD CONDITIONS AS WELL AS LOCATION OF DISTRIBUTION PIPING, SLEEVING, AND SYSTEM CALCULATIONS PRIOR TO INSTALLATION TO OBTAIN A COMPLETE AND OPERATIONAL IRRIGATION SYSTEM. REPORT ANY AND ALL LAYOUT DISCREPANCIES IMMEDIATELY TO THE OWNER'S REPRESENTATIVE FOR DECISION.
14. CONTRACTOR TO LOCATE MAIN AND LATERAL LINES TO AVOID DISRUPTION TO THE ROOT SYSTEM OF EXISTING TREES TO REMAIN.
15. CONTRACTOR TO CONFIRM ALL IRRIGATION SLEEVES ARE IN PLACE AND MARKED PRIOR TO START OF IRRIGATION WORK.
16. ALL IRRIGATION LINES RUNNING IN THE SAME TRENCH SHALL BE SEPARATED BY A MINIMUM OF 3" OF SOIL.
17. IRRIGATION CONTRACTOR TO REQUEST AND CONFIRM ALL ALIGNMENTS AND DEPTHS OF ALL PROPOSED OR EXISTING UTILITY LOCATIONS BEFORE ANY TRENCHING BEGINS.

IRRIGATION DISTRIBUTION PIPING:

1. THE BURIAL DEPTH FOR THE MAIN LINE SHALL BE NO LESS THAN 24" AT FINISHED GRADE.
2. ALL MAIN LINE PIPING RUNS SHALL BE "SNAKED" IN THE TRENCH DURING INSTALLATION TO PREVENT EXCESSIVE STRAIN DUE TO THERMAL EXPANSION AND CONTRACTION.
3. ALL SLEEVING SHALL BE APPROPRIATELY SIZED NON-PERFORATED SCHEDULE 40 PVC PIPE UNLESS OTHERWISE NOTED. SLEEVING SHALL BE NO LESS THAN 24" DEEP UNDER PAVEMENT. PROVIDE SLEEVES UNDER ALL PAVEMENTS.
4. USE PURPLE PRIMER AND GLUE TO CONNECT PIPE.
5. MAIN LINE PIPE SIZE IS 2" UNLESS OTHERWISE NOTED.

CONTROL VALVES FOR ROTARY SPRAYS:

1. ALL VALVES SHALL BE INSTALLED IN RAINBIRD VALVE BOXES WITH LIDS. OR APPROVED EQUAL. THEY ARE TO BE MOUNTED AT GRADE LEVEL.VALVE BOX TOPS TO BE LABELED WITH VALUE NUMBER CORRESPONDING TO NUMBER IN CONTROLLER.
2. REMOTE VALVES SHALL BE AS SHOWN ON THE IRRIGATION SCHEDULE.
3. ALL MANUALLY OPERATED VALVES IN THE SYSTEM SHALL BE RATED FOR A WORKING PRESSURE MINIMUM OF 150 PSI.
4. VALVE WIRING SHALL FOLLOW THE MAINLINE PIPING WHERE FEASIBLE AND SHALL BE LAID TO THE SIDE OF THE PIPING IN A COMMON TRENCH.
5. WIRE RUNS SHALL BE INSTALLED WITH ENOUGH SLACK AND/OR OCCASIONAL EXPANSION LOOPS TO PREVENT EXCESSIVE STRAIN DUE TO THERMAL CONTRACTION.
6. ALL WIRING SHALL BE INSTALLED IN ACCORDANCE WITH THE LOCAL CODE REQUIREMENTS.
7. VALVE LOCATION IS DIAGRAMMATIC. CONTRACTOR SHALL GROUP VALVES TOGETHER AND LOCATE IN BED AREAS WHEREVER POSSIBLE.

CONTROLLER:

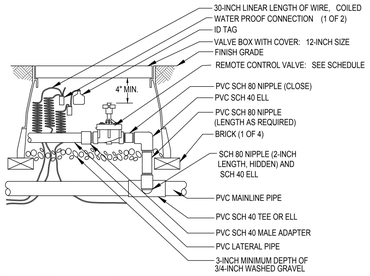
1. THE IRRIGATION CONTROLLER SHALL BE AS NOTED IN THE IRRIGATION SCHEDULE .CONTRACTOR SHALL COORDINATE LOCATION OF CONTROLLER FOR BAND ROOM EXPANSION WITH THE OWNER. THE CONTROLLER SHALL HAVE MORE THAN ENOUGH STATIONS TO HANDLE THE NUMBER OF ZONES REQUIRED FOR ZONES 1-4. ZONES 5 AND 6 SHALL CONNECT TO FIELD HOUSE IRRIGATION CONTROLLER.
2. THE CONTRACTOR SHALL INSTALL AND WIRE THE CONTROLLER TO THE IRRIGATION SYSTEM, INCLUDING ZONES 4 AND 5 TO THE FIELDHOUSE IRRIGATION SYSTEM CONTROLLER.
3. CONTRACTOR SHALL COORDINATE INSTALLATION OF THE CONTROLLER WITH THE ELECTRICAL CONTRACTOR.
4. ALL ELECTRICAL CONNECTIONS MUST BE IN ACCORDANCE WITH LOCAL CODE REQUIREMENTS.
5. RAIN SENSOR SHALL BE PROVIDED ON EXTERIOR FACE OF BUILDING IN APPROXIMATE LOCATION SHOWN ON THE PLAN.

BACKFLOW PREVENTER:

1. BACKFLOW PREVENTION SHALL BE INSTALLED IN STRICT ACCORDANCE WITH LOCAL CODE REQUIREMENTS. APPROXIMATE LOCATION IS SHOWN ON THIS PLAN TO PROVIDE CLARITY OF PIPING LAYOUT. SEE LANDSCAPE PLAN FOR MORE EXACT LOCATION SO THAT SCREENING IS PROVIDED BY PLANT MATERIALS.
2. THE BACKFLOW PREVENTION SYSTEM SHALL BE SUPPLIED WITH ISOLATION VALVES TO ALLOW FOR PROPER MAINTENANCE.
3. USE DEVICE AS NOTED ON THE IRRIGATION SCHEDULE AND PROVIDE ENCLOSURE APPROVED BY THE CITY OF GERMANTOWN.

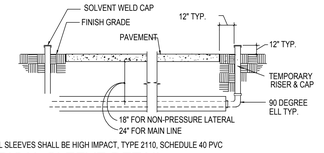
GENERAL NOTES

NOT TO SCALE



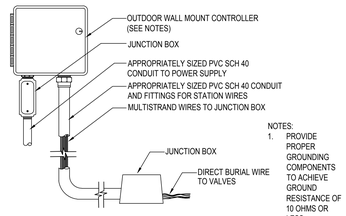
REMOTE CONTROL VALVE

NOT TO SCALE



ALL SLEEVES SHALL BE HIGH IMPACT, TYPE 2110, SCHEDULE 40 PVC

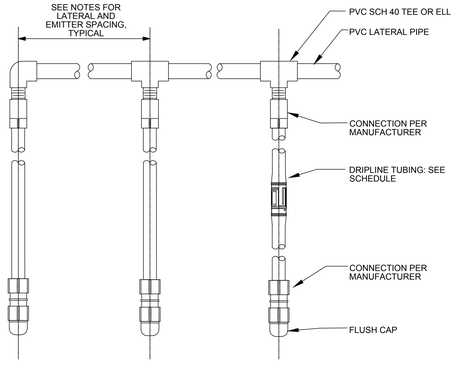
TYPICAL SLEEVE DETAIL



NOTES:
1. PROVIDE PROPER GROUNDING COMPONENTS TO ACHIEVE GROUND RESISTANCE OF 10 OHMS OR LESS.

CONTROLLER

NOT TO SCALE



LANDSCAPE DRIPLINE AT MULCHED AREAS

NOT TO SCALE

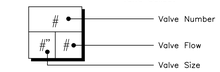
IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
T	Hunter MP Corner PROS-06-PRS40-CV Turf Rotator, 6" (15.24cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. T=Turquoise adj arc 45-105.	5
LST RST SST	Hunter MP Strip PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. LST=Ivory left strip, SST=Brown side strip, RST=Copper right strip.	4
M L O	Hunter MP1000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. M=Maroon adj arc 90 to 210, L=Light Blue 210 to 270 arc, O=Olive 360 arc.	5
K G R	Hunter MP2000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. K=Black adj arc 90-210, G=Green adj arc 210-270, R=Red 360 arc.	4
B Y A	Hunter MP3000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. B=Blue adj arc 90-210, Y=Yellow adj arc 210-270, A=Gray 360 arc.	21
LB	Hunter MP3500 PROS-06-PRS40-CV Turf Rotator, 6.0" Pop-up with factory installed check valve, pressure regulated to 40 psi, MP Rotator nozzle on PRS40 body. LB=light brown adjustable arc, 90-210.	17
ADJ. 360	Hunter MP800SR PROS-06-PRS40-CV Turf Rotator, 4.0" pop-up with check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. ADJ=Orange and Gray (arc 90-210), 360=Lime Green and Gray (arc 360)	21

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
	Hunter ICZ-101-25 Drip Control Zone Kit. 1" ICV Globe Valve with 1" HY100 filter system. Pressure Regulation: 25psi. Flow Range: 2 GPM to 20 GPM. 150 mesh stainless steel screen.	2
	Pipe Transition Point	8
	Area to Receive Dripline Hunter PLD-06-18 (18) In-Line Pressure Compensating Landscape Dripline with Built-In Check Valve. 0.6GPH emitters at 18.0" O.C. Dripline laterals spaced at 18.0" apart, with emitters offset for triangular pattern. UV Resistant.	2,783 s.f.

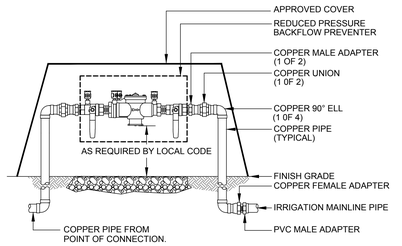
SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
	Hunter PGV-201 Angle 2" Plastic Electric Remote Control Valve, for Residential/Light Commercial Use. Female NPT Inlet/Outlet, With Flow Control. Angle Configuration.	4
BF	Watts LF909 1" Lead Free Reduced Pressure Backflow Preventer.	1
C	Hunter ACC-1200 12 Station Outdoor Modular Controller. No Module Required. High-End Commercial Use. Metal Cabinet.	1
R	Hunter RFC Rain and freeze sensor, with conduit installation, mount as noted. Normally closed switch.	1
M	Water Meter 1"	1
	Irrigation Lateral Line: PVC Class 200 SDR 21	1,984 l.f.
	Irrigation Mainline: PVC Class 200 SDR 21	207.0 l.f.
	Pipe Sleeve: PVC Schedule 40	127.5 l.f.

Valve Callout



IRRIGATION SCHEDULE

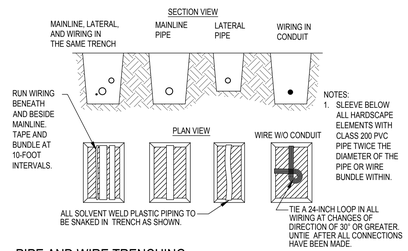
NOT TO SCALE



NOTE:
1. INSTALL BACKFLOW PREVENTER AS REQUIRED BY LOCAL CODES AND HEALTH DEPARTMENT. VERIFY LOCAL REQUIREMENTS PRIOR TO INSTALLATION.

BACKFLOW PREVENTER

NOT TO SCALE



NOTES:
1. SLEEVE BELOW ALL HARDSCAPE ELEMENTS WITH CLASS 200 PVC PIPE TWICE THE DIAMETER OF THE PIPE OR WIRE BUNDLE WITHIN.

PIPE AND WIRE TRENCHING

NOT TO SCALE

Generated:	2019-09-09 12:14	
P.O.C. NUMBER: 01		
Water Source Information:		
FLOW AVAILABLE		
Water Meter Size:	1"	
Flow Available:	37.50 gpm	
PRESSURE AVAILABLE		
Static Pressure at POC:	80.00 psi	
Elevation Change:	0.00 ft	
Service Line Size:	2"	
Length of Service Line:	20.00 ft	
Pressure Available:	80.00 psi	
DESIGN ANALYSIS		
Maximum Station Flow:	32.76 gpm	
Flow Available at POC:	37.50 gpm	
Residual Flow Available:	4.74 gpm	
Pressure Req. at Critical Station:		44.03 psi
Loss for Fittings:	0.06 psi	
Loss for Main Line:	0.58 psi	
Loss for POC to Valve Elevation:		0.00 psi
Loss for Backflow:	15.28 psi	
Loss for Water Meter:	6.43 psi	
Critical Station Pressure at POC:		66.38 psi
Pressure Available:	80.00 psi	
Residual Pressure Available:	13.62 psi	

CRITICAL ANALYSIS

NOT TO SCALE

VALVE_SCHEDULE

NUMBER	MODEL	SIZE	TYPE	GPM	PSI	PSI @ POC	PRECIP
1	Hunter PGV-201 Angle	2"	Turf Rotary	22.09	44.94	62.43	0.34 in/h
2	Hunter PGV-201 Angle	2"	Turf Rotary	26.86	45.55	65	0.39 in/h
3	Hunter PGV-201 Angle	2"	Turf Rotary	32.76	44.03	66.38	0.31 in/h
4	Hunter ICZ-101-25	1"	Area for Dripline	3.16	42.44	54.13	0.45 in/h
5	Hunter ICZ-101-25	1"	Area for Dripline	9.92	47.34	58.02	0.45 in/h
6	Hunter PGV-201 Angle	2"	Turf Rotary	29.72	45.92	58.17	0.51 in/h

VALVE SCHEDULE

NOT TO SCALE

NOTE:
ALTHOUGH THIS SYSTEM HAS BEEN DESIGNED USING HUNTER BRAND IRRIGATION EQUIPMENT, RAINBIRD PRODUCTS ARE AN ACCEPTABLE EQUIVALENT. CONTRACTOR IS RESPONSIBLE FOR ANY PRE-DESIGN REQUIRED FOR RAINBIRD PRODUCT SUBSTITUTION.

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HOUSTON HIGH SCHOOL BAND ROOM EXPANSION

GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10-11-19	REPLACES PREVIOUS PLAN
2	10-30-19	ADDENDUM #2

10-30-2019

Issue Date:	2019-08-26
F&A Project No:	FLEMARCH
Drafted By:	IRR
Checked By:	DBB

Sheet Title: IRRIGATION PLAN

Sheet No. L-002

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File name: J:\FLEMARCH\CAD\Planning Grams\Item15-LS01 DRC IRRIGATION.dwg
Layout Name: IRRIGATION PLAN
Plotted: Tuesday, October 29, 2019 - 3:53 pm

1. BACKFLOW PREVENTER LOCATION IS DIAGRAMMATIC - SEE PLANTING PLAN FOR EXACT LOCATION. DEVICE MUST BE ENCLOSED WITH A COVER AND SCREENED WITH SHRUBS.
2. ADD ALTERNATE #2 IRRIGATION SYSTEM REPLACES IRRIGATION SYSTEM FOR THE BASE BID. ALL WATER SOURCE COMPONENTS (WATER METER, BACKFLOW PREVENTION DEVICE, CONTROLLER, CONTROLLER ACCESSORIES, AND CONNECTIONS ARE INCLUDED IN THE ADD ALTERNATE #2 IRRIGATION SYSTEM.
3. ADD ALTERNATE #3 IRRIGATION ZONES ARE TO BE ADDED TO EITHER THE BASE BID OR ADD ALTERNATE #2 BID. NO BACKFLOW PREVENTION DEVICE, CONTROLLER, OR OTHER ELEMENTS OF THE WATER SOURCE ARE INCLUDED IN ADD ALTERNATE #3.
4. 2" WATER METER SIZE REQUIRED FOR COMPLETE SYSTEM SHOWN ON THE PLAN, INCLUDING ADD ALTERNATE #3.
5. ADD ALTERNATE #3 INCLUDES SLEEVES UNDER EXISTING PAVEMENTS. PROVIDE BORING UNDER PAVEMENT AS REQUIRED.

GENERAL NOTES
NOT TO SCALE

Generated: 2019-10-29 14:27

P.O.C. NUMBER: 01
Water Source Information:

FLOW AVAILABLE
Water Meter Size: 2"
Flow Available: 120.00 gpm

PRESSURE AVAILABLE
Static Pressure at POC: 80.00 psi
Elevation Change: 0.00 ft
Service Line Size: 3"
Length of Service Line: 20.00 ft
Pressure Available: 79.00 psi

DESIGN ANALYSIS
Maximum Station Flow: 41.03 gpm
Flow Available at POC: 120.00 gpm
Residual Flow Available: 78.97 gpm

Critical Station: 2
Design Pressure: 40.00 psi
Friction Loss: 3.49 psi
Fittings Loss: 0.35 psi
Elevation Loss: 0.00 psi
Loss through Valve: 1.90 psi
Pressure Req. at Critical Station: 45.73 psi
Loss for Fittings: 0.12 psi
Loss for Main Line: 1.16 psi
Loss for POC to Valve Elevation: 0.00 psi
Loss for Backflow: 16.21 psi
Loss for Water Meter: 1.36 psi
Critical Station Pressure at POC: 64.58 psi
Pressure Available: 79.00 psi
Residual Pressure Available: 14.42 psi

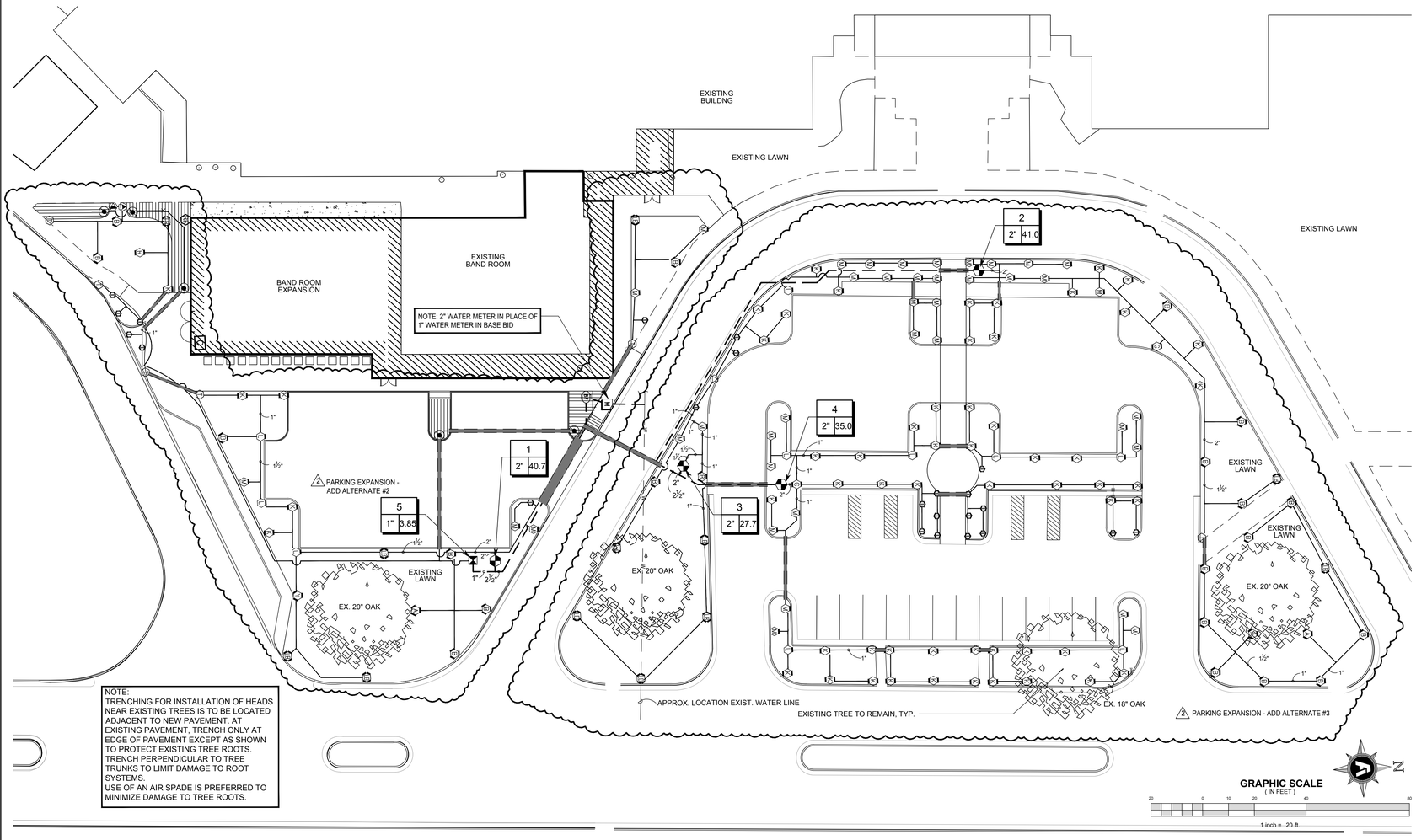
CRITICAL ANALYSIS (OVERALL SYSTEM)
NOT TO SCALE

NUMBER	MODEL	SIZE	TYPE	GPM	PSI	PRECIP
1	Hunter PGV-201 Angle	2"	Turf Rotary	40.72	45.65	0.50 in/h
5	Hunter ICZ-101-25	1"	Area for Dripline	3.85	40.92	0.45 in/h

VALVE SCHEDULE - ADD ALTERNATE #2
NOT TO SCALE

NUMBER	MODEL	SIZE	TYPE	GPM	PSI	PRECIP
2	Hunter PGV-201 Angle	2"	Turf Rotary	41.03	45.73	0.58 in/h
3	Hunter PGV-201 Angle	2"	Turf Rotary	27.67	44.44	0.48 in/h
4	Hunter PGV-201 Angle	2"	Turf Rotary	35.01	45.29	0.57 in/h

VALVE SCHEDULE - ADD ALTERNATE #3
NOT TO SCALE



NOTE:
TRENCHING FOR INSTALLATION OF HEADS NEAR EXISTING TREES IS TO BE LOCATED ADJACENT TO NEW PAVEMENT. AT EXISTING PAVEMENT, TRENCH ONLY AT EDGE OF PAVEMENT EXCEPT AS SHOWN TO PROTECT EXISTING TREE ROOTS. TRENCH PERPENDICULAR TO TREE TRUNKS TO LIMIT DAMAGE TO ROOT SYSTEMS.
USE OF AN AIR SPADE IS PREFERRED TO MINIMIZE DAMAGE TO TREE ROOTS.

BAND ROOM AND PARKING LOT EXPANSION IRRIGATION PLAN - ADD ALTERNATES #2 AND #3
SCALE: 1" = 20'-0"

NOTE:
ALTHOUGH THIS SYSTEM HAS BEEN DESIGNED USING HUNTER BRAND IRRIGATION EQUIPMENT, RAINBIRD PRODUCTS ARE AN ACCEPTABLE EQUIVALENT. CONTRACTOR IS RESPONSIBLE FOR ANY PROJECT RE-DESIGN REQUIRED FOR RAINBIRD PRODUCT SUBSTITUTION.

Tennessee811 Know what's below. Call before you dig.

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
T	Hunter MP Corner PROS-06-PRS40-CV Turf Rotator, 6" (15.24cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. T=Turquoise adj arc 45-105.	5
LST RST SST	Hunter MP Strip PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. LST=Ivory left strip, SST=Brown side strip, RST=Copper right strip.	2
M L O	Hunter MP1000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. M=Maroon adj arc 90 to 210, L=Light Blue 210 to 270 arc, O=Olive 360 arc.	8
K G R	Hunter MP2000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. K=Black adj arc 90-210, G=Green adj arc 210-270, R=Red 360 arc.	6
B Y A	Hunter MP3000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. B=Blue adj arc 90-210, Y=Yellow adj arc 210-270, A=Gray 360 arc.	9
	Hunter MP3500 PROS-06-PRS40-CV Turf Rotator, 6.0" Pop-up with factory installed check valve, pressure regulated to 40 psi, MP Rotator nozzle on PRS40 body. LB=light brown adjustable arc, 90-210.	5
ADJ. 360	Hunter MP800SR PROS-06-PRS40-CV Turf Rotator, 4.0" pop-up with check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. ADJ=Orange and Gray (arc 90-210), 360=Lime Green and Gray (arc 360)	7

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
	Hunter ICZ-101-25 Drip Control Zone Kit. 1" ICV Globe Valve with 1" HY100 filter system. Pressure Regulation: 25psi. Flow Range: 2 GPM to 20 GPM. 150 mesh stainless steel screen.	1
	Pipe Transition Point	5
	Area to Receive Dripline Hunter PLD-06-18 (18) In-Line Pressure Compensating Landscape Dripline with Built-In Check Valve. 0.6GPH emitters at 18.0" O.C. Dripline laterals spaced at 18.0" apart, with emitters offset for triangular pattern. UV Resistant.	819.6 s.f.

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
	Hunter PGV-201 Angle 2" Plastic Electric Remote Control Valve, for Residential/Light Commercial Use. Female NPT Inlet/Outlet, With Flow Control. Angle Configuration.	1
BF	Watts LF909 1" Lead Free Reduced Pressure Backflow Preventer.	1
C	Hunter ACC-1200 12 Station Outdoor Modular Controller. No Module Required. High-End Commercial Use. Metal Cabinet.	1
RFC	Hunter RFC Rain and freeze sensor, with conduit installation, mount as noted. Normally closed switch.	1
M	Water Meter 2"	1
	Irrigation Lateral Line: PVC Class 200 SDR 21	1,162 l.f.
	Irrigation Mainline: PVC Schedule 40	135.1 l.f.
	Pipe Sleeve: PVC Schedule 40	228.6 l.f.

Volve Callout
— Valve Number
#" — Valve Flow
— Valve Size

IRRIGATION SCHEDULE - ADD ALTERNATE #2
NOT TO SCALE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
T	Hunter MP Corner PROS-06-PRS40-CV Turf Rotator, 6" (15.24cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. T=Turquoise adj arc 45-105.	1
LST RST SST	Hunter MP Strip PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. LST=Ivory left strip, SST=Brown side strip, RST=Copper right strip.	1
M L O	Hunter MP1000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. M=Maroon adj arc 90 to 210, L=Light Blue 210 to 270 arc, O=Olive 360 arc.	41
K G R	Hunter MP2000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. K=Black adj arc 90-210, G=Green adj arc 210-270, R=Red 360 arc.	55
B Y A	Hunter MP3000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. B=Blue adj arc 90-210, Y=Yellow adj arc 210-270, A=Gray 360 arc.	16
	Hunter MP3500 PROS-06-PRS40-CV Turf Rotator, 6.0" Pop-up with factory installed check valve, pressure regulated to 40 psi, MP Rotator nozzle on PRS40 body. LB=light brown adjustable arc, 90-210.	7
ADJ. 360	Hunter MP800SR PROS-06-PRS40-CV Turf Rotator, 4.0" pop-up with check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. ADJ=Orange and Gray (arc 90-210), 360=Lime Green and Gray (arc 360)	16

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
	Hunter PGV-201 Angle 2" Plastic Electric Remote Control Valve, for Residential/Light Commercial Use. Female NPT Inlet/Outlet, With Flow Control. Angle Configuration.	3
	Irrigation Lateral Line: PVC Class 200 SDR 21	2,042 l.f.
	Irrigation Mainline: PVC Schedule 40	251.7 l.f.
	Pipe Sleeve: PVC Schedule 40	153.6 l.f.

Volve Callout
— Valve Number
#" — Valve Flow
— Valve Size

IRRIGATION SCHEDULE - ADD ALTERNATE #3
NOT TO SCALE

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HOUSTON HIGH SCHOOL
BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10-11-19	REPLACES PREVIOUS PLAN
2	10-30-19	ADDENDUM #2

STATE OF TENNESSEE — DANIEL B. BOWLIN — 20... — REGISTERED LANDSCAPE ARCHITECT
10-30-2019

Issue Date:	2019-08-26
F&A Project No:	FLEMARCH
Drafted By:	IRR
Checked By:	DBB

Sheet Title:
IRRIGATION PLAN

Sheet No.
L-002.1

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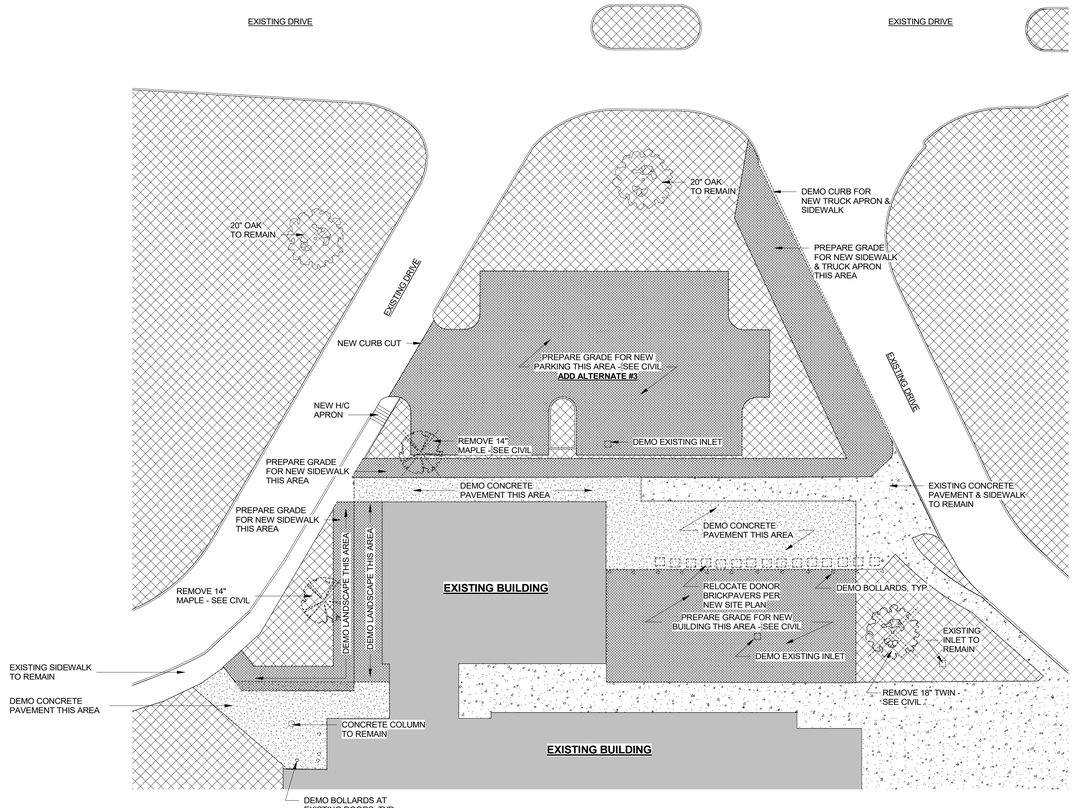
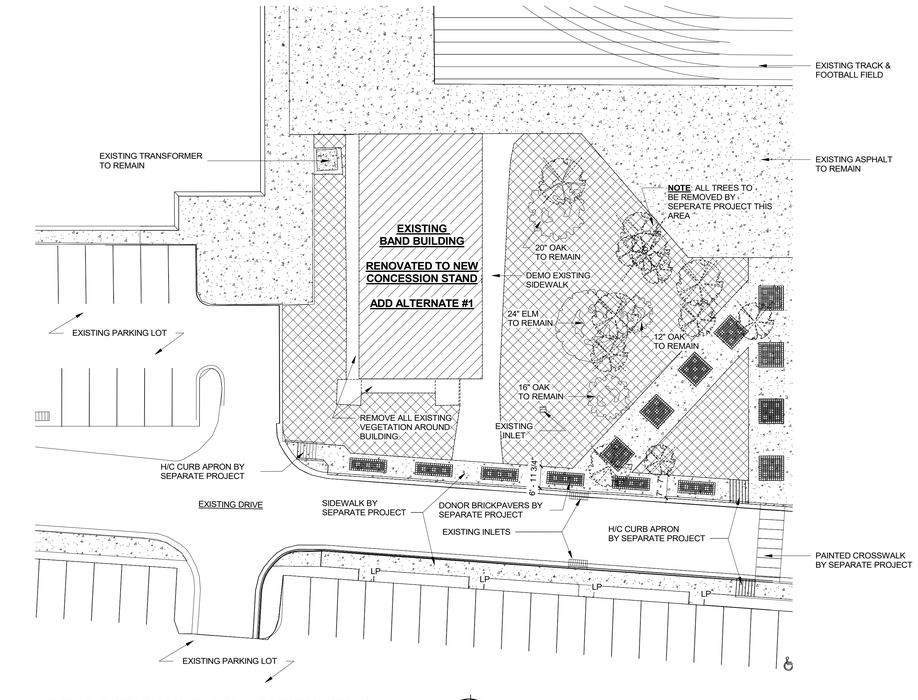
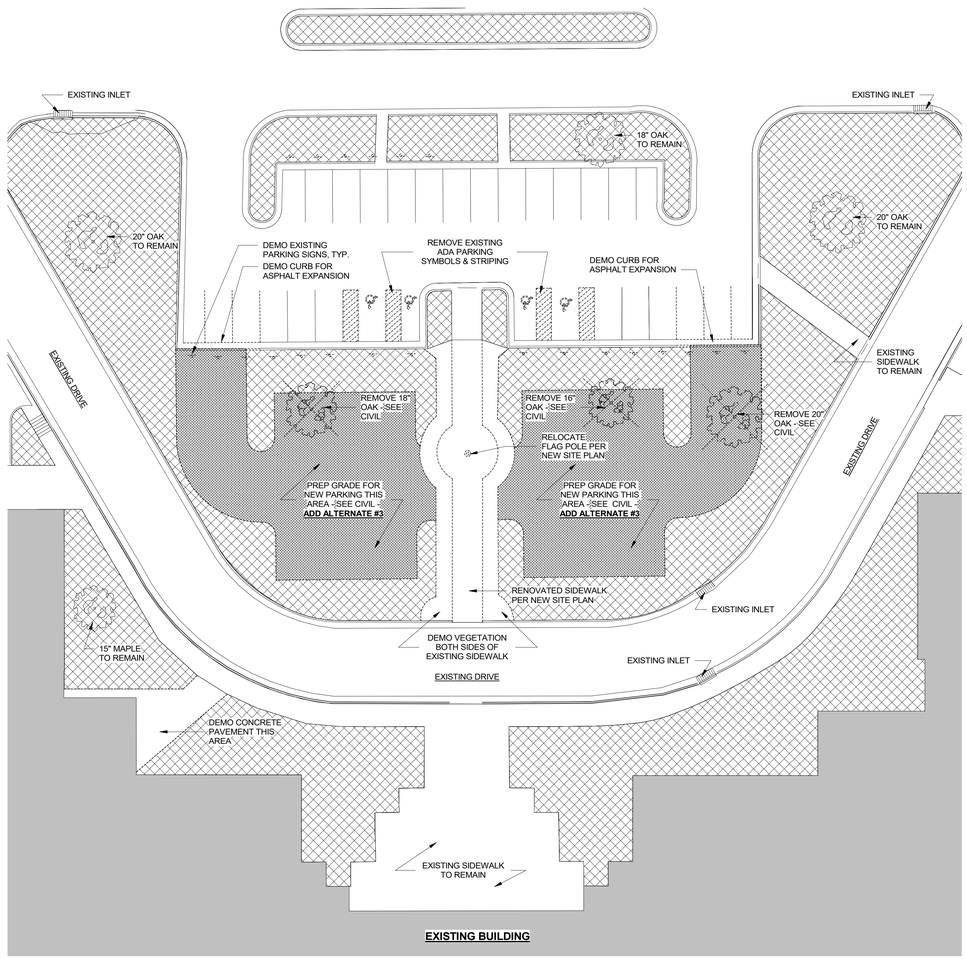
File name: P:\FLEMARCH\DWG\...\planning plans V7em15-R01 parking expansion.dwg
Layout Name: IRRIGATION PLAN
Plotted: Tuesday, October 29, 2019 - 3:58 pm



1 DEMO SITE PLAN @ BAND ADDITION
1" = 20'-0"



2 DEMO SITE PLAN @ CONCESSION STAND
1" = 20'-0"



3 DEMO SITE PLAN @ NEW PARKING
1" = 20'-0"

GENERAL SITE NOTES

1. THE NEW BAND ADDITION IS TO BE CONSIDERED BASE BID, THIS PROJECT PROCEEDS ANY ADD ALTERNATE LISTED BELOW IN CONSTRUCTION.
2. ADD ALTERNATE #1 IS THE EXISTING METAL BUILDING, CURRENTLY USED AS BAND STORAGE, THAT IS TO BE RENOVATED INTO A CONCESSION STAND. THIS PROJECT, IF ADDED TO CONTRACT, WILL HAVE TO BE COMPLETED AFTER THE BAND ADDITION. ALL ITEMS STORED IN THE EXISTING BAND STORAGE WILL HAVE TO BE RELOCATED TO THE NEW BAND ADDITION BEFORE CONSTRUCTION BEGINS. SEE 2/AS1.1.
3. ADD ALTERNATE #2 IS THE PARKING LOT DIRECTLY EAST OF THE NEW BAND ADDITION. SEE 1/AS1.1.
4. ADD ALTERNATE #3 IS TO BE AN ADDITION TO THE PARKING LOT NORTH OF THE NEW BAND ADDITION. SEE 3/AS1.1.

SITE LEGEND

- EXISTING BUILDING
- NEW CONSTRUCTION
- GREENSPACE
- CONCRETE

GENERAL DEMOLITION NOTES

1. CONTRACTOR SH ALL FIELD VERIFY ALL EXISTING CONDITIONS AND REPORT AND DISCREPANCIES TO THE OWNER & ARCHITECT PRIOR TO COMMENCEMENT OF WORK.
2. REFER TO STRUCTURAL & MPE FOR ADDITIONAL INFORMATION AND INSTRUCTION.
3. MATERIAL REMOVED FROM THE CONSTRUCTION SITE DURING THE DEMOLITION PROCESS REMAINS THE PROPERTY OF THE OWNER. VERIFY WITH OWNER PRIOR TO DISPOSAL OF MATERIALS AND/OR EQUIPMENT. IF MATERIALS/EQUIPMENTS ARE TO BE REUSED, VERIFY WITH OWNER WHAT MATERIALS ARE TO BE RECLAIMED AND WHERE THEY ARE TO BE STORED.
4. PATCH AND REPAIR ANY DAMAGED WALLS AND FLOORING. PREP FOR NEW FINISHES.
5. IF EXISTING ITEMS IN WORKING ORDER PRIOR TO DEMOLITION ARE DAMAGED DURING THE COURSE OF THE WORK, THEY SHALL BE REPLACED BY THE CONTRACTOR AT NO COST TO THE OWNER.
6. ANY FINISHES, EQUIPMENT, FURNISHINGS, ETC. THAT ARE DAMAGED OR MISPLACED/LOST DURING THE COURSE OF THE WORK SHALL BE REPLACED AT NO COST TO THE OWNER.
7. WHERE NO WORK IS TO TAKE PLACE, THE CONTRACTOR SHALL PROTECT ALL EXISTING FURNISHINGS AND FINISHES THROUGHOUT DEMOLITION AND RENOVATION WORK.
8. DISPOSE OF ALL DEBRIS IN ACCORDANCE WITH AUTHORITES HAVING JURISDICTION.
9. ALL ABANDONED UTILITIES SHALL BE CAPPED OFF SO AS TO BE CONCEALED FROM VIEW AND TO MEET ALL STATE/LOCAL CODE REQUIREMENTS.
10. WHERE MATERIALS ARE REMOVED, ORIGINAL SUBSTRATE MUST BE REPAIRED OR PREPARED TO RECEIVE NEW FINISHES.

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HOUSTON HIGH SCHOOL
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STEVEN H. LANDWEHR
REGISTERED ARCHITECT
AR016149
STATE OF TENNESSEE

ARCHITECTURAL SITE DEMOLITION PLANS

REVISIONS

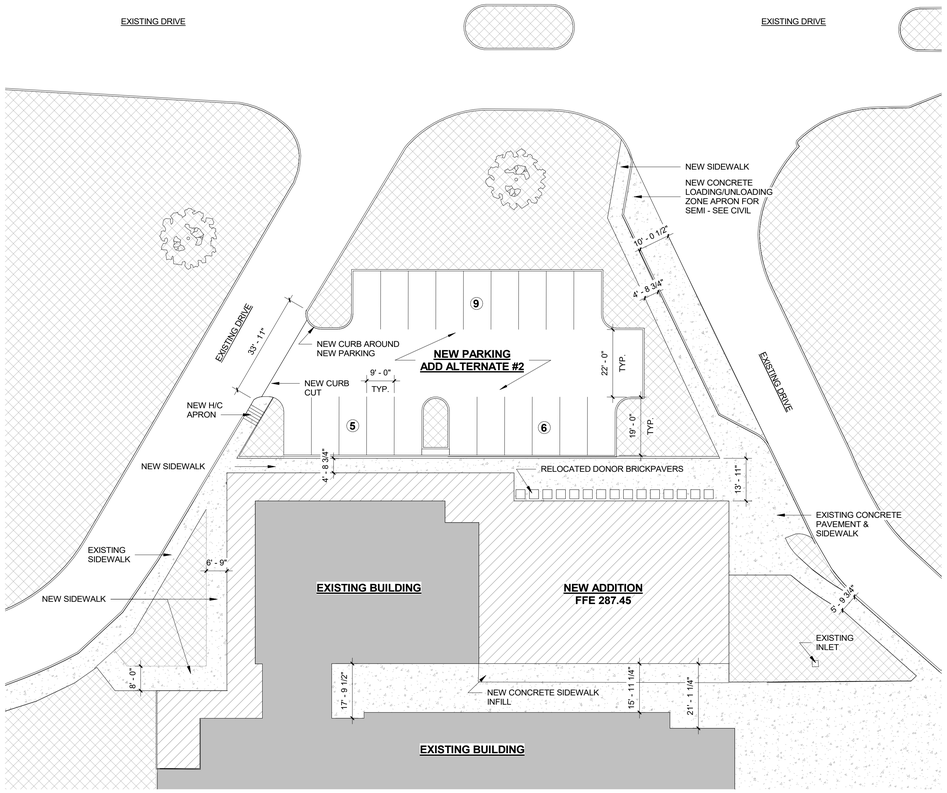
Revision Date	Rev. #	Revision Description
10/30/19	2	ADD. #2

PROJECT NUMBER
150119

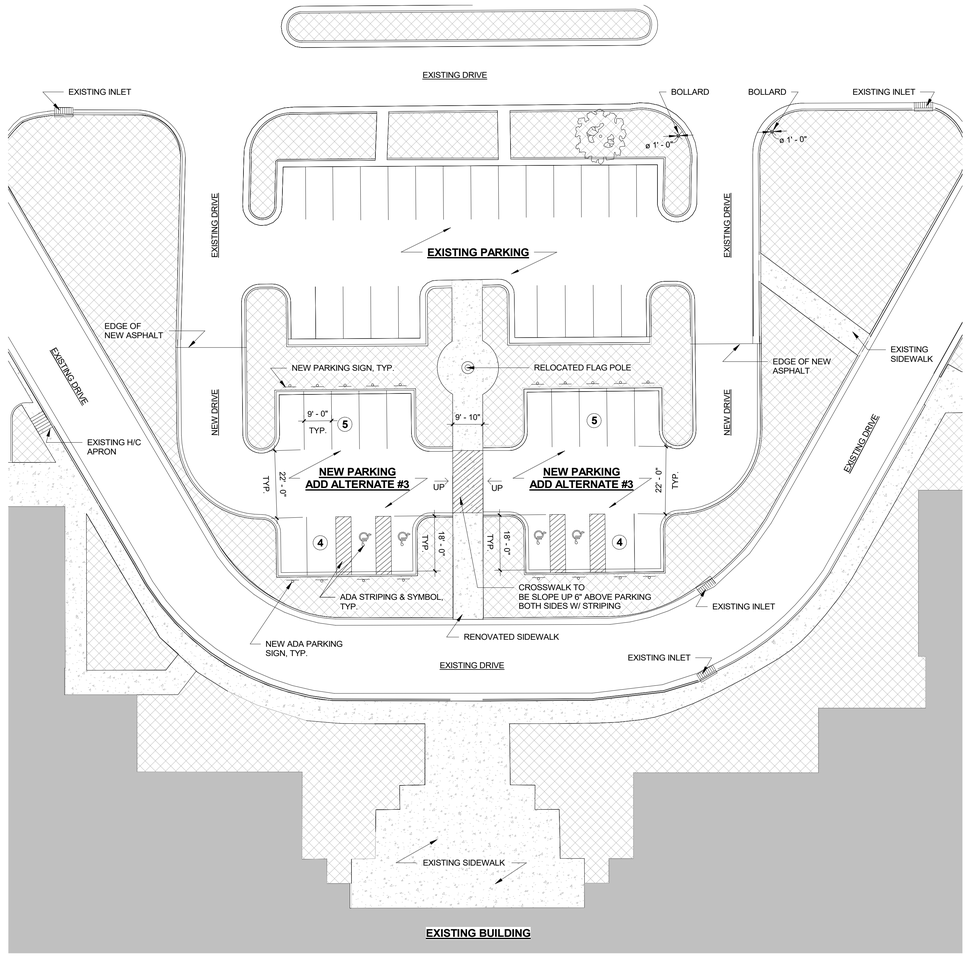
DATE OF ORIGINAL ISSUE
October 11, 2019

SHEET NUMBER
ASD1.1

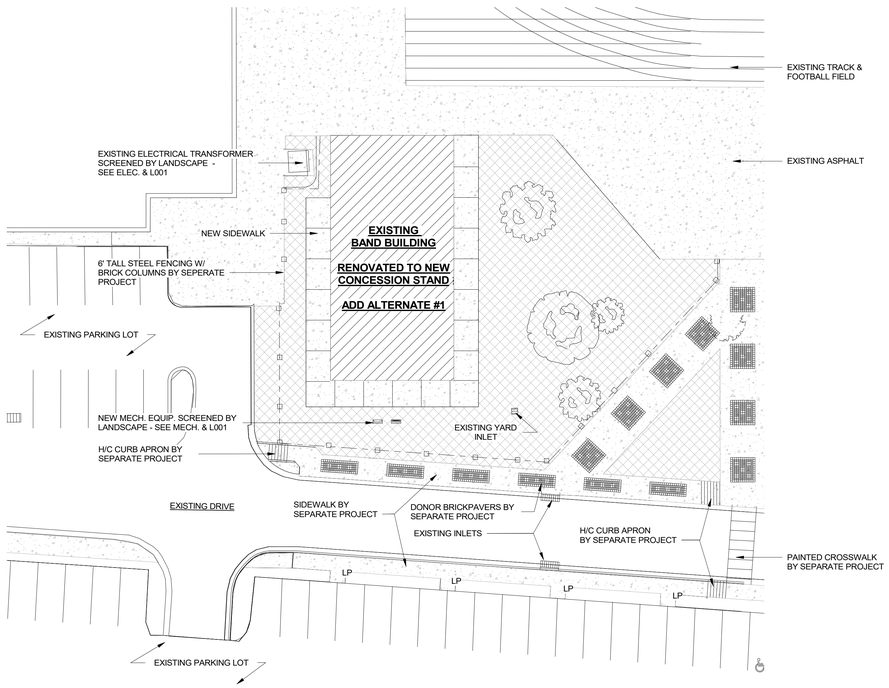
10/29/2019 6:01:45 PM



1 **SITE PLAN @ BAND ADDITION**
1" = 20'-0"



3 **SITE PLAN @ NEW PARKING**
1" = 20'-0"



2 **SITE PLAN @ CONCESSION STAND**
1" = 20'-0"

SITE LEGEND
EXISTING BUILDING
NEW CONSTRUCTION
GREENSPACE
CONCRETE

GENERAL SITE NOTES

1. THE NEW BAND ADDITION IS TO BE CONSIDERED BASE BID. THIS PROJECT PROCEEDS ANY ADD ALTERNATE LISTED BELOW IN CONSTRUCTION.
2. ADD ALTERNATE #1 IS THE EXISTING METAL BUILDING, CURRENTLY USED AS BAND STORAGE. THAT IS TO BE RENOVATED INTO A CONCESSION STAND. THIS PROJECT, IF ADDED TO CONTRACT, WILL HAVE TO BE COMPLETED AFTER THE BAND ADDITION. ALL ITEMS STORED IN THE EXISTING BAND STORAGE WILL HAVE TO BE RELOCATED TO THE NEW BAND ADDITION BEFORE CONSTRUCTION BEGINS. SEE 2/AS1.1.
3. ADD ALTERNATE #2 IS THE PARKING LOT DIRECTLY EAST OF THE NEW BAND ADDITION. SEE 1/AS1.1.
4. ADD ALTERNATE #3 IS TO BE AN ADDITION TO THE PARKING LOT NORTH OF THE NEW BAND ADDITION. SEE 3/AS1.1.

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STEVEN W. LANDWEHR
REGISTERED ARCHITECT
STATE OF TENNESSEE

ARCHITECTURAL SITE PLAN

REVISIONS		
Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
10/30/19	2	ADD. #2

PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
October 11, 2019

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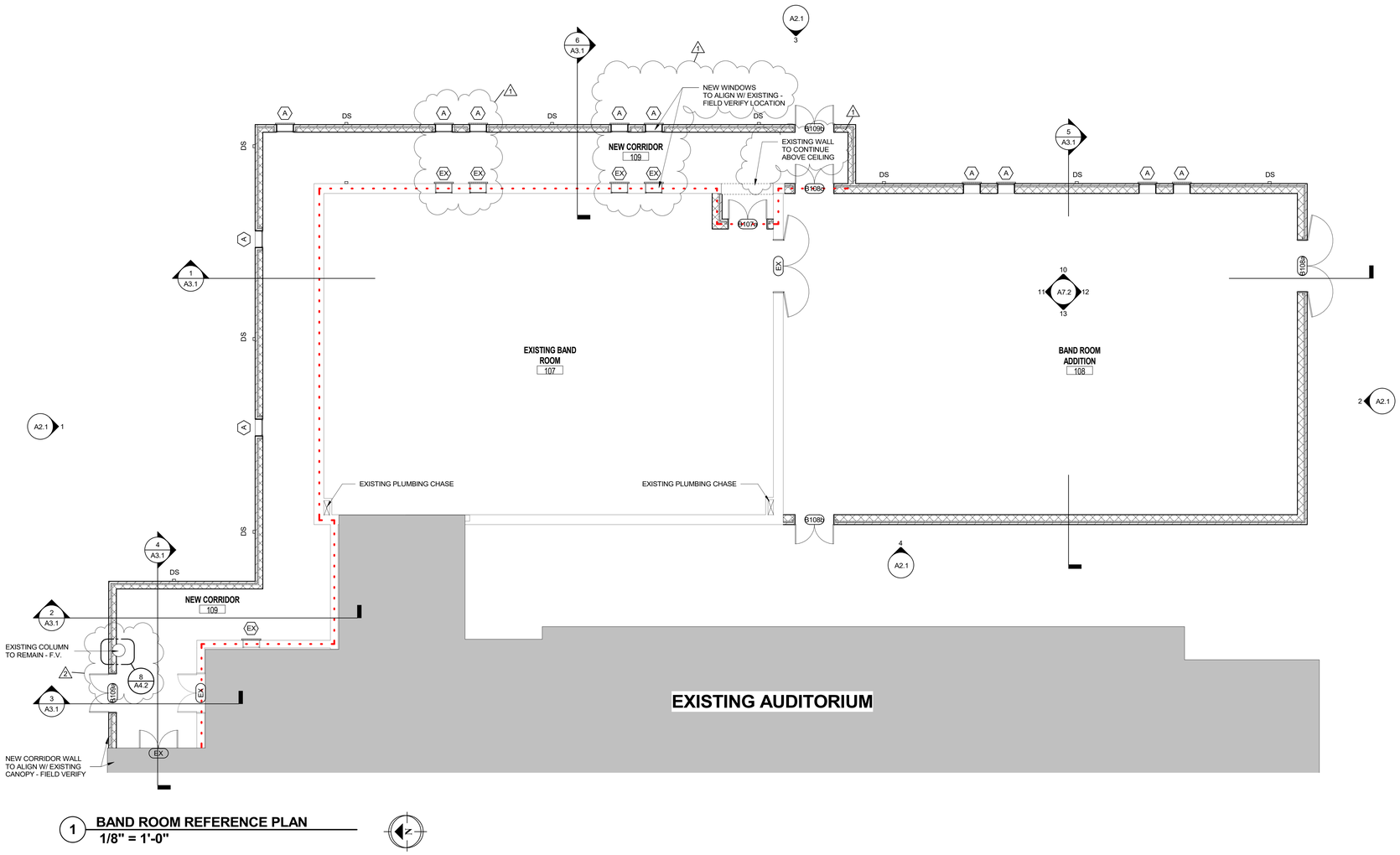
AS1.1

10/29/2019 6:01:42 PM



1 **BAND ROOM REFERENCE PLAN**
1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. INTERIOR DIMENSIONS ARE TO FACE OF FINISHED WALL UNLESS NOTED OTHERWISE.
2. EXTERIOR DIMENSIONS ARE TO FACE OF CONC. FOUNDATION WALLS, FACE OF BRICK OR OPENINGS UNLESS NOTED OTHERWISE.
3. REFER TO ENLARGED FLOOR PLAN SHEETS CONTAINING MORE DETAILED DIMENSIONS AND INFORMATION.
4. DO NOT SCALE DRAWINGS.
5. PROVIDE BLOCKING AT ALL WALL HUNG CABINETS, MIRRORS, WALL MOUNTED TOILET ACCESSORIES, TOILET PARTITIONS, DRINKING FOUNTAINS, AND FLAT SCREEN MONITORS.
6. USE MOISTURE RESISTANT GYP. BD. ON ALL WET WALLS IN JANITOR CLOSETS AND ON ALL NON-CMU WALLS IN FIRE PUMP ROOM.
7. SEE TOILET ENLARGEMENTS FOR LOCATIONS OF CEMENT BOARD AND MOISTURE RESISTANT GYP. BD. IN TOILET ROOMS.
8. SLOPE FLOORS TO FLOOR DRAINS AS INDICATED.
9. DOORS TO BE 4" FROM INTERIOR GYPSUM WALL CORNER UNLESS OTHERWISE NOTED.
10. DOORS TO BE 4" FROM INTERIOR CMU WALL CORNER UNLESS OTHERWISE NOTED.
11. E.J. = EXPANSION JOINT. SEE FLOOR FINISH PLANS FOR DETAILS
12. EVERY DOOR TO HAVE 18" CLEARANCE ON PULL SIDE. DOORS WITH CLOSER TO HAVE 12" CLEARANCE ON PUSH SIDE..
13. NOT ALL WALL FURRING IS NECESSARILY DIMENSIONED ON THESE PLANS. VARIOUS CONDITIONS EXIST SUCH AS COLUMNS, PIPES, CONDUIT, ETC, WHICH ARE LOCATED OUTSIDE THE PARAMETERS OF THE TYPICAL WALLS. IT IS INTENDED THAT ALL SUCH ITEMS BE ENCLOSED IN WALL FURRING.
    A. WALL FURRING SHALL CONSIST OF 2 1/2", 3 5/8", OR 6" METAL STUDS AS CONDITIONS DETERMINE, AND 5/8" GYP. BD.
    B. SEE PLAN ENLARGEMENTS FOR ATYPICAL WALL FURRING CONDITIONS.
    C. G.C. SHALL FIELD VERIFY SIZES OF WALL FURRING AT COLUMNS, PIPING, CONDUIT, ETC. - INSTALL FRAMING AND GYP. BD. AS TIGHT AS POSSIBLE WHILE MAINTAINING REQUIRED CLEARANCES. - COORDINATE WITH MECH., PLUMB., & ELEC.
    D. CONTACT ARCHITECT FOR UNFORESEEN COORDINATION ITEMS BEFORE INSTALLING FRAMING & GYP. BD.
    E. WALL FURRING IS INTENDED TO EXTEND 6" ABOVE THE CEILING FOR VISUAL CONCEALMENT OF COLUMNS, PIPING, CONDUIT, ETC.
14. EX = EXISTING. WINDOWS & DOORS MARKED AS EXISTING ARE FOR REFERENCE ONLY & ARE NOT ACCOUNTED FOR IN SCHEDULES.
15. REMOVE EXISTING UNUSED WEEPS IN EXISTING BAND ROOM AND POINT UP HEAD JOINTS TO SEAL.
16. REMOVE EXISTING BOLLARDS & CHAINS FROM OLD TRUCK APRON AND AT EXISTING ENTRY DOOR.
17. DEMOLISH EXISTING SOFFIT AT EXISTING ENTRY DOOR - SEE RCP.

WALL TAGS DESCRIPTION

A1Y — WALL TYPE TAG

WALL TAGS LETTER ID

C — CMU

WALL TAGS DESCRIPTION

structure material (CMU) — specific wall type — NOT to deck

C1N

SYMBOL LEGEND

- NORTH ARROW
- SIM / 1 / A101 — ENLARGED PLAN OR PLAN DETAIL
- ROOM NAME: 4000A — ROOM NAME & NUMBER
- 1 Ref / Ref / A101 / Ref / 1 Ref — ELEVATION
- SIM / 1 / A101 — SECTION
- COLUMN GRID
- 101 — DOOR NUMBER
- AA — WINDOW TYPE TAG
- A1Y — WALL TYPE TAG
- CENTERLINE
- SPOT ELEVATION
- FD — FLOOR DRAIN
- SMOKE TIGHT PARTITION

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STEVEN W. LANDWEHR — REGISTERED ARCHITECT — STATE OF TENNESSEE

BAND ROOM REFERENCE PLAN

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
10/30/19	2	ADD. #2

PROJECT NUMBER
150119

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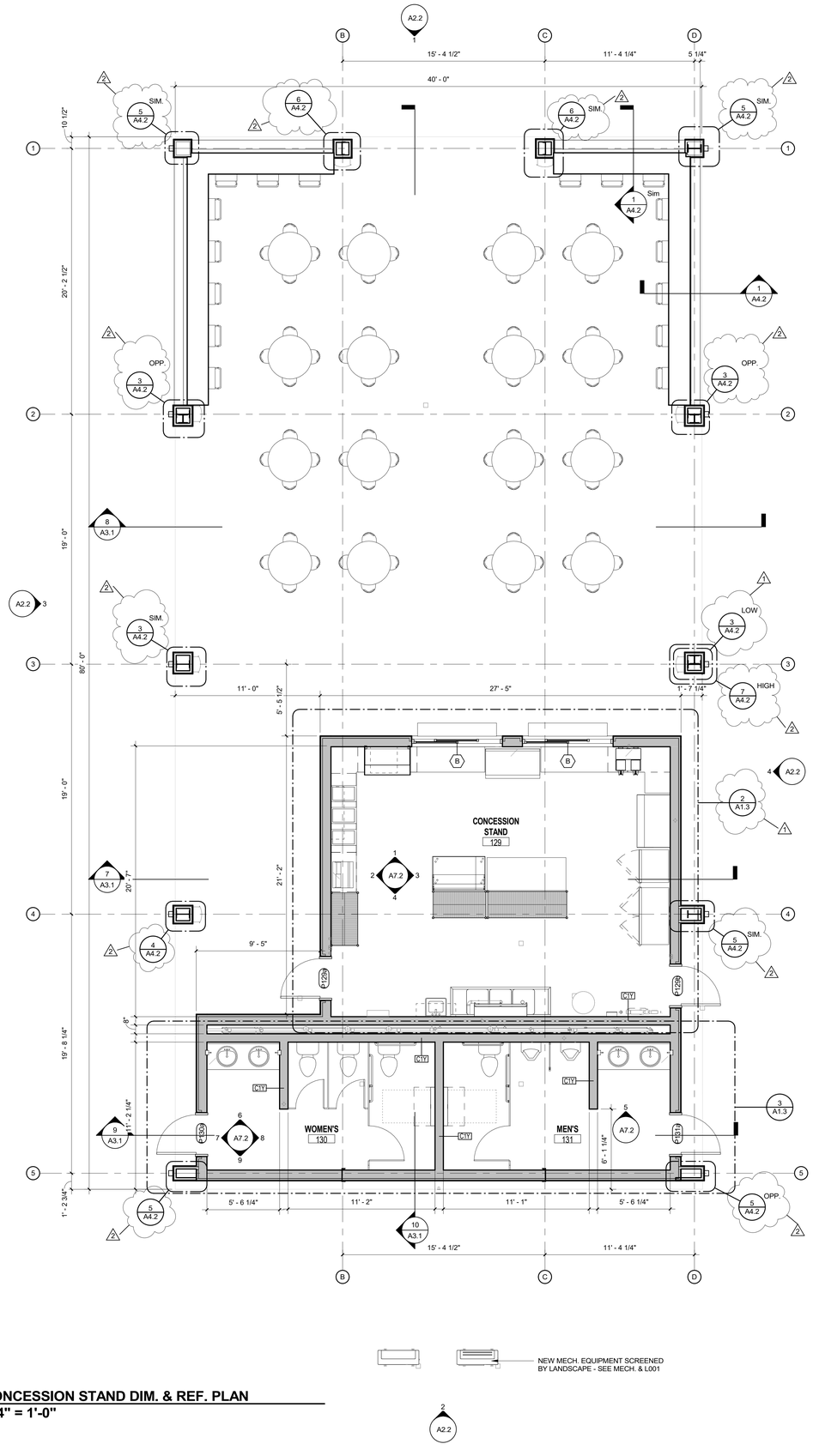
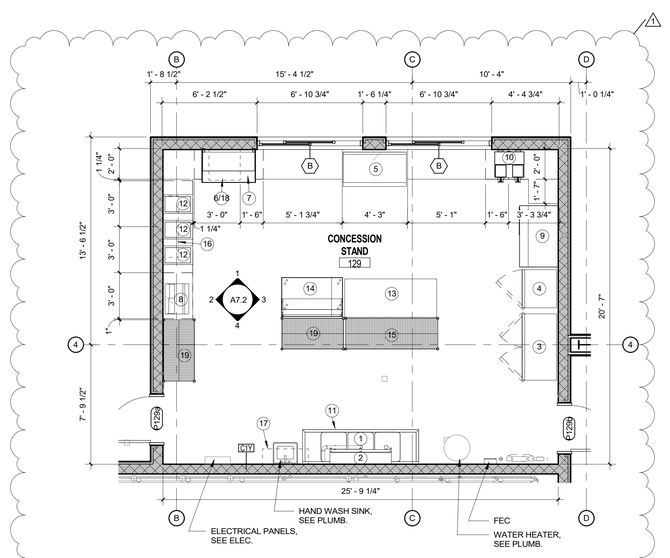
SHEET NUMBER
A1.2

10/30/2019 9:25:43 AM

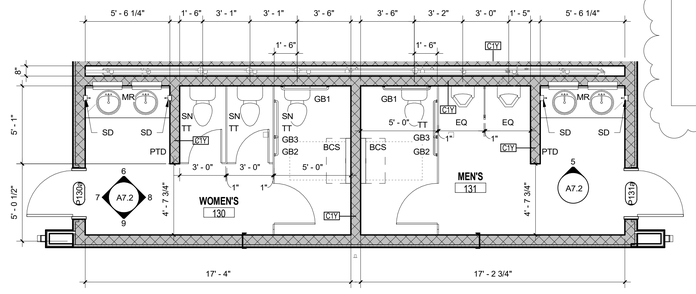


1 CONCESSION STAND DIM. & REF. PLAN
1/4" = 1'-0"

NOTE: CONCESSION STAND WORK IS ADD ALTERNATE #1.



2 ENLARGED PLAN @ CONCESSION STAND
1/4" = 1'-0"



3 ENLARGED PLAN @ CONCESSION STAND RESTROOMS
1/4" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. INTERIOR DIMENSIONS ARE TO FACE OF FINISHED WALL UNLESS NOTED OTHERWISE.
2. EXTERIOR DIMENSIONS ARE TO FACE OF CONC. FOUNDATION WALLS, FACE OF BRICK OR OPENINGS UNLESS NOTED OTHERWISE.
3. REFER TO ENLARGED FLOOR PLAN SHEETS CONTAINING MORE DETAILED DIMENSIONS AND INFORMATION.
4. DO NOT SCALE DRAWINGS.
5. PROVIDE BLOCKING AT ALL WALL HUNG CABINETS, MIRRORS, WALL MOUNTED TOILET ACCESSORIES, TOILET PARTITIONS, DRINKING FOUNTAINS, AND FLAT SCREEN MONITORS.
6. USE MOISTURE RESISTANT GYP. BD. ON ALL WET WALLS IN JANITOR CLOSETS AND ON ALL NON-CMU WALLS IN FIRE PUMP ROOM.
7. SEE TOILET ENLARGEMENTS FOR LOCATIONS OF CEMENT BOARD AND MOISTURE RESISTANT GYP. BD. IN TOILET ROOMS.
8. SLOPE FLOORS TO FLOOR DRAINS AS INDICATED.
9. DOORS TO BE 4" FROM INTERIOR GYPSUM WALL CORNER UNLESS OTHERWISE NOTED.
10. DOORS TO BE 4" FROM INTERIOR CMU WALL CORNER UNLESS OTHERWISE NOTED.
11. E.J. = EXPANSION JOINT. SEE FLOOR FINISH PLANS FOR DETAILS
12. EVERY DOOR TO HAVE 18" CLEARANCE ON PULL SIDE. DOORS WITH CLOSER TO HAVE 12" CLEARANCE ON PUSH SIDE..
13. NOT ALL WALL FURRING IS NECESSARILY DIMENSIONED ON THESE PLANS. VARIOUS CONDITIONS EXIST SUCH AS COLUMNS, PIPES, CONDUIT, ETC. WHICH ARE LOCATED OUTSIDE THE PARAMETERS OF THE TYPICAL WALLS. IT IS INTENDED THAT ALL SUCH ITEMS BE ENCLOSED IN WALL FURRING.
    A. WALL FURRING SHALL CONSIST OF 2 1/2", 3 5/8", OR 6" METAL STUDS AS CONDITIONS DETERMINE, AND 5/8" GYP. BD.
    B. SEE PLAN ENLARGEMENTS FOR ATYPICAL WALL FURRING CONDITIONS.
    C. G.C. SHALL FIELD VERIFY SIZES OF WALL FURRING AT COLUMNS, PIPING, CONDUIT, ETC. - INSTALL FRAMING AND GYP. BD. AS TIGHT AS POSSIBLE WHILE MAINTAINING REQUIRED CLEARANCES. - COORDINATE WITH MECH., PLUMB., & ELEC.
    D. CONTACT ARCHITECT FOR UNFORESEEN COORDINATION ITEMS BEFORE INSTALLING FRAMING & GYP. BD.
    E. WALL FURRING IS INTENDED TO EXTEND 6" ABOVE THE CEILING FOR VISUAL CONCEALMENT OF COLUMNS, PIPING, CONDUIT, ETC.
14. EX = EXISTING. WINDOWS & DOORS MARKED AS EXISTING ARE FOR REFERENCE ONLY & ARE NOT ACCOUNTED FOR IN SCHEDULES.
15. REMOVE EXISTING UNUSED WEEPS IN EXISTING BAND ROOM AND POINT UP HEAD JOINTS TO SEAL.
16. REMOVE EXISTING BOLLARDS & CHAINS FROM OLD TRUCK APRON AND AT EXISTING ENTRY DOOR.
17. DEMOLISH EXISTING SOFFIT AT EXISTING ENTRY DOOR - SEE RCP.

EQUIPMENT LEGEND

MARK	DESCRIPTION - SERIAL NUMBER	SUPPLIER/ INSTALLER	QTY.
1	3-COMPARTMENT SINK - ADVANCE TABCO 94-3-54-18RL	CSCI	1
2	WALL-MOUNTED POT RACK - ADVANCE TABCO SW-48-EC-X	CSCI	1
3	REACH-IN FREEZER - TRAULSEN G22010	CSCI	1
4	REACH-IN REFRIGERATOR - TRAULSEN G10010	CSCI	1
5	BOTTLE COOLER - TRUE MANUFACTURING CO., INC. TD-50-18-HC	CSCI	1
6	MICROWAVE OVEN - MENUMASTER MCS10TS	CSCI	1
7	DISPLAY MERCHANDISER, HEATED, FOR MULTI-PRODUCT - HATCO GR2DS-36D	CSCI	1
8	HOT DOG GRILL - APW WYOTT HR-31SBD	CSCI	1
9	ICE MAKER, CUBE-STYLE - ICE-OMATIC CIM0530HA	CSCI	1
10	COFFEE BREWER - BUNN 04275.0031	CSCI	1
11	DISPOSER - SALVAJOR 100-SA-3-ARSS	CSCI	1
12	HOT FOOD WELL - NEMCO FOOD EQUIPMENT 6055A	CSCI	3
13	WORK TABLE - ADVANCE TABCO VKS-306	CSCI	1
14	SANDWICH/SALAD PREPARATION REFRIGERATOR - HOSHIZAKI SR48A-12	CSCI	1
15	WIRE SHELVING - ADVANCE TABCO EG-2472	CSCI	1
16	SHELVING, WALL-MOUNTED - ADVANCE TABCO WS-12-48	CSCI	1
17	SHELVING, WALL-MOUNTED - ADVANCE TABCO WS-12-36	CSCI	1
18	MICROWAVE OVEN SHELF - ADVANCE TABCO MS-24-24	CSCI	1
19	WIRE SHELVING - ADVANCE TABCO EG-2448	CSCI	2

TOILET ACCESSORY LEGEND

MARK	DESCRIPTION - SERIAL NUMBER	SUPPLIER/ INSTALLER	QTY.
MR	WALL MOUNTED MIRROR - REFER TO INT. ELEV. FOR SIZE.	CSCI	2
GB1	GRAB BAR 36" - BOBRICK B-6806 X 36, 1-1/4" DIA. STAINLESS STEEL W/ SNAP FLANGE	CSCI	2
GB2	GRAB BAR 42"- BOBRICK B-6806 X 42, 1-1/4" DIA. STAINLESS STEEL W/ SNAP FLANGE	CSCI	2
GB3	GRAB BAR 18" VERTICAL - BOBRICK B-6806 X 18, 1-1/4" DIA. STAINLESS STEEL W/ SNAP FLANGE	CSCI	2
SD	SOAP DISPENSER - LOCKABLE STAINLESS STEEL COMMERCIAL GRADE REFILLABLE BY BULK JUG	CSCI	4
TT	TOILET TISSUE DISPENSER - LOCKABLE STAINLESS STEEL 1,000 FT. ROLL 3-1/4"W x 9"D W/ 3-1/4" CORE	CSCI	4
SN	SANITARY NAPKIN DISPOSAL - BOBRICK B-270 SURFACE-MOUNTED	CSCI	3
PTD	PAPER TOWEL DISPENSER - LOCKABLE STAINLESS STEEL 800 FT. ROLL 17-1/2"W x 8"D	CSCI	2
BCS	BABY CHANGING STATION - BOBRICK KB110-SSWM WALL-MOUNTED	CSCI	2

WALL TAGS DESCRIPTION

A1Y — WALL TYPE TAG

WALL TAGS LETTER ID

C — CMU

WALL TAGS DESCRIPTION

structure material (CMU) / specific wall type / NOT to deck

C1N

SYMBOL LEGEND

- NORTH ARROW
- 1 A101 SIM — ENLARGED PLAN OR PLAN DETAIL
- ROOM NAME 4000A — ROOM NAME & NUMBER
- 1 Ref A101 1 Ref — ELEVATION
- 1 A101 SIM — SECTION
- COLUMN GRID
- 101 — DOOR NUMBER
- AA — WINDOW TYPE TAG
- A1Y — WALL TYPE TAG
- CENTERLINE
- SPOT ELEVATION
- FD — FLOOR DRAIN
- SMOKE TIGHT PARTITION

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Germantown, TN 38139

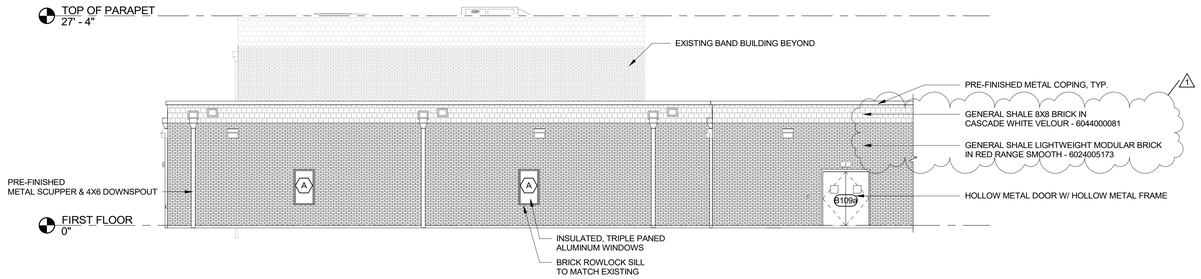
STEVEN W. LANDREVIE — REGISTERED ARCHITECT — TENNESSEE — 10/10/19

CONCESSION STAND DIMENSION & REFERENCE PLAN

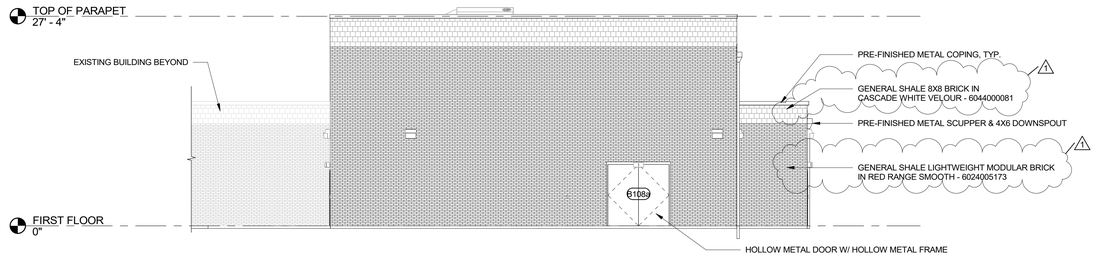
REVISIONS		
Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
10/30/19	2	ADD. #2

PROJECT NUMBER 150119
DATE OF ORIGINAL ISSUE October 11, 2019
SHEET NUMBER
A1.3

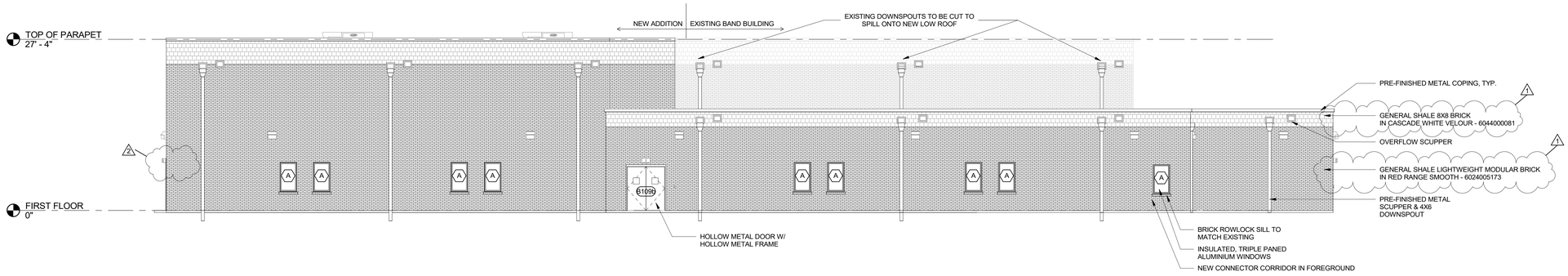
10/29/2019 6:00:54 PM



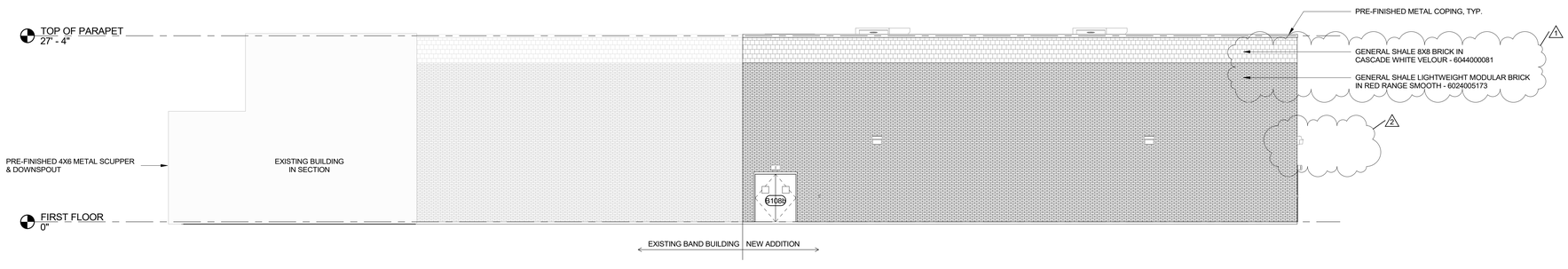
1 BAND ROOM NORTH ELEVATION
1/8" = 1'-0"



2 BAND ROOM SOUTH ELEVATION
1/8" = 1'-0"



3 BAND ROOM EAST ELEVATION
1/8" = 1'-0"



4 BAND ROOM WEST ELEVATION
1/8" = 1'-0"

NOTE: ALL DOWNSPOUTS SHALL TERMINATE INTO A CAST IRON DOWNSPOUT BOOT THAT CONNECTS TO AN UNDERGROUOND STORM LEADER.

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STEVEN R. LANDRETH
REGISTERED ARCHITECT
No. 102019
STATE OF TENNESSEE

BAND ROOM EXTERIOR ELEVATIONS

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
10/30/19	2	ADD. #2

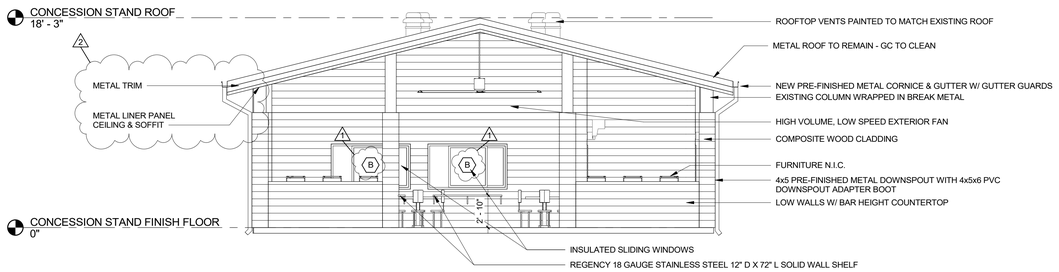
PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
October 11, 2019

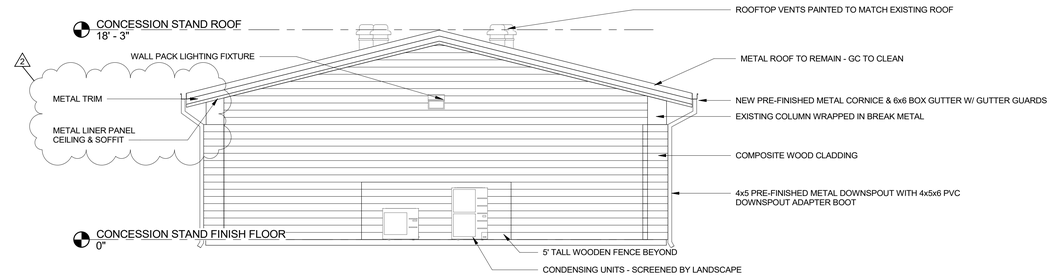
SHEET NUMBER
A2.1

10/30/2019 9:25:44 AM

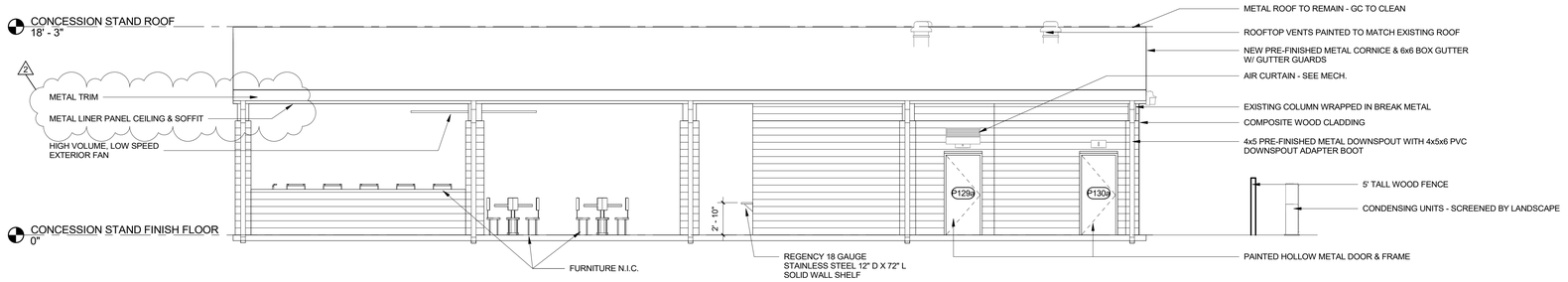
NOTE: CONTRACTOR TO CLEAN EXISTING METAL ROOF.



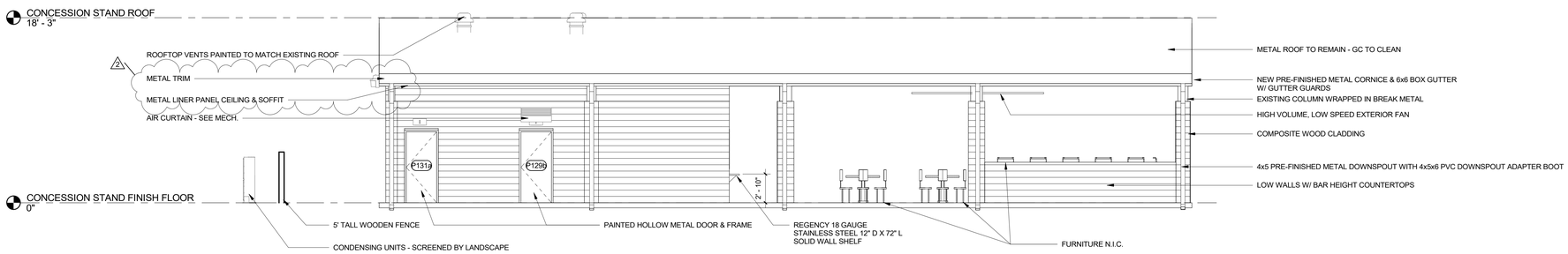
1 CONCESSION STAND EAST ELEVATION
3/16" = 1'-0"



2 CONCESSION STAND WEST ELEVATION
3/16" = 1'-0"



3 CONCESSION STAND NORTH ELEVATION
3/16" = 1'-0"



4 CONCESSION STAND SOUTH ELEVATION
3/16" = 1'-0"

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CONCESSION STAND EXTERIOR ELEVATIONS

REVISIONS

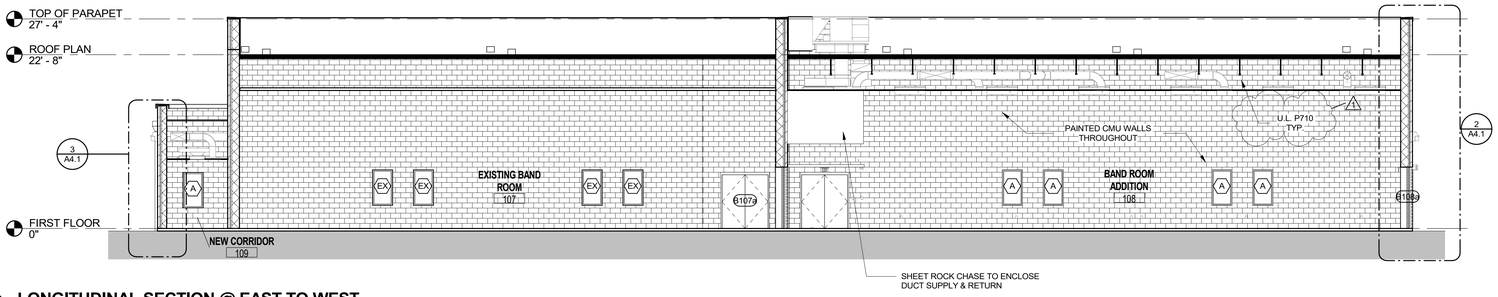
Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
10/30/19	2	ADD. #2

PROJECT NUMBER
150119

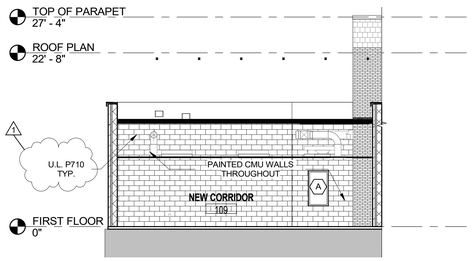
DATE OF ORIGINAL ISSUE
October 11, 2019

SHEET NUMBER
A2.2

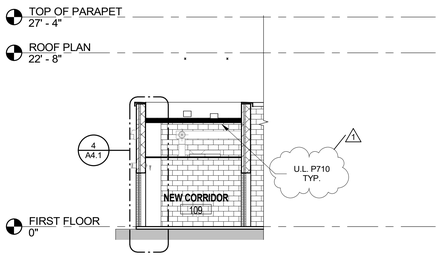
10/29/2019 6:00:58 PM



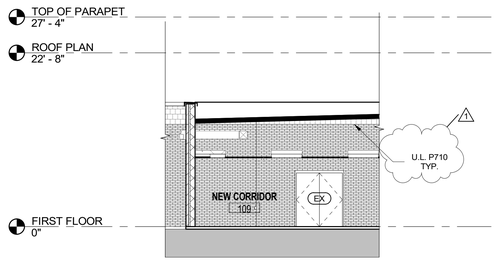
1 LONGITUDINAL SECTION @ EAST TO WEST
1/8" = 1'-0"



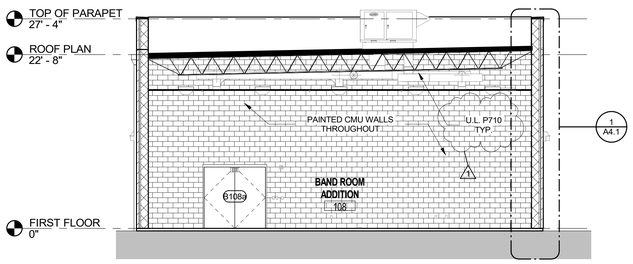
2 LONGITUDINAL SECTION @ CORRIDOR TURN
1/8" = 1'-0"



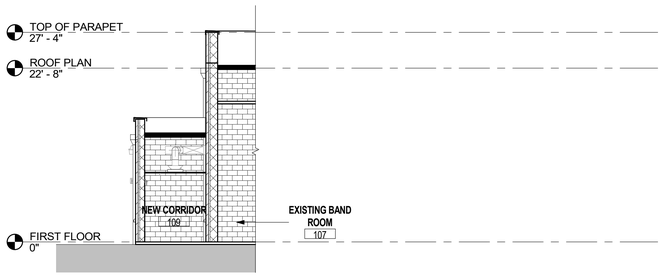
3 LONGITUDINAL SECTION @ SOUTH CORRIDOR ENTRY
1/8" = 1'-0"



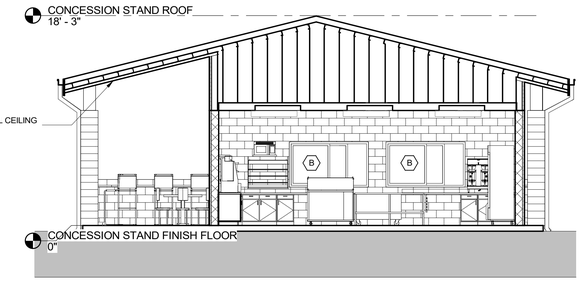
4 TRANSVERSE SECTION @ CORRIDOR TURN
1/8" = 1'-0"



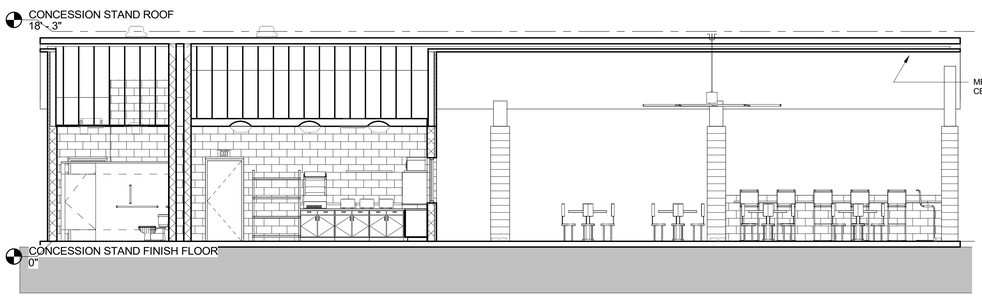
5 TRANSVERSE SECTION @ NEW ADDITION SPACE
1/8" = 1'-0"



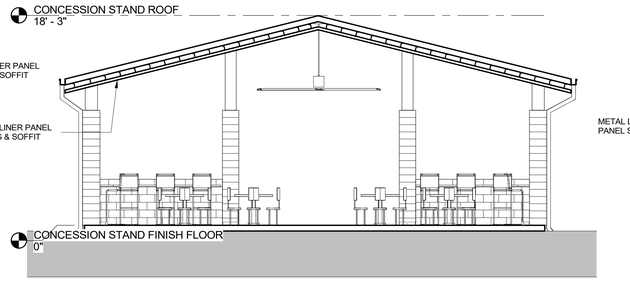
6 TRANVERSE SECTION @ EXISTING SPACE & CORRIDOR
1/8" = 1'-0"



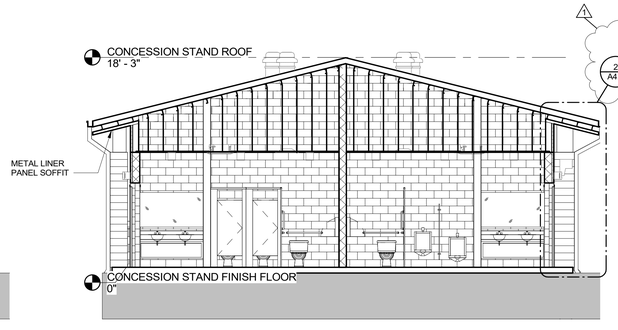
7 SECTION @ INTERIOR CONCESSION STAND
3/16" = 1'-0"



10 LONGITUDINAL CONCESSION STAND SECTION
3/16" = 1'-0"



8 SECTION @ CONCESSION STAND OUTDOOR DINING
3/16" = 1'-0"



9 SECTION @ CONCESSION STAND RESTROOMS
3/16" = 1'-0"

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STEVEN W. LANDWEHR
REGISTERED ARCHITECT
No. 102610
STATE OF TENNESSEE
10/29/19

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
10/30/19	2	ADD. #2

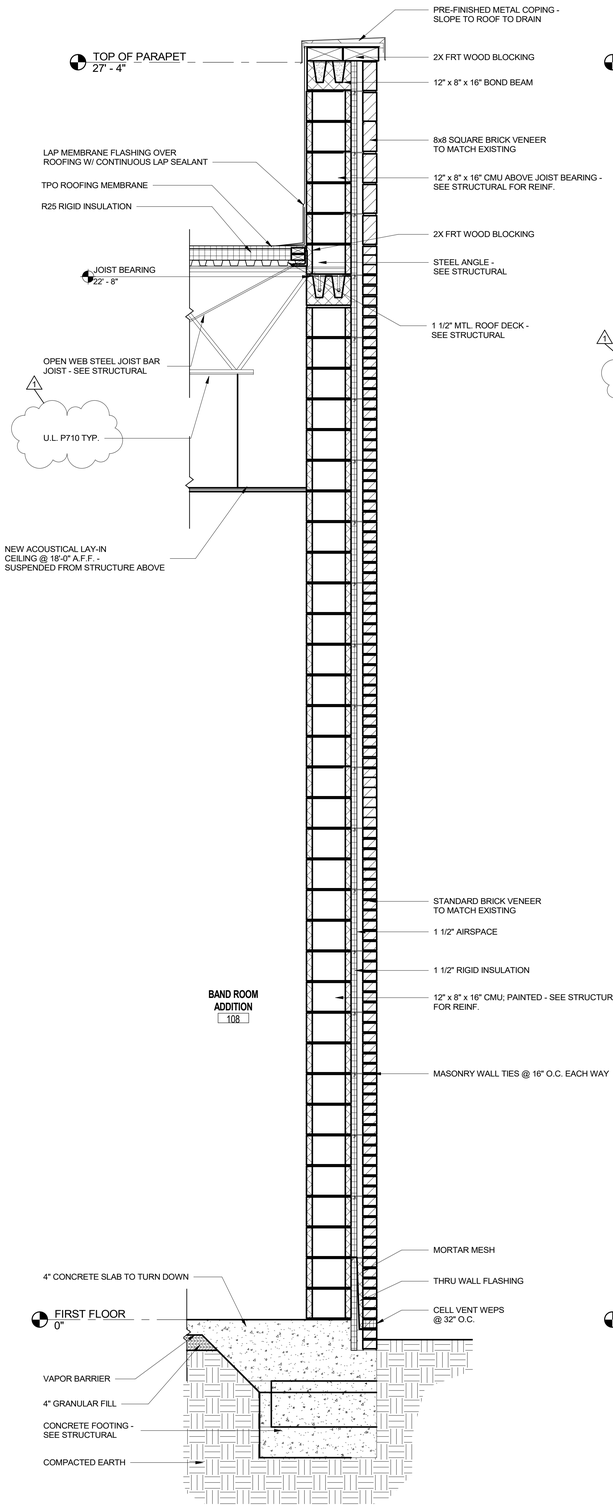
PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
October 11, 2019

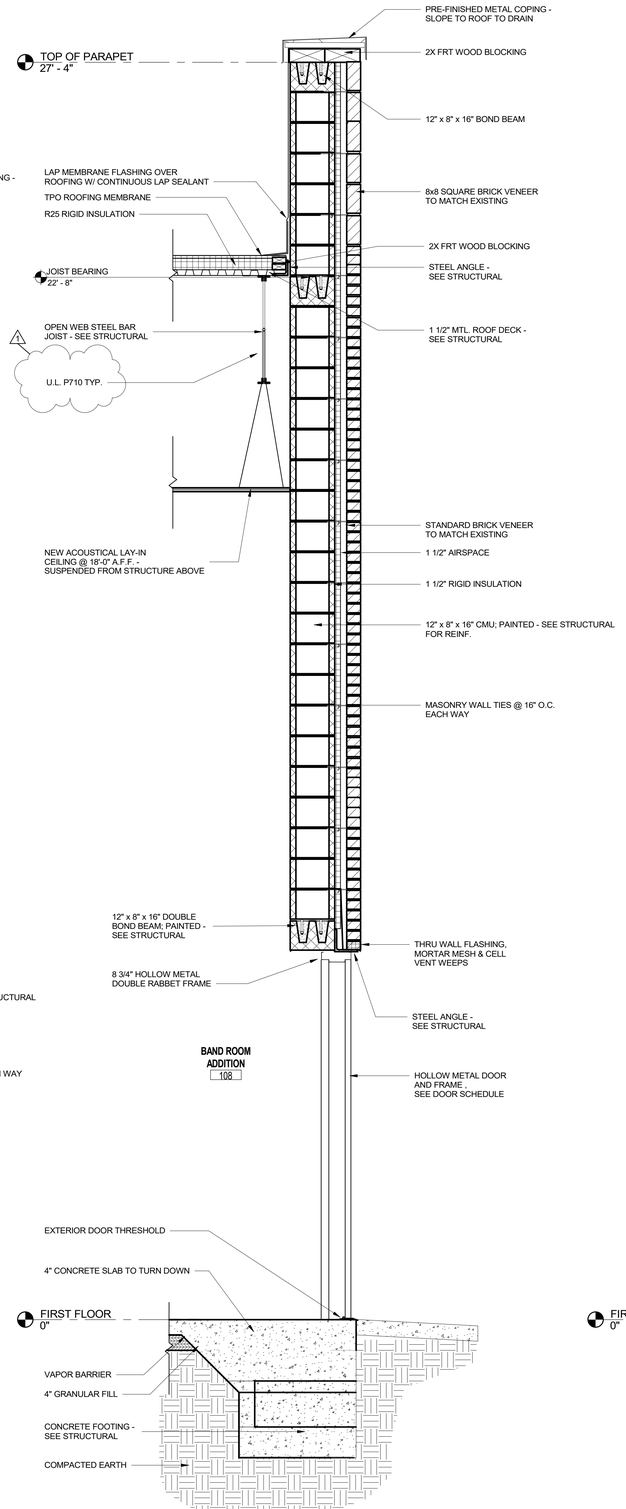
SHEET NUMBER
A3.1

BUILDING SECTIONS

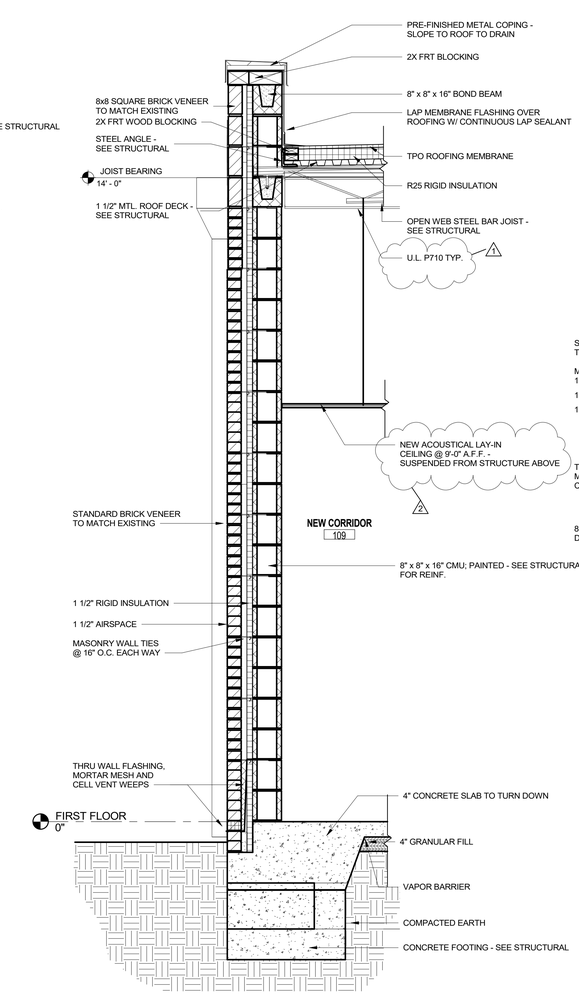
10/29/2019 6:01:03 PM



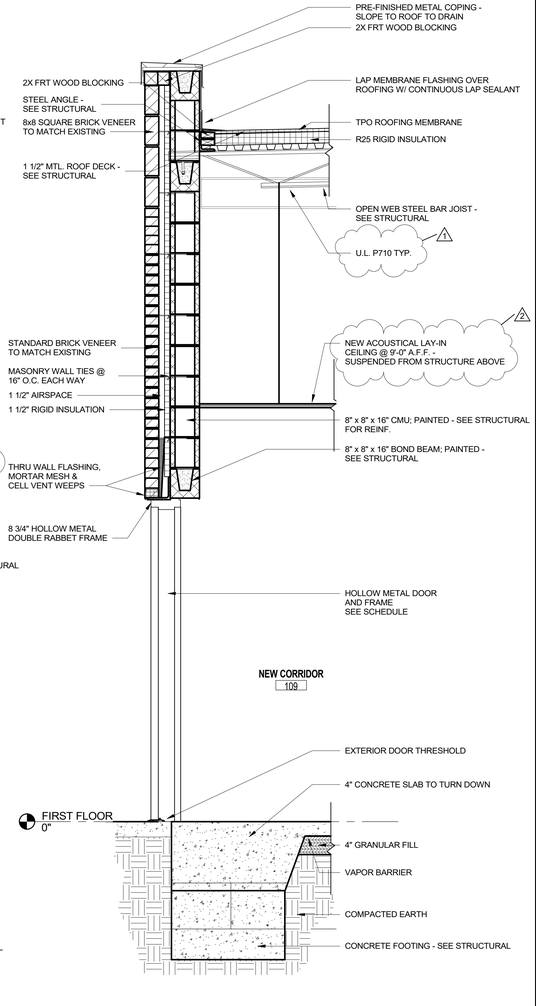
1 **TYP. WALL SECTION @ NEW ADDITION WALL**
3/4" = 1'-0"



2 **TYP. WALL SECTION @ NEW ADDITION WALL W/ DOOR**
3/4" = 1'-0"



3 **TYP. WALL SECTION @ NEW CORRIDOR WALL**
3/4" = 1'-0"



4 **TYP. WALL SECTION @ NEW CORRIDOR WALL W/ DOOR**
3/4" = 1'-0"

10/29/2019 6:01:05 PM

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STEVEN W. LANDWEHR
REGISTERED ARCHITECT
No. 102019
STATE OF TENNESSEE
10/11/19

REVISIONS

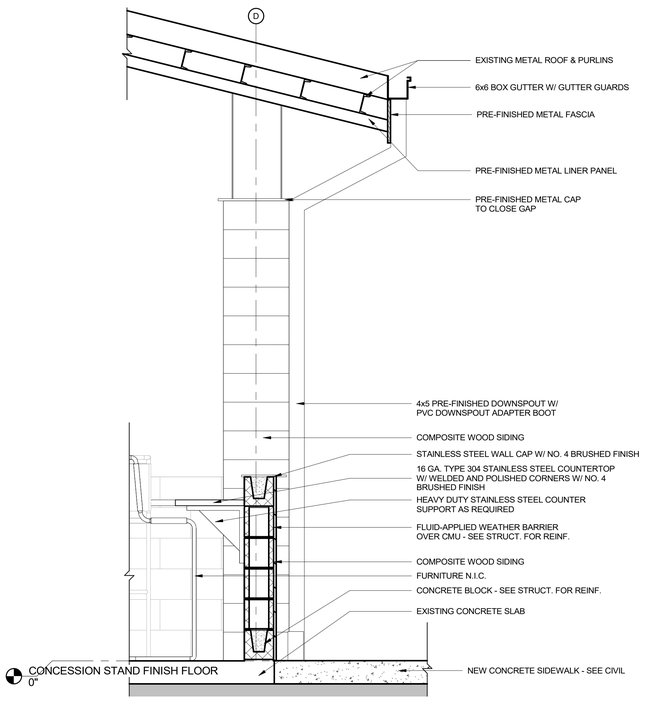
Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
10/30/19	2	ADD. #2

PROJECT NUMBER
150119

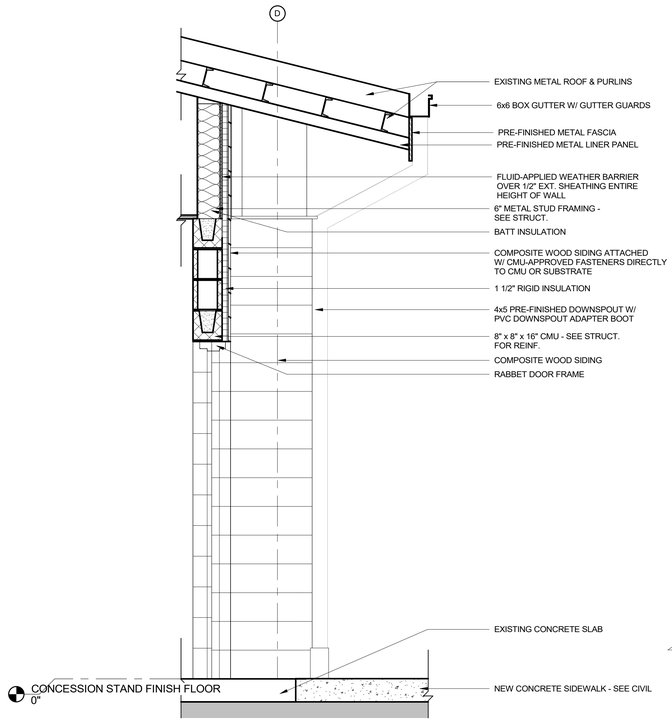
DATE OF ORIGINAL ISSUE
October 11, 2019

SHEET NUMBER
A4.1

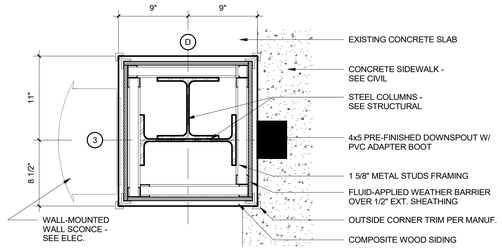
WALL SECTIONS



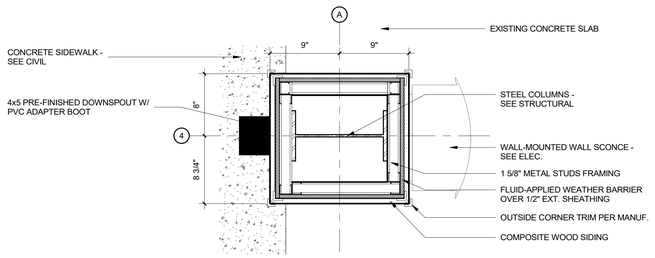
1 TYP. WALL SECTION @ CONCESSION STAND BAR WALLS
3/4" = 1'-0"



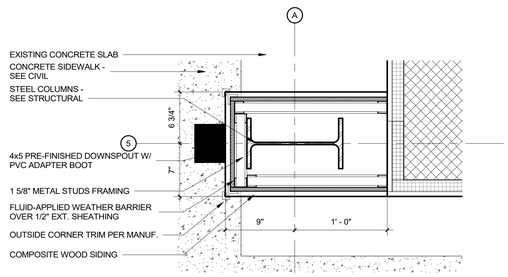
2 TYP. WALL SECTION @ CONCESSION STAND DOOR
3/4" = 1'-0"



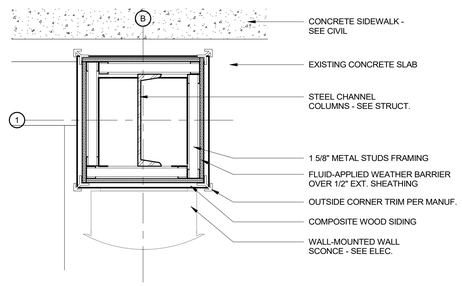
3 TYP. DOUBLE COLUMN BASE DTL.
1 1/2" = 1'-0"



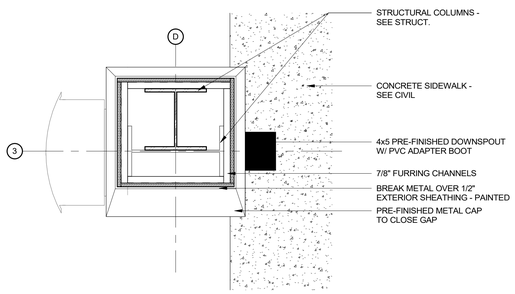
4 TYP. SINGLE COLUMN BASE DTL.
1 1/2" = 1'-0"



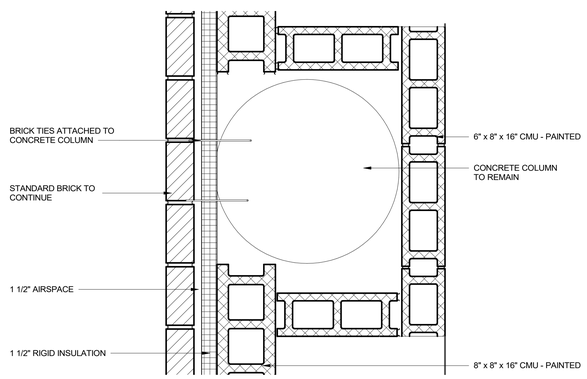
5 TYP. COLUMN DTL. @ WALL
1 1/2" = 1'-0"



6 TYP. CHANNEL COLUMN DTL.
1 1/2" = 1'-0"

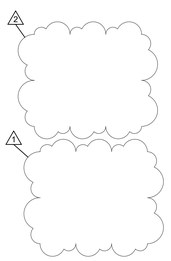


7 TYP. BREAK METAL COLUMN WRAP DTL.
1 1/2" = 1'-0"



NOTE: FIELD VERIFY EXISTING PLANE OF NORTHERN BRICK WITH THE NORTH FACE OF EXISTING CIRCULAR COLUMN.

8 DETAIL @ EXISTING COLUMN FURR-OUT
1 1/2" = 1'-0"



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STEVEN W. LANDWEHR
REGISTERED ARCHITECT
ACD.0001276
10/30/19
STATE OF TENNESSEE

WALL SECTIONS AND DETAILS

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
10/30/19	2	ADD. #2

PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
October 11, 2019

SHEET NUMBER
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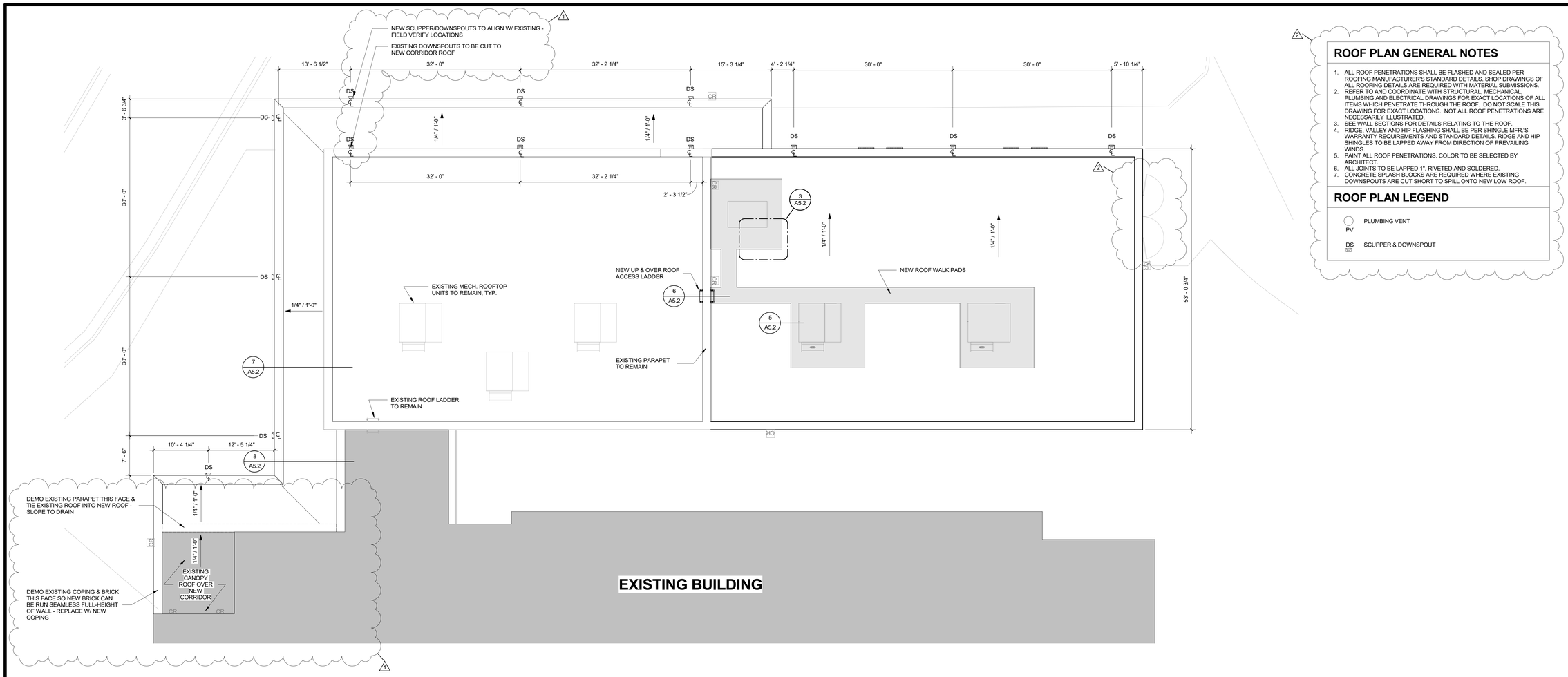

1 **BAND ROOM ROOF PLAN**
1/8" = 1'-0"

ROOF PLAN GENERAL NOTES

1. ALL ROOF PENETRATIONS SHALL BE FLASHED AND SEALED PER ROOFING MANUFACTURER'S STANDARD DETAILS. SHOP DRAWINGS OF ALL ROOFING DETAILS ARE REQUIRED WITH MATERIAL SUBMISSIONS.
2. REFER TO AND COORDINATE WITH STRUCTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR EXACT LOCATIONS OF ALL ITEMS WHICH PENETRATE THROUGH THE ROOF. DO NOT SCALE THIS DRAWING FOR EXACT LOCATIONS. NOT ALL ROOF PENETRATIONS ARE NECESSARILY ILLUSTRATED.
3. SEE WALL SECTIONS FOR DETAILS RELATING TO THE ROOF.
4. RIDGE, VALLEY AND HIP FLASHING SHALL BE PER SHINGLE MFR.'S WARRANTY REQUIREMENTS AND STANDARD DETAILS. RIDGE AND HIP SHINGLES TO BE LAPPED AWAY FROM DIRECTION OF PREVAILING WINDS.
5. PAINT ALL ROOF PENETRATIONS. COLOR TO BE SELECTED BY ARCHITECT.
6. ALL JOINTS TO BE LAPPED 1", RIVETED AND SOLDERED.
7. CONCRETE SPLASH BLOCKS ARE REQUIRED WHERE EXISTING DOWNSPOUTS ARE CUT SHORT TO SPILL ONTO NEW LOW ROOF.

ROOF PLAN LEGEND

PV PLUMBING VENT

DS SCUPPER & DOWNSPOUT

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ARCOLORADO
STATE OF TENNESSEE

10/11/19
10/30/19

ROOF PLAN

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
10/30/19	2	ADD. #2

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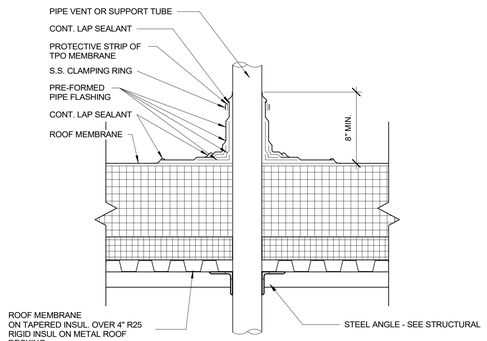
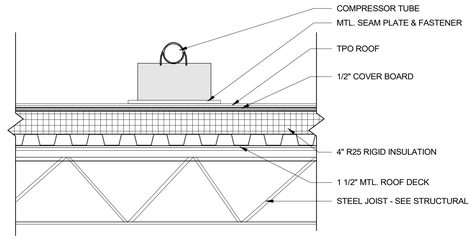
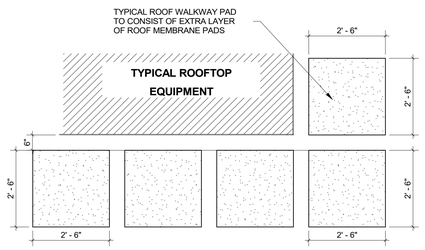


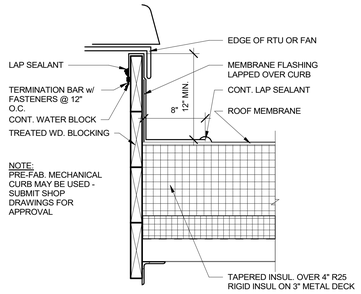
1 TYP. PIPE PENETRATION DETAIL
1 1/2" = 1'-0"



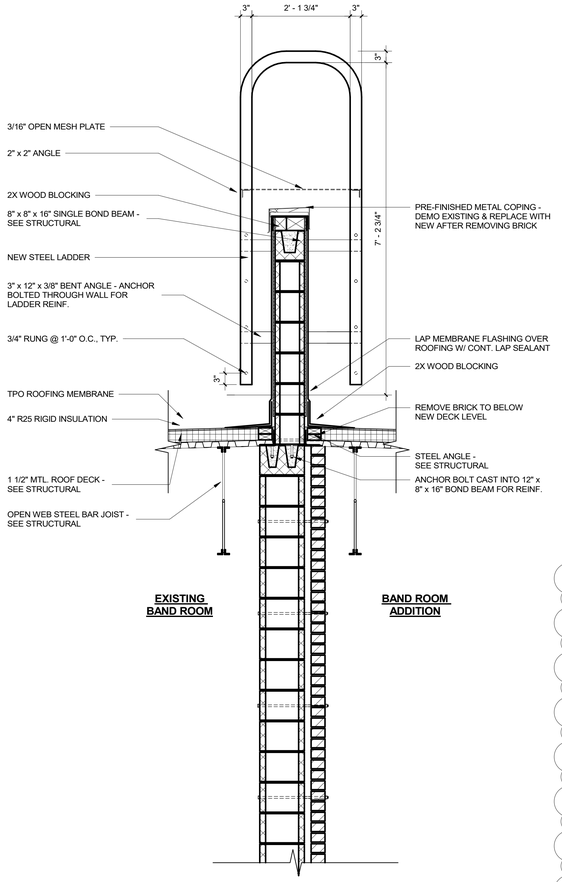
2 TYP. PIPE ANCHOR DETAIL
1 1/2" = 1'-0"



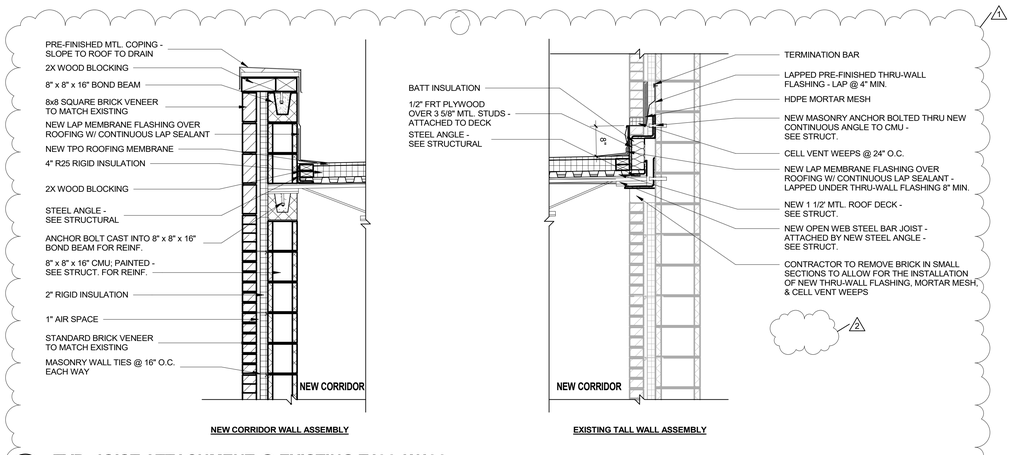
3 TYP. ROOF WALK PADS DETAIL
1/2" = 1'-0"



5 TYP. MECHANICAL CURB DETAIL
1 1/2" = 1'-0"

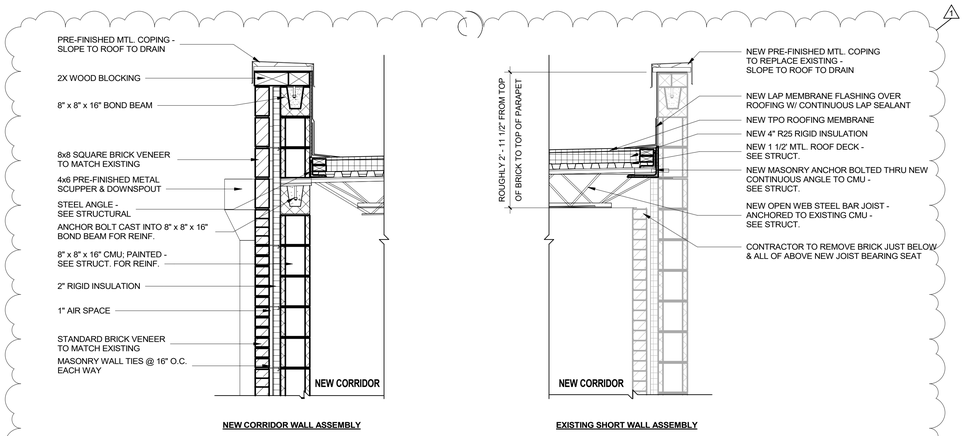


6 ROOF ACCESS LADDER DETAIL
3/4" = 1'-0"



7 TYP. JOIST ATTACHMENT @ EXISTING TALL WALL
3/4" = 1'-0"

NOTE: ALL NEW STRUCTURE AND DECK ARE 1 HOUR PROTECTED - U.L. P710



8 TYP. JOIST ATTACHMENT @ EXISTING SHORT WALL
3/4" = 1'-0"

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ACCLIVITY
10-11-19
STATE OF TENNESSEE

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PROJECT NUMBER
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DATE OF ORIGINAL ISSUE
October 11, 2019

SHEET NUMBER
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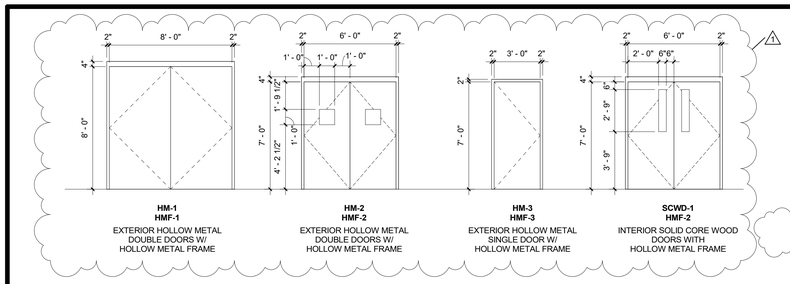
ROOF DETAILS

10/30/2019 9:25:45 AM

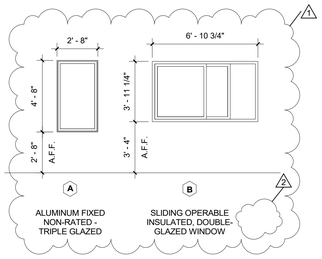


HM-1
HMF-1
EXTERIOR HOLLOW METAL DOUBLE DOORS W/ HOLLOW METAL FRAME

HM-2
HMF-2
EXTERIOR HOLLOW METAL DOUBLE DOORS W/ HOLLOW METAL FRAME

HM-3
HMF-3
EXTERIOR HOLLOW METAL SINGLE DOOR W/ HOLLOW METAL FRAME

SCWD-1
HMF-2
INTERIOR SOLID CORE WOOD DOORS WITH HOLLOW METAL FRAME



ALUMINUM FIXED NON-RATED - TRIPLE GLAZED

SLIDING OPERABLE INSULATED, DOUBLE-GLAZED WINDOW

DOOR & WINDOW SCHEDULE GENERAL NOTES

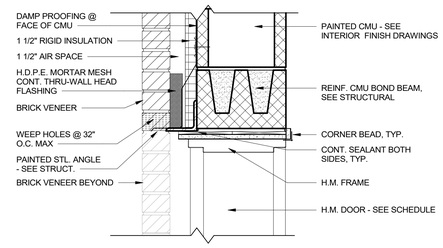
1. HOLLOW METAL FRAMES TO HAVE SILENCERS (TYPICAL).
2. VERIFY KEYING REQUIREMENTS WITH OWNER (TYPICAL)
3. H.M. FRAMES TO BE PAINTED.
4. SEE DOOR SCHEDULE FOR DOOR FINISHES.
5. PROVIDE ASTRAGALS AND COORDINATORS AT RATED INTERIOR PAIR DOORS.
6. PROVIDE SMOKE SEALS AT ALL SMOKE AND FIRE RATED INTERIOR DOORS.
7. COORDINATE LATCHING FOR ALL DOORS WITH HOLD OPENS.
8. CONTRACTOR SHALL COORDINATE FRAME THROAT DIMENSIONS WITH WALL TYPE LEGEND.
9. ALL DOOR SURFACES SHALL BE FINISHED INCLUDING TOP AND BOTTOM EDGES.
10. ALL EXTERIOR HOLLOW METAL DOORS ARE TO BE INSULATED.
11. FIRE-RESISTANCE RATED DOORS MUST HAVE FIRE RATED FRAMES, HARDWARE, CLOSERS, AND OTHER RATED ACCESSORIES. [1999 NFPA 80 1-4 DEFINITION OF "FIRE DOOR," 1-6.1, 2-4.7, AND IBC 715.4]
12. CLOSERS AND POSITIVE LATCHING HARDWARE ARE REQUIRED ON DOORS IN SMOKE PARTITIONS OR BARRIERS. [NFPA 101 7.2.1.8, 8.3.3.3., 8.4.3.5, 1999 NFPA 80 3-4, AND IBC 715.4.7]
13. HOLLOW METAL FRAMES IN STUD & GYP. BD. WALLS SHALL WRAP THE WALL ENDS, TYP.
14. SEE DOOR AND WINDOW TYPE ELEVATIONS FOR GLAZING TYPES

TEMPERED GLASS IS REQUIRED IN THE FOLLOWING LOCATIONS BY CODE:

1. GLAZING IN AN INDIVIDUAL FIXED OR OPERABLE PANEL ADJACENT TO A DOOR WHERE THE NEAREST EXPOSED EDGE OF THE GLAZING IS WITHIN A 24" ARC OF EITHER VERTICAL EDGE OF A DOOR IN CLOSED POSITION AND WHERE THE BOTTOM EXPOSED EDGE OF THE GLAZING IS LESS THAN 60" ABOVE THE WALKING SURFACE. GLAZING IN PERPENDICULAR PLANE TO DOORS WHEN CLOSED ARE EXEMPT ON THE LATCH SIDE OF THE DOOR IN GROUP R-2 [IBC 2406.3.6]

2. GLAZING IN AN INDIVIDUAL FIXED OR OPERABLE PANEL IN WHICH THE EXPOSED AREA OF AND INDIVIDUAL PANE IS GREATER THAN 9 SF., THE BOTTOM EDGE IS LESS THAN 18" ABOVE THE FLOOR, THE EXPOSED TOP EDGE IS GREATER THAN 36" ABOVE THE FLOOR, AND ONE OR MORE WALKING SURFACES ARE WITHIN 36" HORIZONTALLY OF THE PLANE OF THE GLAZING [IBC 2406.3.7]

3. GLAZING ADJACENT TO STAIRWAYS, LANDINGS AND RAMPS WITHIN 36" HORIZONTALLY OF A WALKING SURFACE, WITHIN 60" HORIZONTALLY OF THE BOTTOM TREAD OF A STAIRWAY IN ANY DIRECTION, AND THE BOTTOM EDGE IS LESS THAN 60" ABOVE THE PLANE OR THE ADJACENT WALKING SURFACE. [IBC 2406.3.10 & 2406.3.11]



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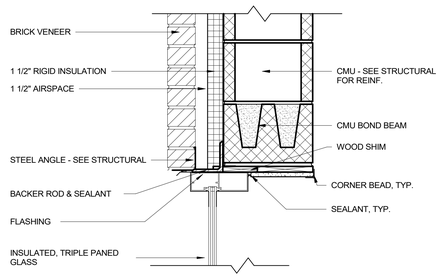

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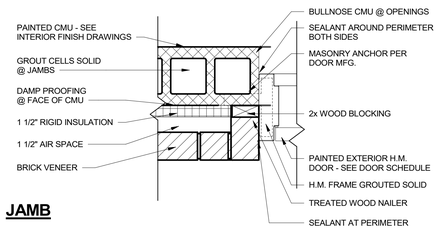
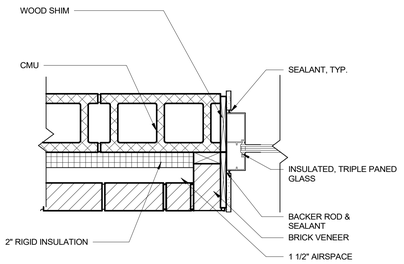


JAMB



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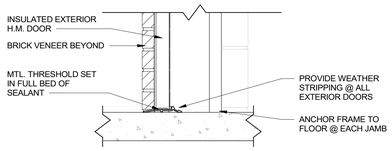
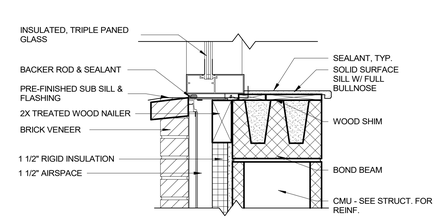


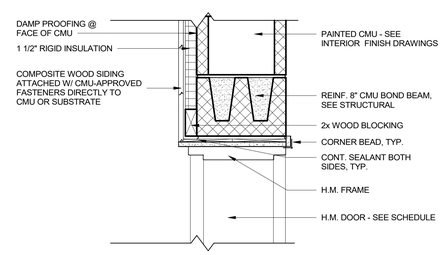
THRESHOLD

1 TYP. EXTERIOR HM @ CMU W/ BRICK DETAILS
1 1/2" = 1'-0"



SILL @ WALL

3 TYP. WINDOW @ CMU DETAILS
1 1/2" = 1'-0"



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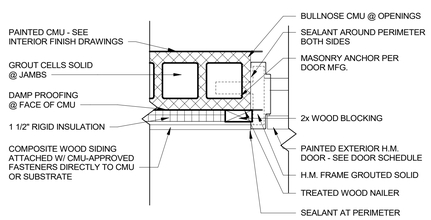

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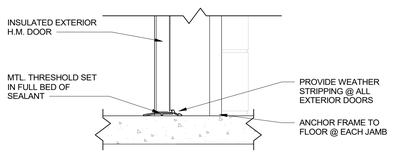

THRESHOLD

2 TYP. EXTERIOR HM @ CMU W/ COMPOSITE WOOD SIDING DETAILS
1 1/2" = 1'-0"

DOOR SCHEDULE

Mark	DOOR Width	DOOR Height	DOOR Thickness	Door Type	Door Finish	Frame Type	Frame Finish	Fire Rating	Comments
B107a	6' - 0"	7' - 0"	1 3/4"	SCWD-1	PAINT	HMF-2	PAINT	SMOKE SEALED	PANIC HARDWARE, CLOSERS, SMOKE SEALS, CLASSROOM LOCK, ASTRAGAL
B108a	8' - 0"	8' - 0"	1 3/4"	HM-1	PAINT	HMF-1	PAINT	N/A	PANIC HARDWARE, CLOSERS, SMOKE SEALS, CLASSROOM LOCK, ASTRAGAL
B108b	6' - 0"	7' - 0"	1 3/4"	HM-2	PAINT	HMF-2	PAINT	N/A	PANIC HARDWARE, CLOSERS, SMOKE SEALS, CLASSROOM LOCK, ASTRAGAL
B108c	6' - 0"	7' - 0"	1 3/4"	SCWD-1	PAINT	HMF-2	PAINT	SMOKE SEALED	PANIC HARDWARE, CLOSERS, SMOKE SEALS, CLASSROOM LOCK, ASTRAGAL
B109a	6' - 0"	7' - 0"	1 3/4"	HM-2	PAINT	HMF-2	PAINT	N/A	PANIC HARDWARE, CLOSERS, CARD READERS, ELECTRIC STRIKE W/ KEY EMERGENCY ACCESS, WEATHER STRIPPING AND DRIPS
B109b	6' - 0"	7' - 0"	1 3/4"	HM-2	PAINT	HMF-2	PAINT	N/A	PANIC HARDWARE, CLOSERS, CARD READERS, ELECTRIC STRIKE W/ KEY EMERGENCY ACCESS, WEATHER STRIPPING AND DRIPS
P129a	3' - 0"	7' - 0"	1 3/4"	HM-3	PAINT	HMF-3	PAINT	N/A	CLOSERS, STORE ROOM LOCK, WEATHER STRIPPING AND DRIPS
P129b	3' - 0"	7' - 0"	1 3/4"	HM-3	PAINT	HMF-3	PAINT	N/A	CLOSERS, STORE ROOM LOCK, WEATHER STRIPPING AND DRIPS
P130a	3' - 0"	7' - 0"	1 3/4"	HM-3	PAINT	HMF-3	PAINT	N/A	CLOSERS, STORE ROOM LOCK, WEATHER STRIPPING AND DRIPS
P131a	3' - 0"	7' - 0"	1 3/4"	HM-3	PAINT	HMF-3	PAINT	N/A	CLOSERS, STORE ROOM LOCK, WEATHER STRIPPING AND DRIPS

DOOR / WINDOW LEGEND

HM = HOLLOW METAL
HMF = HOLLOW METAL FRAME
ALF = ALUMINUM FRAME
INS = TEMPERED INSULATING GLAZING

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STEVEN W. LANDWEHR
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AGRICOLA
No. 102708
STATE OF TENNESSEE

REVISIONS		
Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
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October 11, 2019

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DOOR & WINDOW SCHEDULES AND DETAILS

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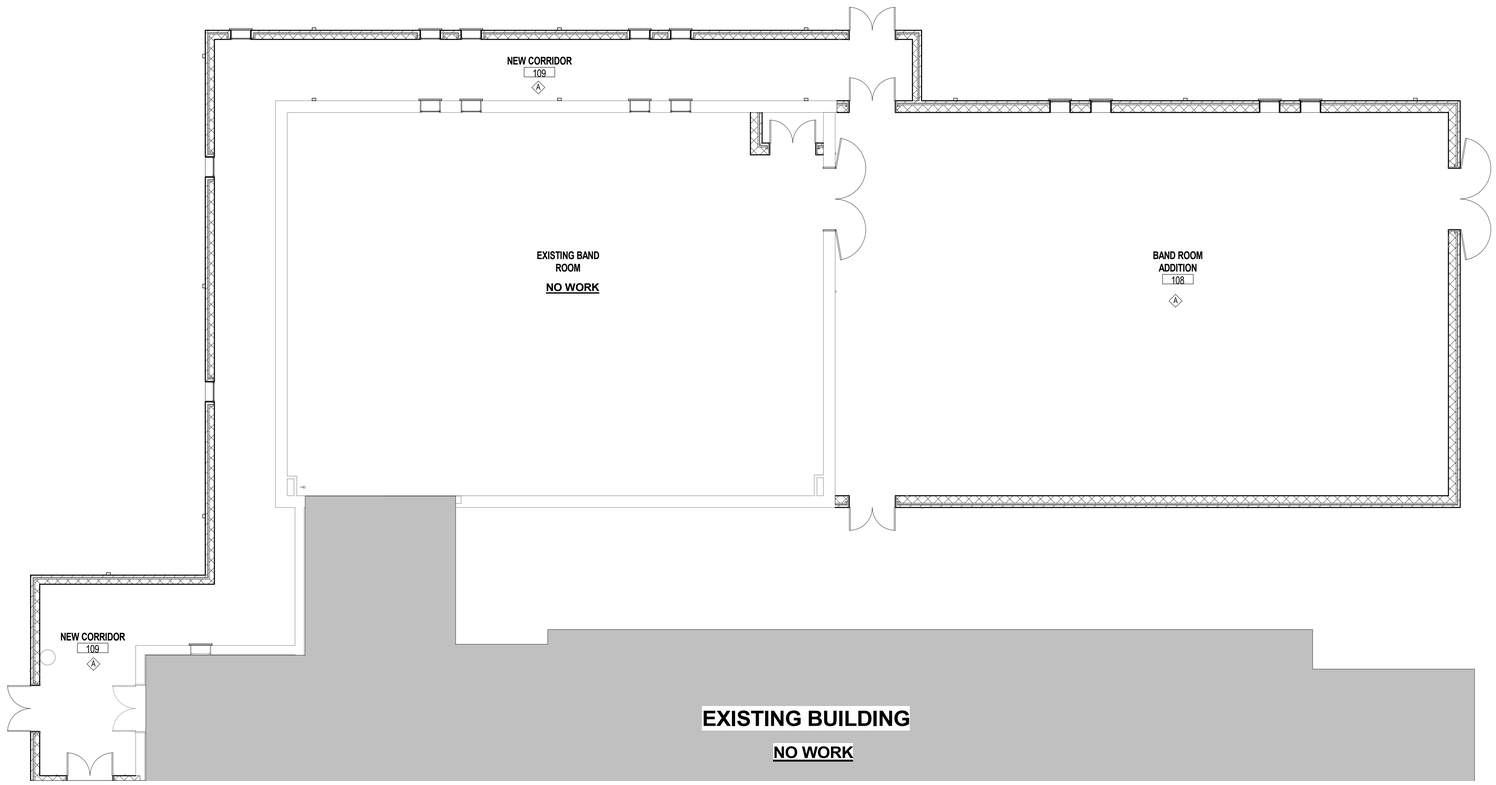
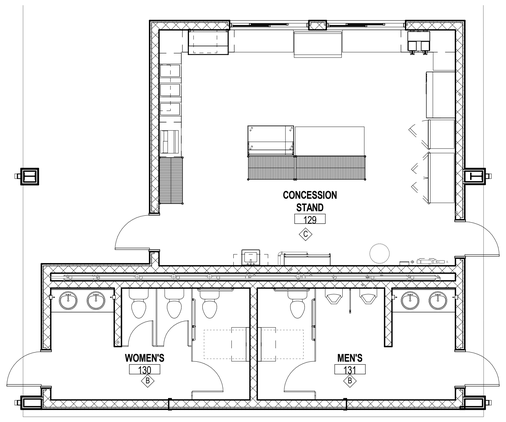


1 **BAND ROOM FINISH PLAN**
1/8" = 1'-0"



2 **CONCESSION STAND FINISH PLAN**
3/16" = 1'-0"

FINISH LEGEND

- A — VCT
  4" RUBBER BASE
  PAINT CMU WALLS - COLOR 1
- B — FLOOR TILE 1
  SCHLUTER DILEX-AHK COVE BASE
  PORCELAIN FULL-HEIGHT WALL TILE
- C — SEALED CONCRETE
  4" RUBBER BASE
  PAINT - COLOR 2

NOTE: EXISTING BRICK IN NEW CORRIDOR TO BE CLEANED AND LEFT EXPOSED/ UNFINISHED AS THE FINAL PRODUCT.

1 **FINISH PLANS FOR BOTH THE CONCESSION STAND AND BAND ROOM ADDITION WERE ADDED TO THE PROJECT.**

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STEVEN W. LANDWEHR
REGISTERED ARCHITECT
ACTIVE
10/30/19
STATE OF TENNESSEE

FINISH PLANS

REVISIONS

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10/11/19	1	ADD. #1
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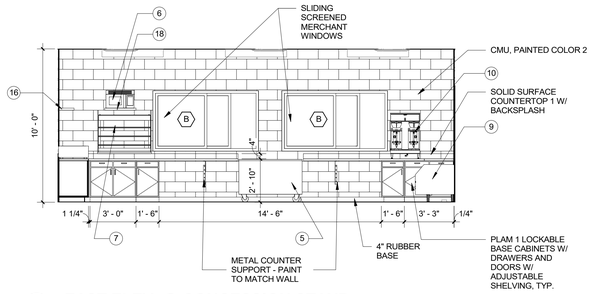
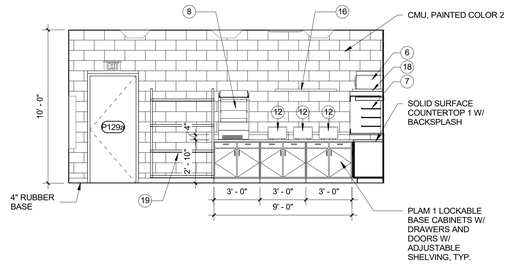
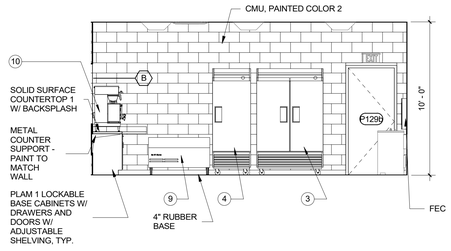


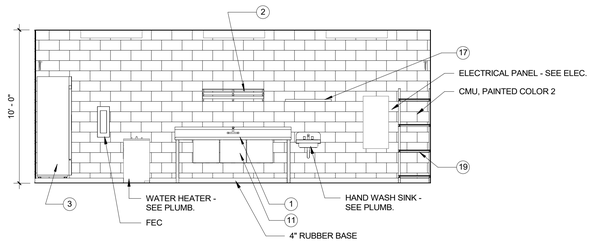
1 EAST ELEV. @ CONCESSION STAND
1/4" = 1'-0"



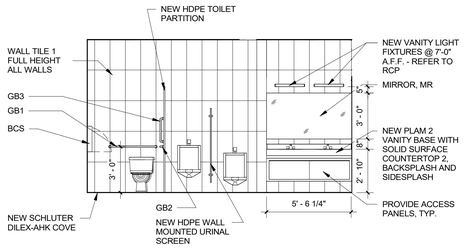
2 NORTH ELEV. @ CONCESSION STAND
1/4" = 1'-0"



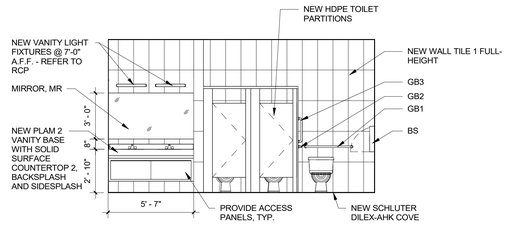
3 SOUTH ELEV. @ CONCESSION STAND
1/4" = 1'-0"



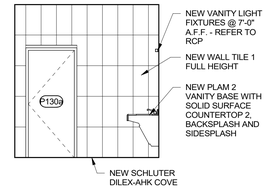
4 WEST ELEV. @ CONCESSION STAND
1/4" = 1'-0"



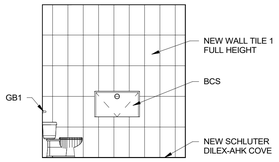
5 EAST ELEV. @ MEN'S
1/4" = 1'-0"



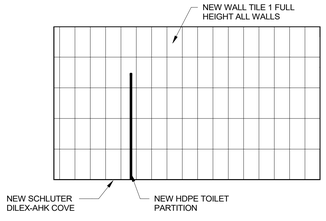
6 EAST ELEV. @ WOMEN'S
1/4" = 1'-0"



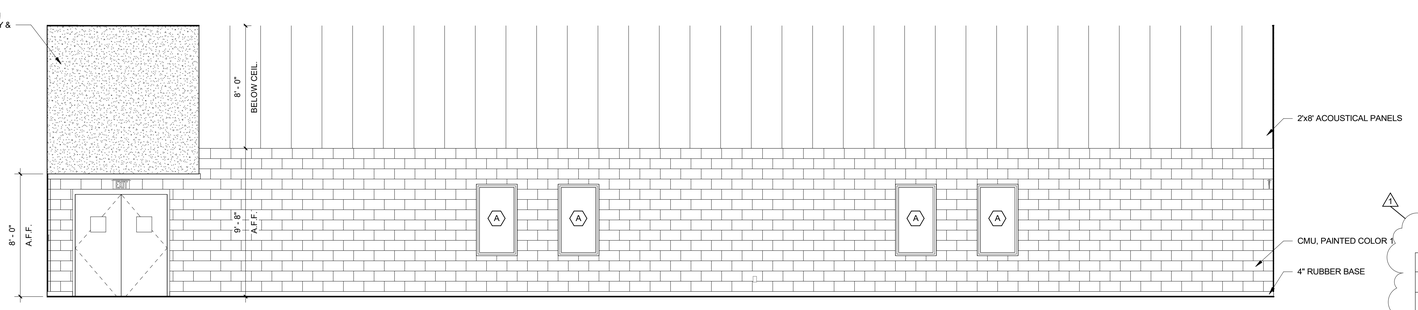
7 NORTH ELEV. @ WOMEN'S
1/4" = 1'-0"



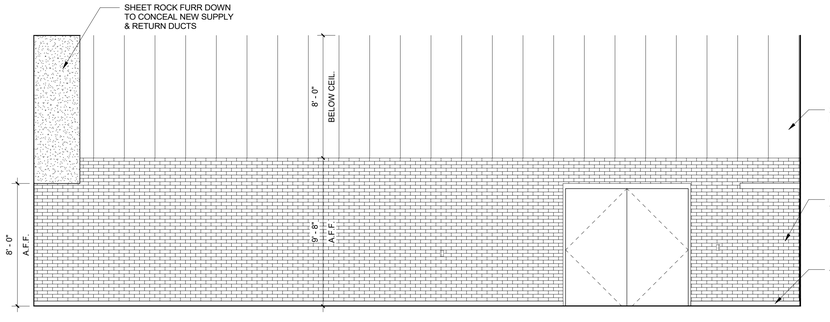
8 SOUTH ELEV. @ WOMEN'S
1/4" = 1'-0"



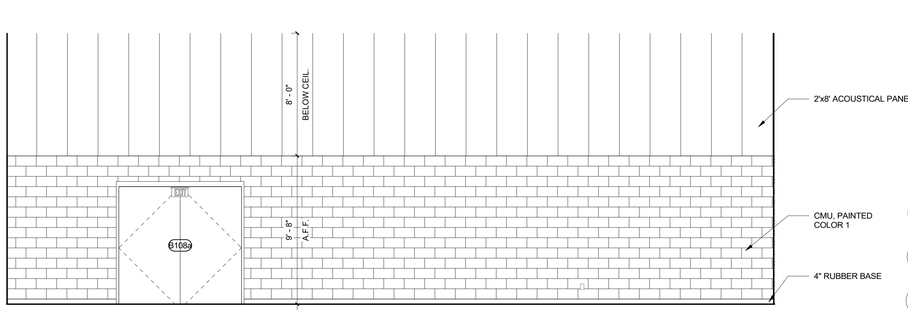
9 WEST ELEV. @ WOMEN'S
1/4" = 1'-0"



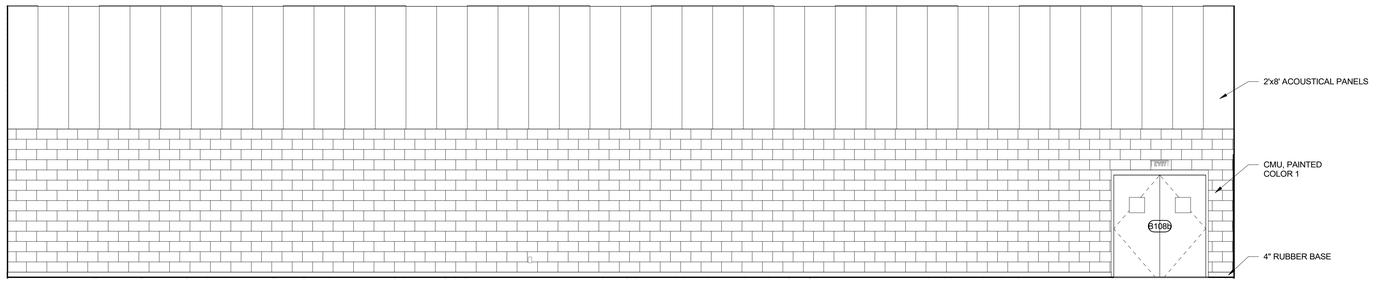
10 EAST ELEV. @ BAND ROOM ADDITION
1/4" = 1'-0"



11 NORTH ELEV. @ BAND ROOM ADDITION
1/4" = 1'-0"



12 SOUTH ELEV. @ BAND ROOM ADDITION
1/4" = 1'-0"



13 WEST ELEV. @ BAND ROOM ADDITION
1/4" = 1'-0"

THE BAND ROOM INTERIOR ELEVATIONS AND EQUIPMENT FOR THE CONCESSION STAND WAS ADDED TO THE PROJECT.

REVISED ACOUSTICAL SOUND PANELS.

TOILET ACCESSORY LEGEND

MARK	DESCRIPTION - SERIAL NUMBER	SUPPLIER/ INSTALLER	QTY.
MR	WALL MOUNTED MIRROR - REFER TO INT. ELEV. FOR SIZE	CSCI	2
GB1	GRAB BAR 36" - BOBRICK B-6806 X 36, 1-1/4" DIA. STAINLESS STEEL W/ SNAP FLANGE	CSCI	2
GB2	GRAB BAR 42"- BOBRICK B-6806 X 42, 1-1/4" DIA. STAINLESS STEEL W/ SNAP FLANGE	CSCI	2
GB3	GRAB BAR 18" VERTICAL - BOBRICK B-6806 X 18, 1-1/4" DIA. STAINLESS STEEL W/ SNAP FLANGE	CSCI	2
SD	SOAP DISPENSER - LOCKABLE STAINLESS STEEL COMMERCIAL GRADE REFILLABLE BY BULK JUG	CSCI	4
TT	TOILET TISSUE DISPENSER - LOCKABLE STAINLESS STEEL 1,000 FT. ROLL 3-1/4"W x 9"D W/ 3-1/4" CORE	CSCI	4
SN	SANITARY NAPKIN DISPOSAL - BOBRICK B-270 SURFACE-MOUNTED	CSCI	3
PTD	PAPER TOWEL DISPENSER - LOCKABLE STAINLESS STEEL 800 FT. ROLL 17-1/2"W x 8"D	CSCI	2
BCS	BABY CHANGING STATION - BOBRICK KB110-SSWM WALL-MOUNTED	CSCI	2

EQUIPMENT LEGEND

MARK	DESCRIPTION - SERIAL NUMBER	SUPPLIER/ INSTALLER	QTY.
1	3-COMPARTMENT SINK - ADVANCE TABCO 94-3-54-18RL	CSCI	1
2	WALL-MOUNTED POT RACK - ADVANCE TABCO SW-48-EC-X	CSCI	1
3	REACH-IN FREEZER - TRAULSEN G22010	CSCI	1
4	REACH-IN REFRIGERATOR - TRAULSEN G10010	CSCI	1
5	BOTTLE COOLER - TRUE MANUFACTURING CO., INC. TD-50-18-HC	CSCI	1
6	MICROWAVE OVEN - MENUMASTER MCS10TS	CSCI	1
7	DISPLAY MERCHANDISER, HEATED, FOR MULTI-PRODUCT - HATCO GR2DS-36D	CSCI	1
8	HOT DOG GRILL - APW WYOTT HR-31SBD	CSCI	1
9	ICE MAKER, CUBE-STYLE - ICE-OMATIC CIM0530HA	CSCI	1
10	COFFEE BREWER - BUNN 04275.0031	CSCI	1
11	DISPOSER - SALVAJOR 100-SA-3-ARSS	CSCI	1
12	HOT FOOD WELL - NEMCO FOOD EQUIPMENT 6055A	CSCI	3
13	WORK TABLE - ADVANCE TABCO VKS-306	CSCI	1
14	SANDWICH/SALAD PREPARATION REFRIGERATOR - HOSHIZAKI SR48A-12	CSCI	1
15	WIRE SHELVING - ADVANCE TABCO EG-2472	CSCI	1
16	SHELVING, WALL-MOUNTED - ADVANCE TABCO WS-12-48	CSCI	1
17	SHELVING, WALL-MOUNTED - ADVANCE TABCO WS-12-36	CSCI	1
18	MICROWAVE OVEN SHELF - ADVANCE TABCO MS-24-24	CSCI	1
19	WIRE SHELVING - ADVANCE TABCO EG-2448	CSCI	2

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HOUSTON HIGH SCHOOL
BAND ROOM ADDITION & CONCESSION STAND
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Germantown, TN 38139

STEVEN W. LANDWEHR
REGISTERED ARCHITECT
ACTIVE
10-11-19
STATE OF TENNESSEE

REVISIONS		
Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
10/30/19	2	ADD. #2

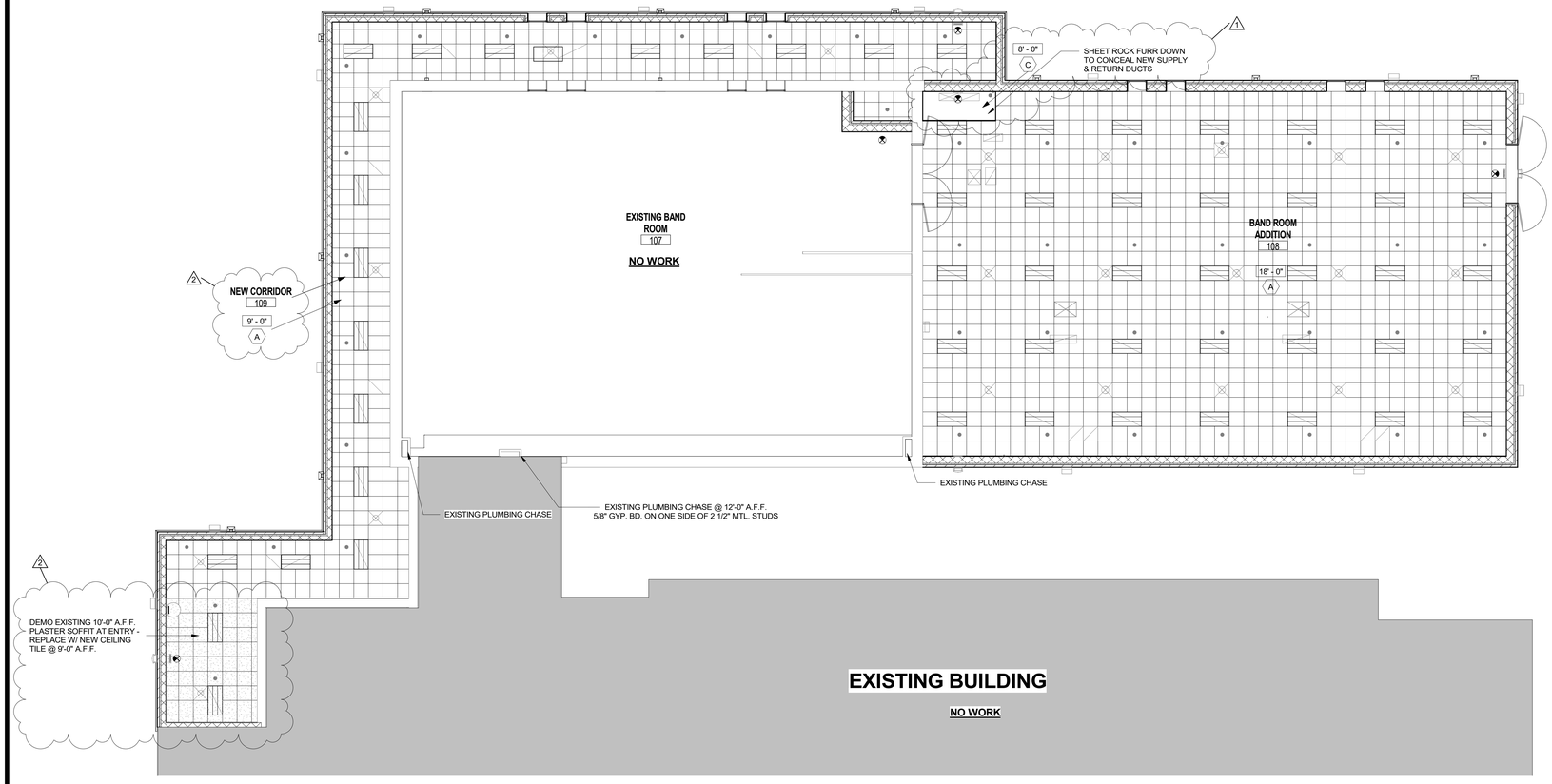
PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
October 11, 2019

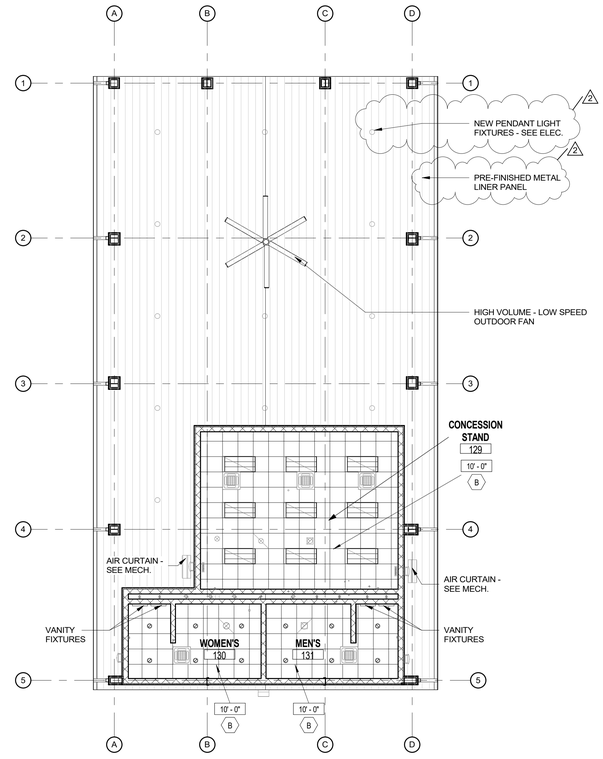
SHEET NUMBER
A7.2

INTERIOR ELEVATIONS

10/30/2019 9:25:56 AM



1 **BAND ROOM REFLECTED CEILING PLAN**
1/8" = 1'-0"



2 **CONCESSION STAND REFLECTED CEILING PLAN**
1/8" = 1'-0"

REFLECTED CEILING PLAN LEGEND

- 2 X 4 RECESSED FIXTURE
- VANITY FIXTURE
- EXTERIOR WALL-MOUNT LED FIXTURE
- SUPPLY DIFFUSER
- RETURN DIFFUSER
- [S] SMOKE DETECTOR
- SPRINKLER HEAD
- EXIT SIGN
- 1'-0" CEILING HEIGHT
- (A) CEILING MATERIAL
- EXTENT OF EXISTING SOFFIT TO BE DEMOLISHED
- (A) 24"x24" ROCKFON KORAL LAY-IN CEILING TILE IN CHICAGO METALLIC 1200 15/16" EXPOSED GRID SYSTEM
- (B) 24"x24" HYGENIC PLUS LAY-IN CEILING TILE IN CHICAGO METALLIC G90 EXTERIOR GRADE GRID SYSTEMS
- (C) GYP. BD. CEILING - PAINTED COLOR 3

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STEVEN W. LANDWEHR
REGISTERED ARCHITECT
ACCOUNTING
No. 101758
STATE OF TENNESSEE
10/30/19

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1
10/30/19	2	ADD. #2

PROJECT NUMBER
150119

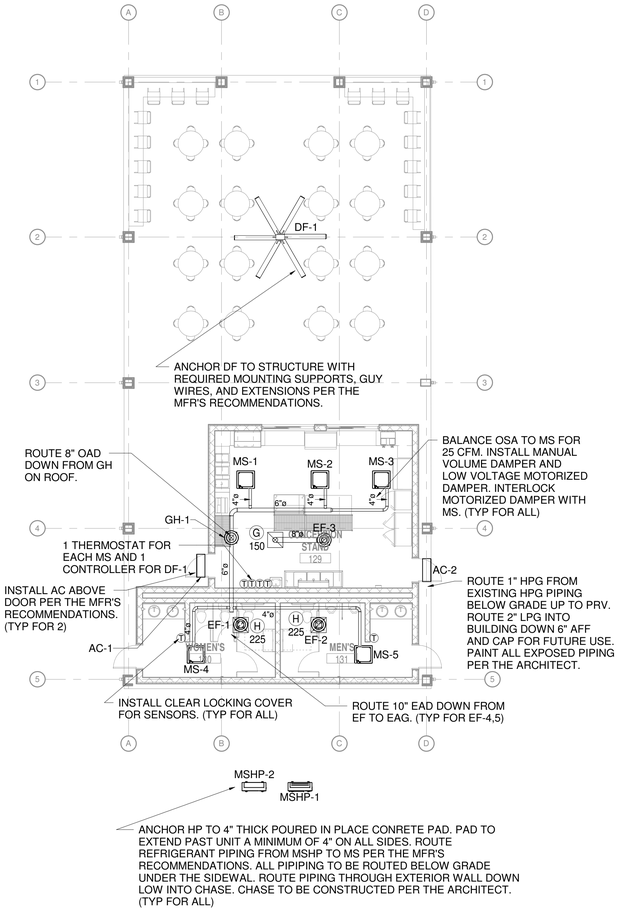
DATE OF ORIGINAL ISSUE
October 11, 2019

REFLECTED CEILING PLANS

SHEET NUMBER
A8.1

10/30/2019 9:25:58 AM

NOTE: CONCESSION STAND IS NOT A SPACE WHERE STUDENTS EARN CREDIT HOURS.

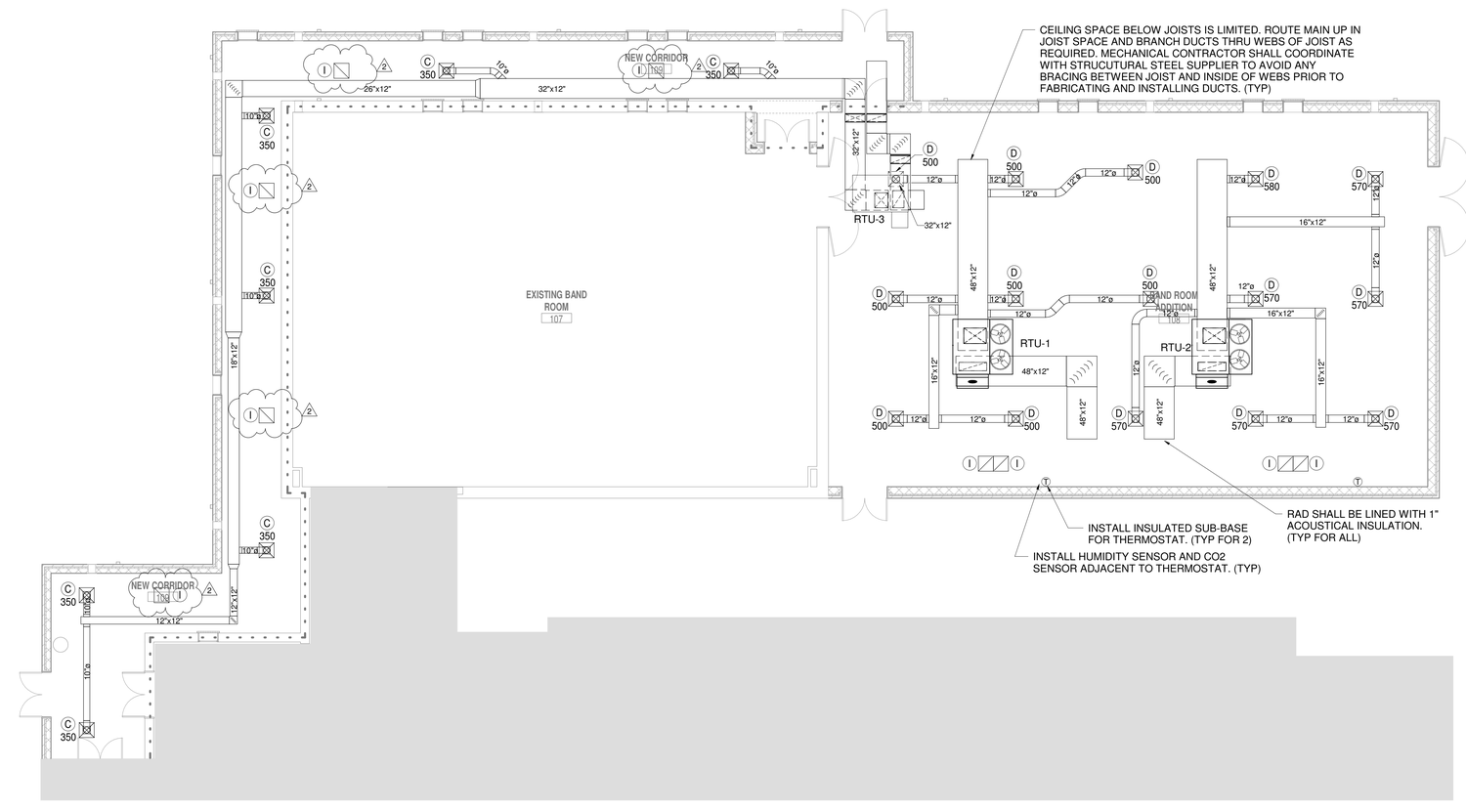


2 CONCESSION STAND FLOOR PLAN - MECHANICAL

1/8" = 1'-0"

WALL RATING LEGEND

- SMOKE TIGHT PARTITION
- ONE HOUR RATED FIRE BARRIER
- TWO HOUR RATED FIRE BARRIER



1 BAND ROOM FLOOR PLAN - MECHANICAL

1/8" = 1'-0"

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150119

MICHAEL DILLOW
REGISTERED ENGINEER
STATE OF TENNESSEE

HNA ENGINEERING

FLOOR PLANS - MECHANICAL

REVISIONS

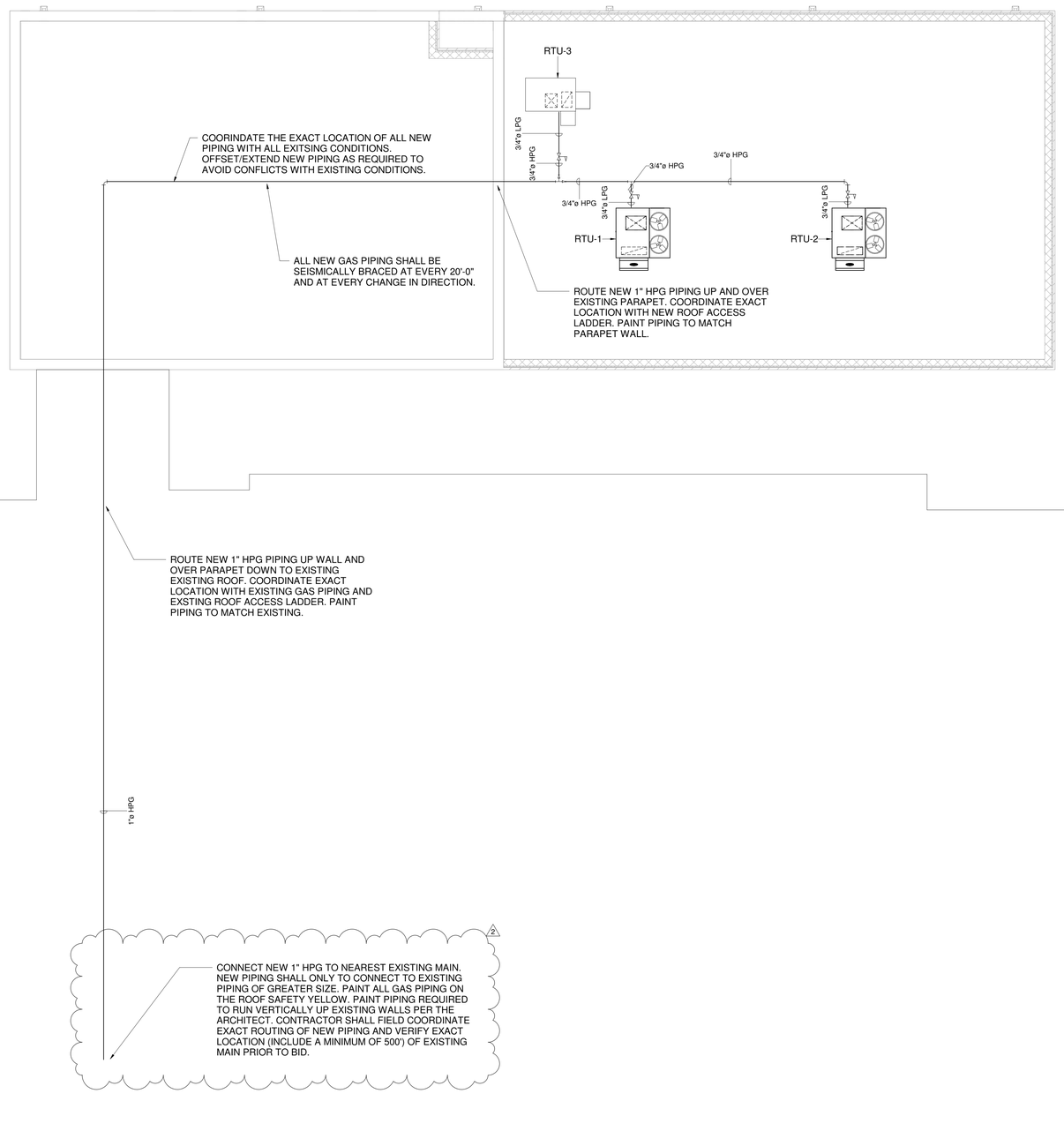
Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1
10-30-19	2	Addendum 2

PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
September 2, 2019

SHEET NUMBER
M1.1

10/29/2019 9:14:19 AM



1 BAND ROOM ROOF PLAN - MECHANICAL

1/8" = 1'-0"

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150119

MICHAEL DILLON
REGISTERED ENGINEER
STATE OF TENNESSEE

REVISIONS

Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1
10-30-19	2	Addendum 2

PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
September 2, 2019

SHEET NUMBER
M1.2

ROOF PLAN - MECHANICAL

HNA ENGINEERING

10/29/2019 9:15:09 AM

PLUMBING FIXTURE SCHEDULE

TAG	FIXTURE TYPE	FLUSH / FAUCET / SHOWER HEAD	TRIM AND REMARKS	TRAP SIZE	MIN. SIZE CONN. SW	SV	CW	HW
WC-1	WATER CLOSET, REGULAR, WHITE VITREOUS CHINA, ELONGATED BOWL, FLOOR MOUNTED, 1-1/2" TOP SPUD, SIPHON JET ACTION, AMERICAN STANDARD 2234.001 OR EQUAL.	1.6 GPF, INTEGRAL VACUUM BREAKER, SCREWDRIVER/CHECK STOP, BATTERY POWERED ZURN ZER6000 OR EQUAL. PROVIDE TRAP PRIMER OPTION WHERE REQUIRED.	SEAT TO BE ELONGATED, OPEN FRONT, SOLID PLASTIC WITH SELF SUSTAINING CHECK HINGES, COLOR WHITE, BEMIS 1955SSC.	INT.	4"	2"	3/4"	---
WC-2	WATER CLOSET, ADA, WHITE VITREOUS CHINA, ELONGATED BOWL, FLOOR MOUNTED, 1-1/2" TOP SPUD, SIPHON JET ACTION, AMERICAN STANDARD 3043-001 OR EQUAL.	1.6 GPF, INTEGRAL VACUUM BREAKER, SCREWDRIVER/CHECK STOP, BATTERY POWERED ZURN ZURN ZER6000 OR EQUAL, PROVIDE TRAP PRIMER OPTION WHERE REQUIRED.	SEAT TO BE ELONGATED, OPEN FRONT, SOLID PLASTIC WITH SELF SUSTAINING CHECK HINGES, COLOR WHITE, BEMIS 1955SSC.	INT.	4"	2"	3/4"	---
U-1	URINAL, REGULAR AND DISABLED, WHITE VITREOUS CHINA, WALL MOUNTED, WASHOUT ACTION, 3/4" TOP SPUD, 0.5 GPF, AMERICAN STANDARD 6550.001.	0.5 GPF, ADA COMPLIANT, INTEGRAL VACUUM BREAKER, SCREWDRIVER/CHECK STOP, BATTERY POWERED ZURN ZER6003AV	PROVIDE FLOOR MOUNTED CONCEALED CARRIER.	INT.	2"	1-1/4"	3/4"	---
L-1	LAVATORY, ADA COMPLIANT, WHITE VITREOUS CHINA, DROP-IN, SINGLE HOLE DRILLED, AMERICAN STANDARD.	POLISHED CHROME PLATED, DECK MOUNTED, LEVER HANDLES, 0.5 GPM FLOW, EQUAL TO DELTA 2503LF. PROVIDE WITH ZURN ZW3870XLT MIXING VALVE BELOW DECK.	1-1/4" GRID WITH TAILPIECE, ZURN Z8743-PC. P-TRAP TO BE 1-1/2" BRASS (17 GA. MIN), ZURN ZR361-RB. PROVIDE SUPPLIES AND STOPS, ZURN Z8800 SERIES. PROVIDE "LAV-GUARD" INSLUATION BY TRUBRO ON ALL EXPOSED TRIM.	1-1/2"	1-1/2"	1-1/2"	1/2"	1/2"
S-1	SINK, 1-COMP, STAINLESS STEEL (TYPE 304, 16 GA.), SELF RIMMING, 1 HOLE DRILLED, ELKAY LR2521PD.	DECK MOUNTED, SINGLE HANDLE WITH GOOSNECK SPOUT WITH PULL DOWN SPRAY, 1.8 GPM, DELTA 9159-DST.	INSTALL STANDARD DRAIN. PROVIDE APPLICABLE WHEEL HANDLE STOPS AND SUPPLIES, ZURN Z8800 SERIES. DRAIN BOARDS ARE NOT TO BE INCLUDED WITH SINK. BADGER 5 'INSINKERATOR' DISPOSAL TO BE PROVIDED.	1-1/2"	1-1/2"	1-1/2"	1/2"	1/2"
NFWH	WALL HYDRANT (NON-FREEZE), KEY OPERATED WITH CHROME PLATED FACE, INTEGRAL VACUUM BREAKER, NICKEL BRONZE BOX FLUSH WITH WALL, ZURN Z1300XL	--	3/4" HOSE CONNECTION, ALL BRONZE HEAD, SEAT CASTING AND INTERNAL WORKING PARTS, GALVANIZED WALL CASING AND HYDRANT KEY. MOUNT 24"AFF TO BOTTOM OF HYDRANT.	--	--	--	3/4"	--
CM-1	COFFEE MAKER (OFCI): PROVIDE AND INSTALL 1/2" SOFT COPPER TYPE "K" COILED WATER LINE. INSTALL IN-LINE SHUT-OFF VALVE AND ANTI-SIPHON, SPILL RESISTANT BACKFLOW PREVENTER EQUAL TO WATTS LF008PCQT. PRIOR TO CONNECTION TO COFFEE MACHINE.	--		--	--	--	1/2"	--
FD-1	FLOOR DRAIN: CAST IRON FLOOR DRAIN WITH BOTTOM OUTLET, COMBINATION INVERTIBLE MEMBRANE CLAMP, ADJUSTABLE COLLAR, SEEPAGE OPENINGS, POLISHED NICKEL BRONZE LIGHT DUTY LEVELING STRAINER WITH VANDAL PROOF SCREW - ZURN Z415BZ.		SET TOP OF DRAINS 1/2" BELOW FINISHED FLOOR. PROVIDE AND INSTALL TRAP GUARD INSERTS ON ALL FLOOR DRAINS NOT SERVED BY TRAP PRIMER.	DWG	DWG	2"	---	---
FCO	FLOOR CLEANOUT: CAST IRON CLEANOUT WITH THREADED ADJUSTABLE HOUSING, FLANGED FERRULE WITH TAPERED BRASS PLUG, ROUND, SECURED, SCORIATED NICKEL BRONZE TOP - ZURN Z1400.		SET TOP OF CLEANOUT COVER FLUSH WITH FINISHED FLOOR.	DWG	DWG	---	---	---
WCO	WALL CLEANOUT: CAST IRON CLEANOUT WITH TAPERED BRASS PLUG, ROUND STAINLESS STEEL COVER PLATE WITH SCREW - ZURN Z1441.			DWG	DWG	---	---	---

BACKFLOW PREVENTER SCHEDULE

DESIGNATION:	BFP-1
SERVICE:	DOMESTIC WATER
TOTAL NUMBER:	1
MANUFACTURER:	WATTS / ZURN
MODEL NO:	LF-919-QTS / 975XL2
GPM FLOW RATE:	XX / XX
SIZE:	2" / 2"
PSI LOSS:	11 / 12

BACKFLOW NOTES:
- PROVIDE WITH AIR GAP FITTING AND STRAINER.
- TERMINATE DRAIN OVER FLOOR DRAIN WITH AIR GAP.
- SIZE DRAIN PER MANUFACTURER'S RECOMMENDATIONS.

WATER HEATER SCHEDULE

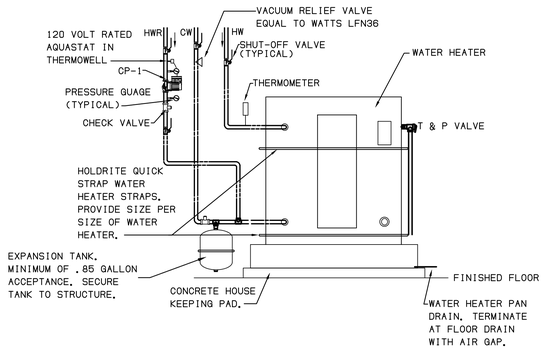
DESIGNATION:	WH-1	
SERVICE:	DOMESTIC HOT WATER	
TOTAL NUMBER:	1	
MANUFACTURER:	STATE	AO SMITH
MODEL NO:	PCE 52 20RTA	DEN-52
SET WATER TEMP:	120°F	120°F
GALLON STORAGE:	50	50
RECOVERY:	23 GPH @ 80° RISE	23 GPH @ 80° RISE
ELEC CONNECTION:	4.5KW/208V/3ϕ	4.5KW/208V3ϕ

WATER HEATER NOTES:
- PROVIDE JUNCTION BOX AND DISCONNECT.
- PROVIDE AND INSTALL SEISMIC RESTRAINT ON WATER HEATER.

RECIRCULATION PUMP SCHEDULE

DESIGNATION:	CP-1
SERVICE:	DOMESTIC HOT WATER RETURN
TOTAL NUMBER:	1
MANUFACTURER:	BELL AND GOSSET
MODEL NO:	NBF-9U
GPM:	2
FEET OF HEAD:	5
TYPE:	IN-LINE
WATTS/AMPS:	41 / 0.40
ELEC CONNECTION:	120V/1ϕ/60HZ

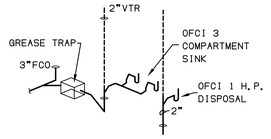
PUMP NOTES:
- PUMP SHALL BE UL/FM LISTED AND APPROVED.
- PROVIDE AND INSTALL SEISMIC RESTRAINT ON PUMP.
- PROVIDE UNIONS AT PUMP SO PUMP CAN BE TAKEN OUT OF SYSTEM AND SERVICED.



WATER HEATER DETAIL
NO SCALE

LEGEND

LINE TYPE	DESCRIPTION
	SANITARY WASTE
	SANITARY VENT
GW	GREASE WASTE
GV	GREASE WASTE VENT
	COLD WATER
	HOT WATER
	HOT WATER RETURN
CD	CONDENSATE (CD)



3 COMP RISER DIAGRAM
NO SCALE

PLUMBING NOTES:

- CONTRACTOR SHALL COORDINATE THE UTILITY SERVICE CONNECTIONS WITH CIVIL PRIOR TO INSTALLATION OF UTILITIES.

-CONTRACTOR SHALL COORDINATE WITH OWNER THE DISRUPTION OF ANY SERVICE A MINIMUM OF 72 HOURS IN ADVANCE.

- CONTRACTOR SHALL COORDINATE THE INSTALLATION OF THE PLUMBING SYSTEM AS A WHOLE WITH ALL THE TRADES INVOLVED TO AVOID ROUTING CONFLICTS/PROBLEMS. IF COFLICTS/PROBLEMS ARE FOUND AND CAN NOT BE RESOLVED BY THE INVOLVED TRADES THEN THE ARCHITECT SHALL BE CONSULTED AND THEIR DECISION SHALL GOVERN.

-IF THE VENT PENETRATIONS OF THE ROOF ARE REQUIRED TO BE 3" AND LARGER BY CODE, THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL REQUIRED INCREASERS BELOW ROOF DECK AND PENETRATE THE ROOF WITH THE MINIMUM REQUIRED PIPE SIZE.

-CONTRACTOR SHALL PROVIDE AND INSTALL PISTON TYPE WATER HAMMER ARRESTORS ON WATER LINES SERVING FLUSH VALVES AND QUICK CLOSING VALVES. CONTRACTOR SHALL SIZE AND INSTALL WATER HAMMER ARRESTORS WITH THE REQUIREMENTS OF THE PLUMBING AND DRAINAGE INSTITUTE GUIDELINES.

- CONTRACTOR SHALL COORDINATE ALL VENTS AND ROOF PENETRATIONS WITH MECHANICAL EQUIPMENT PRIOR TO INSTALLATION. ALL VENT THROUGH ROOFS SHALL BE ROUTED A MINIMUM OF 15 FEET AWAY FROM FRESH AIR INTAKES FROM MECHANICAL EQUIPMENT.

- FURNISH AND INSTALL DEEP SEAL P-TRAPS & TRAP GUARD INSERTS ON FLOOR DRAINS NOT FED BY AN AUTOMATIC TRAP PRIMER SYSTEM, WHERE REQUIRED BY CODE.

- CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURERS EQUIPMENT CUT SHEETS AND LAYOUT OF ALL EQUIPMENT THAT WILL BE PROVIDED BY OWNER AND GENERAL CONTRACTOR PRIOR TO THE INSTALLATION OF PLUMBING ROUGH-INS. CONTRACTOR SHALL PROVIDE AND INSTALL PLUMBING ROUGH IN FOR ALL EQUIPMENT. CONTRACTOR SHALL PROVIDE AND INSTALL ALL REQUIRED GAUGES, PRESSURE REDUCING VALVES, WATER HAMMER ARRESTORS, SHUT-OFF VALVES, CHECK VALVES, BACK FLOW PREVENTION DEVICES ETC THAT ARE REQUIRED BY THE MANUFACTURER FOR THEIR EQUIPMENT. CONTRACTOR SHALL ALSO PROVIDE AND INSTALL ALL ITEMS REQUIRED BY LOCAL, STATE AND FEDERAL CODES FOR PLUMBING ROUGH-INS.

- ALL FIXTURES, EQUIPMENT AND PIPING SHOWN ON THESE DRAWINGS SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODE REQUIREMENTS.

- PENETRATIONS THROUGH NEW WALLS AND FLOORS SHALL BE SLEEVED AND/OR PATCHED. REFER TO ARCHITECTURAL SERIES FOR FINISH INFORMATION.

- ALL NEW PIPE PENETRATIONS OF FIRE RATED WALLS, AS SHOWN BY THE LIFE SAFETY PLANS, SHALL HAVE A UL LISTED F RATING EQUAL TO THE WALL FIRE RATING. SEE PLUMBING PLANS FOR UL PENETRATION DETAILS.

- ALL WORK SHOWN IS PART OF BASE BID EXCEPT WHERE OTHERWISE DESIGNATED.

- SEISMICALLY BRACE ALL PIPE AS REQUIRED BY LOCAL CODE REQUIREMENTS.

- PIPING SHALL NOT BE INSTALLED OVER ELECTRICAL EQUIPMENT.

- CAULK AROUND ALL PLUMBING FIXTURES. CAULK COLOR SHALL MATCH PLUMBING FIXTURE COLOR.

- EXACT LOCATIONS OF MECHANICAL EQUIPMENT SHALL BE VERIFIED WITH THE MECHANICAL CONTRACTOR. ALL REQUIRED CONDENSATE PIPING SHALL BE COORDINATED WITH THIS EQUIPMENT.

- SANITARY SEWER PIPING SHALL BE SLOPED AS FOLLOWS: 3" SANITARY WASTE PIPING AND LARGER SHALL BE ROUTED AT 1/8" PER FOOT MINIMUM. 2" SANITARY WASTE PIPING AND SMALLER SHALL BE ROUTED AT 1/4" PER FOOT MINIMUM.

- CONTRACTOR TO PROVIDE PROPERLY SIZED ISOLATION VALVES AT ALL DOWESTIC WATER BRANCH PIPING AND ALL DOMESTIC WATER PIPING SERVING INDIVIDUAL FIXTURES OR RESTROOMS. VALVES TO BE INSTALLED IN AN ACCESSIBLE LOCATION ABOVE TILE CEILING.

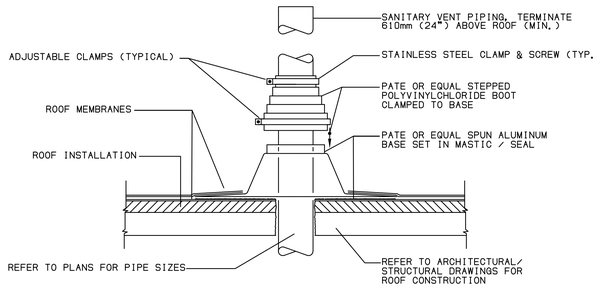
- CONTRACTOR TO PROPERLY BALANCE DOMESTIC HOT WATER AND HOT WATER RETURN SYSTEMS. CONTRACTOR TO PROVIDE CALINBRATED BALANCING VALVES ON HOT WATER RETURN PIPING AS NECESSARY.

- ALL CONDENSATE PIPING ROUTED ABOVE CEILING SHALL HAVE A CLEANOUT AT ALL 90 DEGREE TURNS AND EVERY 50'.

- CONTRACTOR SHALL ESTABLISH A SEQUENCE OF INSTALLATION WITH OTHER TRADES WORKING ON THE PROJECT. CONTRACTOR SHALL THOROUGHLY COORDINATE ALL SYSTEMS WITH OTHER TRADES.

- CATHODIC PROTECTION, IF REQUIRED, IS THE CONTRACTOR'S RESPONSIBILITY. CONTRACTOR SHALL PROTECT ALL UNDERGROUND METALLIC PIPING FROM CORROSION. REFER TO SOILS REPORT. UNDERGROUND PIPING MAY ALSO BE PROTECTED WITH POLYETHYLENE ENCASEMENT CONFORMING TO ANSI/AWWA REQUIREMENTS. ALL PIPING SHALL BE WRAPPED COMPLETELY WITH ENCASEMENT TO A POINT AT LEAST 12 A.F.G OR FIN. FLOOR. ENCASEMENT SHALL BE FREE OF TEARS WITH ALL JOINTS COMPLETELY SEALED. NO PORTION OF THE PIPE SHALL BE LEFT EXPOSED TO CORROSIVE SOIL.

- PLASTIC PIPING IS NOT ALLOWED IN PLENUM SPACES.



VENT THROUGH ROOF DETAIL
NO SCALE

2
1. DELETED DRINKING FOUNTAIN FROM SCHEDULE.
2. REMOVED DRY WELL DETAIL.
3. REVISED BACKFLOW PREVENTER FOR CM-1.
4. ADDED 3-COMP SINK RISER DIAGRAM.
5. ADDED RECIRCULATION PUMP SCHEDULE AND REVISED WATER HEATER DETAIL.

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STATE OF TENNESSEE

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LEGENDS, NOTES AND SCHEDULES - PLUMBING

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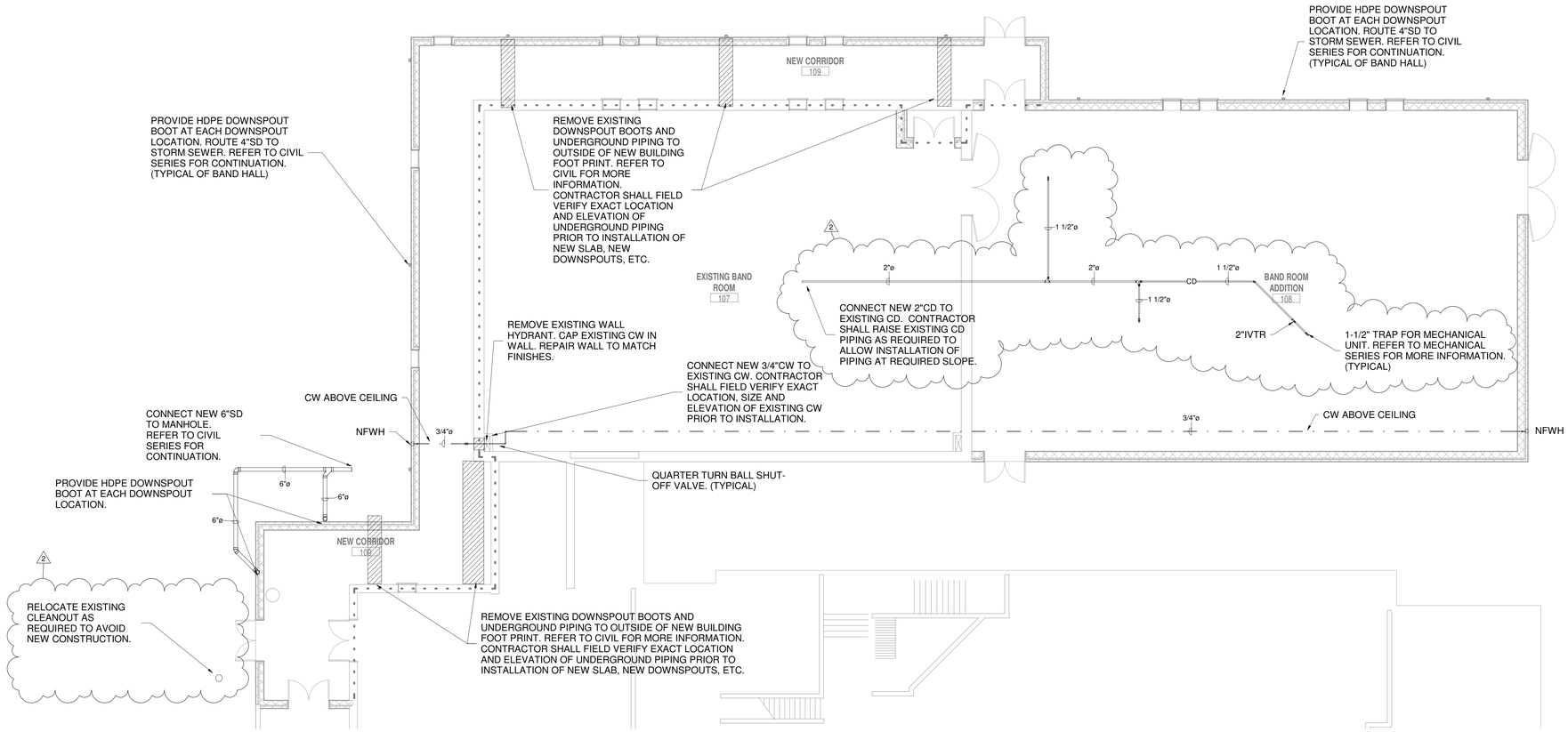
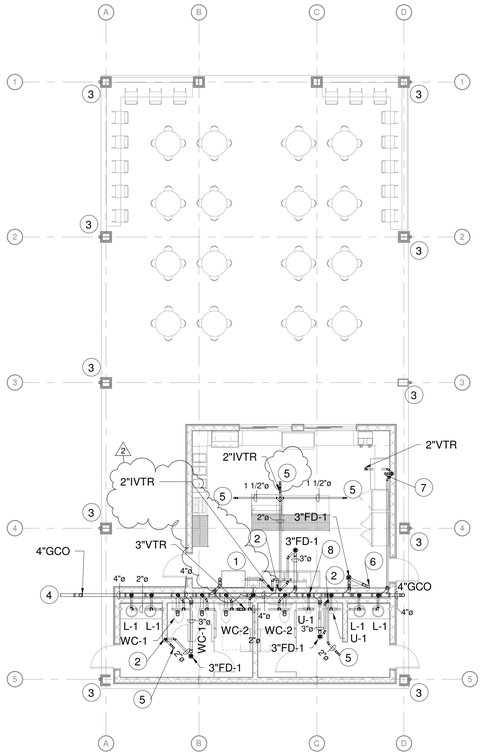


3 BAND HALL FLOOR PLAN - PLUMBING

1/8" = 1'-0"

NOTE: CONCESSION STAND IS NOT A SPACE WHERE STUDENTS EARN CREDIT HOURS.



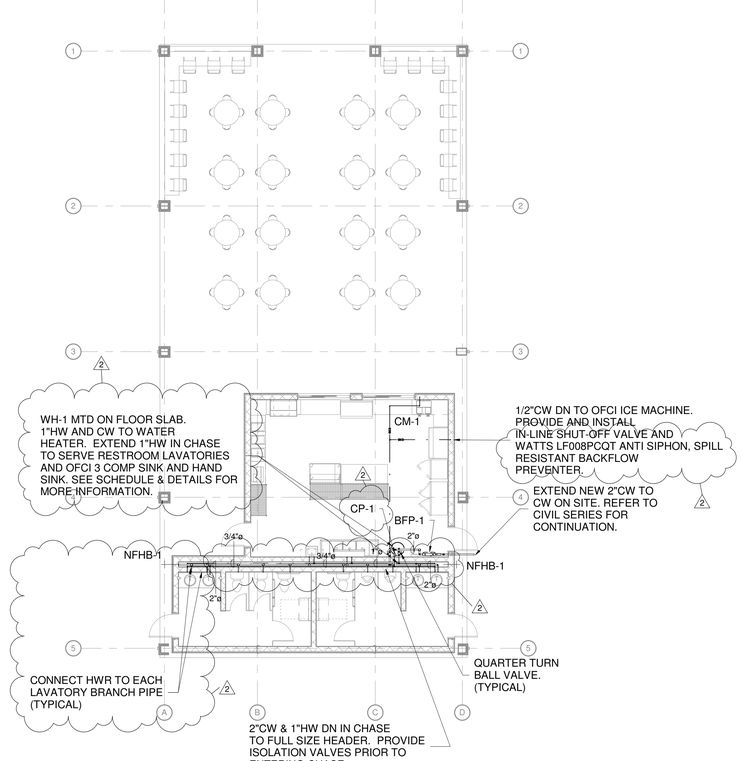
KEY NOTES:

1. 100 LB GREASE TRAP, EQUAL TO ZURN Z1170, TOP OF GREASE TRAP SHALL BE FLUSH WITH FINISHED FLOOR.
2. 2"CD DN TO BELOW SLAB. CONNECT TO HOUSE SIDE OF FLOOR DRAIN TRAP ABOVE WATER SEAL.
3. PROVIDE HDPE DOWNSPOUT BOOT AT EACH DOWNSPOUT LOCATION. ROUTE 3"SD TO STORM SEWER. REFER TO CIVIL SERIES FOR CONTINUATION.
4. 4"SANITARY WASTE ROUTED FROM BLDG. SEE CIVIL SERIES FOR CONTINUATION.
5. 1-1/2"TRAP FOR MECHANICAL UNIT. REFER TO MECHANICAL SERIES FOR MORE INFORMATION. (TYPICAL)
6. 3"HUB DRAIN W/ 4" INCREASER ABOVE SLAB.
7. 2"HUB DRAIN W/ 4" INCREASER ABOVE SLAB.
8. 2"SW FOR URINAL AND OFCI 1 H.P DISPOSAL. CONTRACTOR SHALL COORDINATE LOCATION OF DISPOSAL WITH KITCHEN EQUIPMENT CUT SHEETS AND CONNECT TO SANITARY SEWER AS REQUIRED.

1 CONCESSIONS FLOOR PLAN - DWV - PLUMBING - ADD ALTERNATE NO. 1

1/8" = 1'-0"

NOTE: CONCESSION STAND IS NOT A SPACE WHERE STUDENTS EARN CREDIT HOURS.



2 CONCESSIONS FLOOR PLAN - WATER - PLUMBING - ADD ALTERNATE NO. 1

1/8" = 1'-0"

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FLOOR PLANS - PLUMBING

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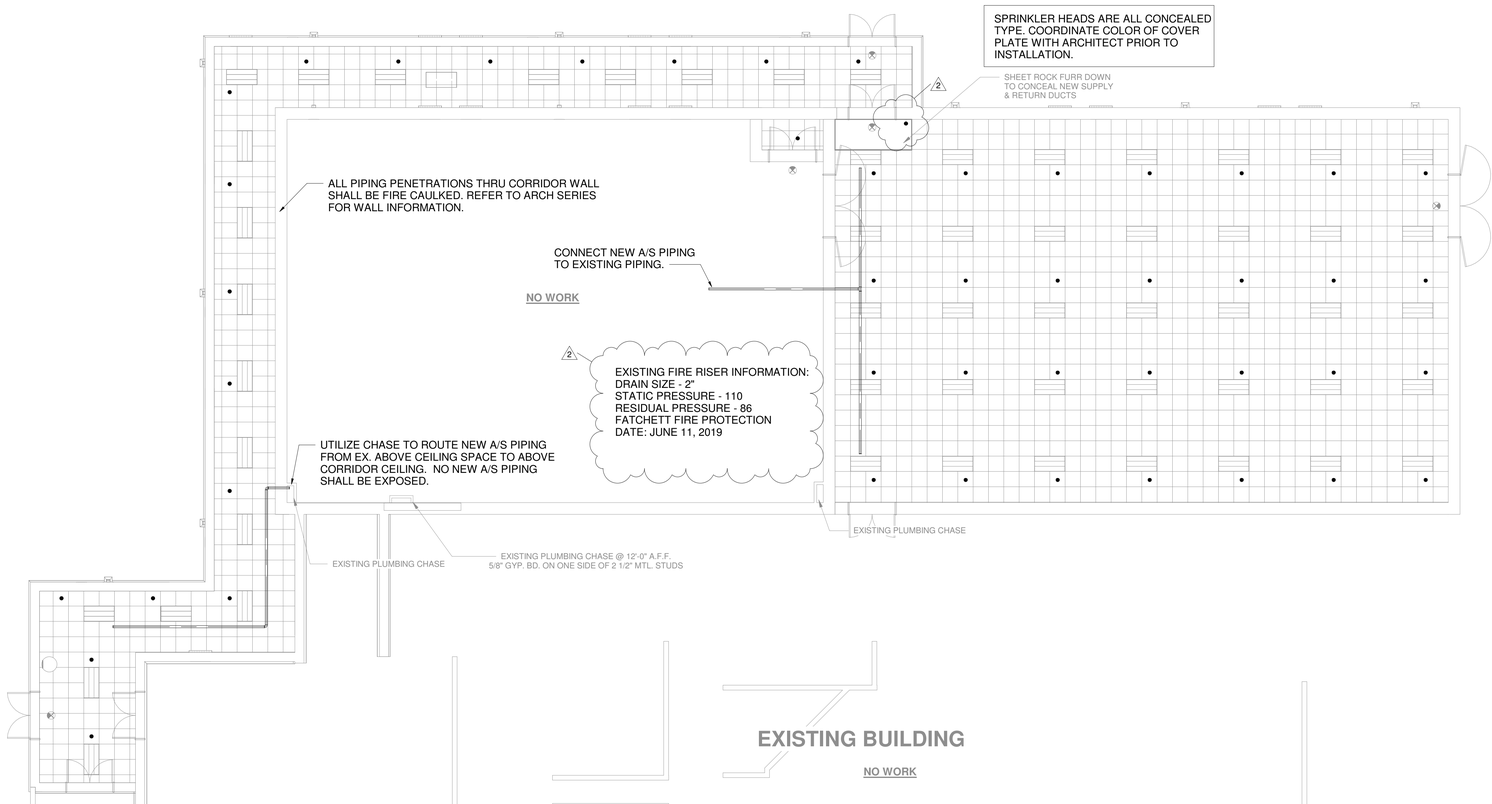

1 BAND HALL FLOOR PLAN - FIRE PROTECTION

1/8" = 1'-0"

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FLOOR PLAN - FIRE PROTECTION

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LIGHTING		EXIT SIGN
LIGHTING		EXTERIOR SCONCE, REFER TO ARCHITECTURAL DRAWINGS FOR ELEVATIONS.
LIGHTING		STRIPLIGHT
LIGHTING		2'X4' FIXTURE, REFER TO SCHEDULE FOR MOUNTING
LIGHTING		HATCHED FIXTURE DESIGNATES A FIXTURE WITH AN EMERGENCY BATTERY BALLAST OR CONNECTED TO AN EMERGENCY BACK-UP POWER SUPPLY, REFER TO SCHEDULE FOR MOUNTING.
LIGHTING		EXTERIOR WALLPACK, REFER TO ARCHITECTURAL DRAWINGS FOR ELEVATIONS.
LIGHTING	A	DENOTES FIXTURE TAG "A" - SEE FIXTURE SCHEDULE
LIGHTING	$	SINGLE POLE, SINGLE THROW LIGHT SWITCH - CENTER MTD, 48" AFF. "3" INDICATES 3-WAY SWITCH, "OC" INDICATES DUAL TECHNOLOGY OCCUPANCY SENSOR WITH MANUAL OVERRIDE SWITCH EQUAL TO WATTSTOPPER DSW-10G, "d" INDICATES DIMMER SWITCH, "4" INDICATES 4-WAY SWITCH, "I" INDICATED ILLUMINATED SWITCH, "T" INDICATES TIMER SWITCH.
LIGHTING	OC	CEILING MOUNTED, DUAL TECHNOLOGY, LOW VOLTAGE OCCUPANCY SENSOR EQUAL TO MODEL WATTSTOPPER DT-355. PROVIDE POWER PACKS AS REQUIRED. SEE WIRING DETAILS.
LIGHTING	OC	CORNER/WALL MTD, OCCUPANCY SENSOR EQUAL TO WATTSTOPPER DT-205 SERIES. MTD 90" AFF. PROVIDE POWER PACKS AS REQUIRED. SEE WIRING DETAILS.
POWER		DUPLEX RECEPTACLE, CENTER MTD. 18" AFF., UOI.
POWER		GROUND FAULT INTERRUPTER RECEPTACLE, CENTER MTD. 18" AFF IN JANITOR ROOMS & EXTERIOR LOCATIONS. MTD. IN ROOF CURB ON THE ROOF. CENTER MTD. 44" AFF. IN BATHROOMS, AND 4" ABOVE BACKSPLASH AT MILLWORK - COORDINATE WITH ARCHITECTURAL ELEVATIONS.
POWER	IG	ISOLATED GROUND DUPLEX RECEPTACLE, CENTER MTD. 18" AFF., UOI.
POWER		ABOVE COUNTER DUPLEX RECEPTACLE, CENTER MTD. 4" ABOVE BACKSPLASH AT MILLWORK. COORDINATE WITH ARCHITECTURAL ELEVATIONS & CASEWORK VENDOR.
POWER	WP	DUPLEX RECEPTACLE WITH WEATHER-PROOF IN-USE COVER, CENTER MTD. 18" AFF, UOI.
POWER		DOUBLE DUPLEX RECEPTACLE, CENTER MTD. 18" AFF., UOI.
POWER		SPECIAL RECEPTACLE, TYPE AND MOUNTING AS INDICATED.
POWER	FB	IN-GRADE FLOORBOX W/ DUPLEX RECEPTACLE. ROUTE CONDUIT TO NEAREST ACCESSIBLE CEILING.
POWER		PANELBOARD - RATING, MOUNTING, ETC. PER SINGLE LINE DIAGRAM
POWER	J	JUNCTION BOX - USE AS INDICATED
POWER		FUSED HEAVY-DUTY DISCONNECT, SIZED & RATED AS INDICATED
POWER		NON-FUSED HEAVY-DUTY DISCONNECT, SIZED & RATED AS INDICATED
POWER		FEEDER RUN OVERHEAD - CONCEALED IN OR ABOVE CEILING IN WALL OR EXPOSED ON STRUCTURE - #12 COPPER CONDUCTORS IN 0.75"C CONDUIT, UOI. #10 INDICATES #10 AWG CU
POWER		FEEDER RUN CONCEALED BELOW FLOOR, IN WALL OR BELOW GRADE
POWER		INDICATES GROUNDING CONDUCTOR - #12 COPPER GROUNDING CONDUCTOR, UOI. #10 INDICATES #10 AWG CU
COMMUNICATIONS		TELE/DATA OUTLET CENTER MTD. 18" AFF, PROVIDE (1)-1.25"C FROM OUTLET TO NEAREST ACCESSIBLE CEILING SPACE. CONTRACTOR SHALL PROVIDE DATA DROPS TO EACH BOX AS INDICATED ON DRAWINGS. PROVIDE DOUBLE GANG DEEP BOX.
ANNOTATION	#	KEYED NOTE
FIRE ALARM	F	FIRE ALARM MANUAL PULL STATION, MTD 48" AFF TO BOTTOM.
FIRE ALARM	V	VISUAL INDICATOR DEVICE, WALL MTD.
FIRE ALARM		COMBINATION AUDIBLE & VISUAL INDICATOR ALARM, WALL MTD. DEVICES TO BE SPEAKER/STROBES.
FIRE ALARM	S	SMOKE DETECTOR, CEILING MTD.
FIRE ALARM	HD	HEAT DETECTOR, CEILING MTD.
FIRE ALARM	DH	CONNECTION TO DOOR HOLDER

1 SYMBOL LEGEND

ELECTRICAL SYMBOLS

- NONFUSED DISCONNECT SWITCH - SIZE AS INDICATED
- FUSED DISCONNECT SWITCH - SIZE AS INDICATED
- COMBINATION STARTER/DISCONNECT - SIZE AS INDICATED
- $ TOGGLE SWITCH
- FEEDER/BRANCH RUN OVERHEAD - CONCEALED IN OR ABOVE CEILING, IN WALL, OR EXPOSED ON STRUCTURE
- EMERGENCY, NIGHT LIGHT, OR FEEDER/BRANCH CONCEALED BELOW FLOOR, IN WALL, OR BELOW GRADE
- P-16 HOME RUN TO CIRCUIT PANEL, NEUTRAL/HOT/GROUND, #12 COPPER, UOI

ABBREVIATIONS

GC	GENERAL CONTRACTOR
EC	ELECTRICAL CONTRACTOR
MC	MECHANICAL CONTRACTOR
UOI	UNLESS OTHERWISE INDICATED
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
WP	WEATHERPROOF
a, b, c, etc.	DENOTES SWITCHING SCHEME
AFF	ABOVE FINISHED FLOOR
AC	MOUNT ABOVE COUNTER
MTD	MOUNTED
AFG	ABOVE FINISHED GRADE
BFG	BELOW FINISHED GRADE
SPD	SURGE PROTECTIVE DEVICE
STB	SHUNT TRIP BREAKER
EX	EXISTING
EP	EXPLOSION PROOF
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
FACP	FIRE ALARM CONTROL PANEL
FAA	FIRE ALARM ANNUNCIATOR PANEL

DRAWING LEGEND

DRAWING NO.	DESCRIPTION
E0.1	Legend & Schedules - Electrical
E0.2	One Line Diagram - Electrical
E0.3	Details - Electrical
E0.4	Panel Schedules - Electrical
E1.1	Site Plan - Electrical
E2.1	Floor Plan - Lighting
E3.1	Floor Plan - Power/Comm

2

DEVICE NOTES

1. COORDINATE FINAL DEVICE FINISHES WITH ARCHITECT/OWNER.

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LEGEND & SCHEDULES - ELECTRICAL

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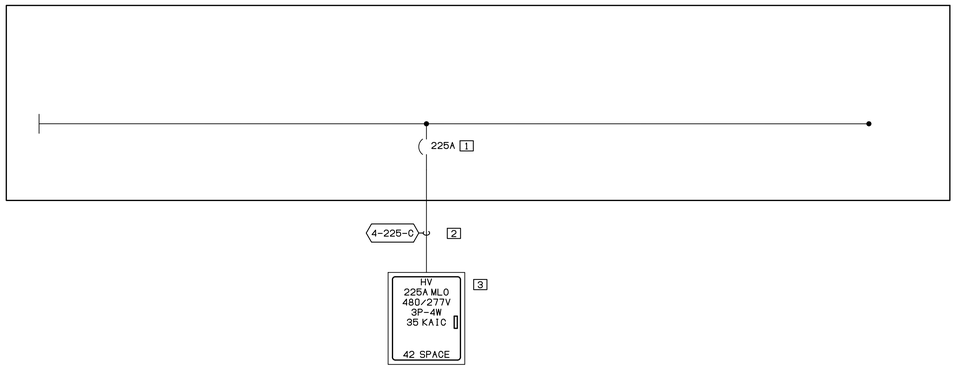
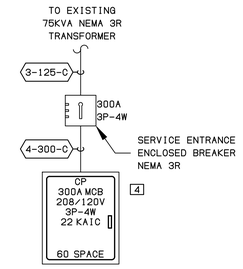
EXISTING MSB, GE AV-LINE SWITCHBOARD
480/277V, 3PH, 4W, 2000A



1 ONE LINE DIAGRAM - BAND BUILDING



2 ONE LINE DIAGRAM - CONCESSION STAND

FEEDER SCHEDULE (NOTE: ALL CONDUCTORS THHN / THWN U.O.N.)

TAG #	NOMINAL AMPACITY	MINIMUM CONDUIT SIZE (IN)	NO. OF PARALLEL RUNS	MINIMUM CABLE SIZE (AWG)	MATERIAL (INCLUDES ALL CONDUCTORS)	NO. OF CONDUCTORS	EQUIP. GROUND. COND. (AWG)
3-PHASE, 4-WIRE SYSTEMS							
4-300-C	300A	3"	1	#300MCM	CU	4	#4
4-225-C	225A	2-1/2"	1	#4/0	CU	4	#4
3-PHASE, 3-WIRE SYSTEMS							
3-125-C	125A	1-1/4"	1	#1	CU	3	#6

3 FEEDER SCHEDULE

ONE LINE SYMBOL LEGEND

- 600A — MOLDED CASE CIRCUIT BREAKER, NUMBER INDICATED TRIP RATING
- MAIN 42 MLO 225A 3P-4W — LIGHTING OR DISTRIBUTION PANELBOARD
- CURRENT TRANSFORMER
- POTENTIAL TRANSFORMER
- DPM — DIGITAL METERING PACKAGE (AMPS, VOLTS, KWD, KWH, PF)
- GF — GROUND FAULT RELAY
- SPD — SURGE PROTECTIVE DEVICE
- X-XXX-C — FEEDER CALLOUT, REFER TO FEEDER SCHEDULE
- XX, XXX KV — AVAILABLE SYMMETRICAL SHORT CIRCUIT CURRENT AT THE EQUIPMENT AS CALCULATED BY THE ENGINEER.
- GROUNDING CONNECTION OF SEPARATELY DERIVED SYSTEM
- 45 KVA, 480V Δ / 208/120V 3P WYE, #6G-CU-G — DELTA/WYE DRY TYPE TRANSFORMER. TRANSFORMER SHALL BE CONSIDERED A SEPARATELY DERIVED SYSTEM AND SHALL BE GROUNDED PER NEC 250-30.

ELECTRICAL ONE-LINE NOTES

1. IN ACCORDANCE WITH NEC ARTICLE 110.16, ELECTRICAL EQUIPMENT LIKELY TO REQUIRE EXAMINATION WHILE ENERGIZED SHALL BE FIELD MARKED TO WARN PERSONNEL OF POTENTIAL ARC FLASH HAZARDS. THIS SHALL BE FURNISHED FROM THE FACTORY.
2. IN ACCORDANCE WITH NEC ARTICLE 110.24, THE SERVICE EQUIPMENT SHALL BE FIELD MARKED WITH THE MAXIMUM AVAILABLE FAULT CURRENT ALONG WITH THE DATE THE CALCULATION WAS PERFORMED.
3. ALL WORKING SPACE REQUIREMENTS AROUND ELECTRICAL EQUIPMENT IN ACCORDANCE WITH NEC ARTICLE 110.26 SHALL BE STRICTLY ADHERED TO BY ALL TRADES.
4. IN ACCORDANCE WITH NEC ARTICLE 230.8, RACEWAYS ENTERING A BUILDING FROM AN UNDERGROUND DISTRIBUTION SYSTEM SHALL BE SEALED IN ACCORDANCE WITH 300.5.G.
5. ALL PANELBOARDS SHALL HAVE COPPER BUSSING.
6. CONTRACTOR SHALL PROVIDE SPARE BREAKERS AS INDICATED ON PANEL SCHEDULES.
7. GROUNDING SHALL BE PER NEC 250.
8. ALL PANELBOARDS ARE TO EASY-TRIM TYPE.

SERVICE ENTRANCE NOTES

1. UNDERGROUND SERVICE LATERAL CONDUCTORS MUST BE PROTECTED FROM DAMAGE IN ACCORDANCE WITH ARTICLE 300.5. UNDERGROUND SERVICE CONDUCTORS THAT ARE NOT ENCASED IN CONCRETE AND THAT ARE BURIED 18" OR MORE BELOW GRADE SHALL HAVE THEIR LOCATION IDENTIFIED BY A WARNING RIBBON PLACED 12" ABOVE THE UNDERGROUND INSTALLATION.
2. UNLESS LOCAL CODE DICTATES OTHERWISE, PVC SERVICE ENTRANCE LATERAL RACEWAY MUST BE BURIED AT LEAST 18" TO THE TOP OF THE RACEWAY UNLESS BELOW A COVERING OF AT LEAST 2" OF CONCRETE. RACEWAY COVERED UNDER 2" OF CONCRETE MUST BE BURIED AT LEAST 12" TO THE TOP OF THE RACEWAY.
3. BACKFILL THAT CONTAINS LARGE ROCKS, PAVING MATERIALS, CORROSIVE MATERIAL OR ANYTHING ELSE THAT MAY CAUSE DAMAGE TO RACEWAYS OR CABLES SHALL NOT BE PLACED IN EXCAVATION.
4. CONDUITS OR RACEWAYS THROUGH WHICH MOISTURE MAY CONTACT LIVE PARTS SHALL BE SEALED OR PLUGGED AT ONE OR BOTH ENDS. SPARE OR UNUSED RACEWAYS SHALL ALSO BE SEALED. SEALANTS SHALL BE IDENTIFIED FOR USE WITH THE CABLE, INSULATION, SHIELD OR OTHER COMPONENTS.

KEYED NOTES

[#]

1. ~~CONTRACTOR SHALL PROVIDE NEW 225A BREAKER IN EXISTING SWITCHBOARD.~~ 2
2. CONTRACTOR SHALL FIELD COORDINATE EXACT ROUTING PRIOR TO BID (APPROXIMATELY 750'). CONTRACTOR SHALL MAKE ALL REPAIRS TO CEILINGS AND WALL AS REQUIRED. CONTRACTOR SHALL MAINTAIN ALL EXISTING WALL RATINGS. DURING CONSTRUCTION, THIS WORK SHALL BE PHASED TO MINIMIZE INTERRUPTIONS TO OWNER'S OPERATIONS.
3. ~~CONTRACTOR SHALL PROVIDE APPROPRIATE CUO K-KT FOR ENLARGED CONDUCTORS~~ DUE TO VOLTAGE DROP.
4. PROVIDE SINGLE SECTION CONSTRUCTION.

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ONE LINE DIAGRAM - ELECTRICAL

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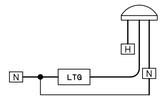
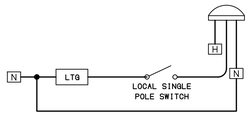
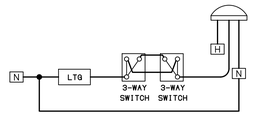


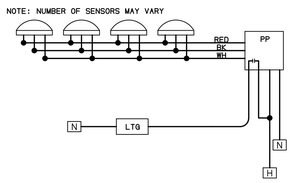
1 LINE VOLTAGE SENSOR



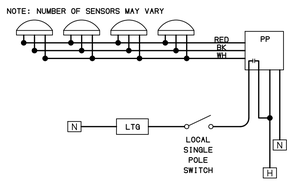
2 LINE VOLTAGE SENSOR W/ SINGLE SWITCHING



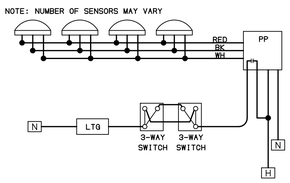
3 LINE VOLTAGE SENSOR W/ 3-WAY SWITCHING



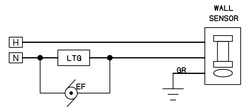
4 LOW VOLTAGE SENSORS



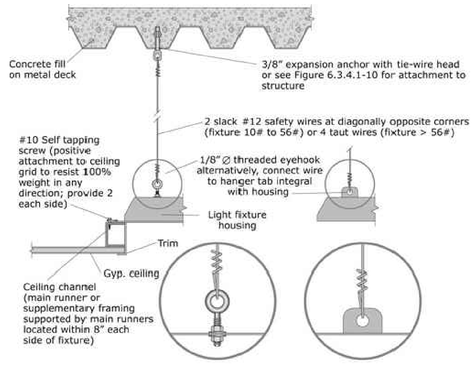
5 LOW VOLTAGE SENSORS W/ SINGLE SWITCHING



6 LOW VOLTAGE SENSORS W/ 3-WAY SWITCHING



7 WALL SWITCH SENSOR W/ EXHAUST FAN



8 SEISMIC MOUNT DETAIL

△2

LUMINAIRE SCHEDULE

CALLOUT	LAMP NO.	LAMP WATTS	LAMP TYPE	DESCRIPTION	MOUNTING	MANUFACTURER	MODEL	INPUT WATTS (TOTAL)	VOLTS	NOTE #1	NOTE #2
A	-	-	LED	2'X4' ARCHITECTURAL TROFFER	RECESSED	LITHONIA	2BLT2-60L-ADSM-EZ1-LP840	53	277V-1P-2W		
AE	-	-	LED	2'X4' ARCHITECTURAL TROFFER	RECESSED	LITHONIA	SAME AS FIXTURE "A", ON GENERATOR BACKUP	53	277V-1P-2W	CONNECT TO UNSWITCHED "LIFE SAFETY" CIRCUIT	
B	-	-	LED	2'X4' WET LOCATION ARCHITECTURAL TROFFER	RECESSED	LITHONIA	2WRTL-G-L48-3000LM-MVOLT-EZ1-40K-80CRI	27	120V-1P-2W		
BE	-	-	LED	2'X4' WET LOCATION ARCHITECTURAL TROFFER	RECESSED	LITHONIA	SAME AS FIXTURE "B", ON BATTERY BACKUP	27	120V-1P-2W		PROVIDE LIGHTING MANUFACTURER RECOMMENDED EMERGENCY BATTERY BACKUP CAPABLE OF 90 MINUTE RUNTIME
D	-	-	LED	6" DOWNLIGHT	RECESSED	GOTHAM	EVO-40/20-6AR-MD-LD-MVOLT -EZ1-TRW	24	120V-1P-2W		
DE	-	-	LED	6" DOWNLIGHT	RECESSED	GOTHAM	SAME AS FIXTURE "D1", ON BATTERY BACKUP	24	120V-1P-2W		PROVIDE LIGHTING MANUFACTURER RECOMMENDED EMERGENCY BATTERY BACKUP CAPABLE OF 90 MINUTE RUNTIME
E	-	-	LED	EXIT SIGN	WALL/CEILING	LITHONIA	LQM-S-W-3-R-120/277-EL-N	2	277V-1P-2W	CONNECT TO UNSWITCHED "LIFE SAFETY CIRCUIT.	ON GENERATOR BACKUP
EX	-	-	LED	EXIT SIGN	WALL/CEILING	LITHONIA	LQM-S-W-3-R-120/277-EL-N	2	120V-1P-2W		PROVIDE LIGHTING MANUFACTURER RECOMMENDED EMERGENCY BATTERY BACKUP CAPABLE OF 90 MINUTE RUNTIME
EG	-	-	LED	LED EXTERIOR EM SCONCE, PHOTOCELL	WALL, @ 10' AFF	ISOLITE	ELED-EM-WH-CD	11	277V-1P-2W	CONNECT TO UNSWITCHED "LIFE SAFETY CIRCUIT.	ON GENERATOR BACKUP
EGX	-	-	LED	LED EXTERIOR EM SCONCE, PHOTOCELL	WALL, @ 10' AFF	ISOLITE	ELED-EM-WH-CD	11	120V-1P-2W		PROVIDE LIGHTING MANUFACTURER RECOMMENDED EMERGENCY BATTERY BACKUP CAPABLE OF 90 MINUTE RUNTIME
G	-	-	LED	14" PENDANT	PENDANT	TMS	CAL-O-14-19LED-C24"-40K-120V-BR	19	120V-1P-2W	COORDINATE FINISH WITH ARCHITECT	
P	-	-	LED	WALL MTD. EXTERIOR FIXTURE	WALL, MTD PER ARCHITECT ELEVATIONS	CREE	OSQ-A-NM-3ME-Z-40K-UL-BK	53	277V-1P-2W	COORDINATE FINISH WITH ARCHITECT	PROVIDE WITH "WM-2" WALL MOUNT ACCESSORY, ORDERED SEPERATELY.
S	-	-	LED	SITE POLE FIXTURE, TYPE 3 DISTRIBUTION	POLE	CREE	OSQ-A-NM-3ME-K-40K-UL-BK, WITH OSQ-B-AA ADJUSTABLE ARM MOUNT	130	277V-1P-2W	FULL CUT OFF PARKING LOT FIXTURE	PROVIDE WITH 25' SQUARE STEEL POLE, FINISH TO MATCH FIXTURE. FIELD COORDINATE EXISTING POLE HEIGHTS AND MATCH EXISTING.
W	-	-	LED	UPLIGHT/DOWNLIGHT CYLINDER	WALL, @ 7' AFF	LITHONIA	OLLWU-LED-P1-40K-MVOLT-??	14	120V-1P-2W	COORDINATE FINISH WITH ARCHITECT	
Z	-	-	LED	EXTERIOR WALLPACK	WALL, MTD PER ARCHITECT ELEVATIONS	LITHONIA	WST-LED-P2-40K-VW-MVOLT-DDBXD	25	120V-1P-2W	COORDINATE FINISH WITH ARCHITECT	

9 LUMINAIRE SCHEDULE

FIXTURE NOTES

1. THE ARCHITECT/ENGINEER RESERVES THE RIGHT TO REJECT ANY AND ALL FIXTURES NOT PRE-APPROVED BY ARCHITECT/ENGINEER 10 DAYS PRIOR TO BID.
2. ALL OCCUPANCY SENSORS SHALL BE SET WITH A 10 MINUTE TIME OUT, WITH THE EXCEPTION OF RESTROOM SENSORS. ALL RESTROOM SENSORS SHALL BE SET WITH A 20 MINUTE TIME OUT.
3. ALL EMERGENCY BALLAST OPTIONS SHALL BE AT LEAST 1400 LUMENS.
4. COORDINATE ALL FIXTURE MOUNTING HEIGHTS WITH ARCHITECT.
5. PROVIDE FACES AND DIRECTIONAL ARROWS AS REQUIRED FOR EXIT SIGNS. COORDINATE MOUNTING TYPE FOR EACH FIXTURE PER PLANS.

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HOUSTON HIGH SCHOOL
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150119

JOSHUA D. HOLCOMB
REGISTERED ENGINEER
STATE OF TENNESSEE

REVISIONS

Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1
10-30-19	2	Addendum 2

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DETAILS - ELECTRICAL

6/17/2019 10:54:58 AM

Branch Panel: CP

Location: CONCESSION STAND 129
Supply From:
Mounting: Flush
Enclosure: NEMA 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 22,000
Mains Type: MCB
Mains Rating: 300 A
MCB Rating: 300 A

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	Receptacle (RESTROOM)	20 A	1	540 VA	3120...					2	50 A	Power (MSHP-1)	2
3	Receptacle (CONV)	20 A	1			180 VA	3120...			--	--	--	4
5	Receptacle (SANDWICH/SALAD PREP FRIDGE)	20 A	1					300 VA	2038...	2	30 A	Power (MSHP-2)	6
7	Receptacle (HOTDOG GRILL)	20 A	1	900 VA	2038...					--	--	--	8
9	Receptacle (COFFEE MAKER)	20 A	1			1660...	500 VA			1	20 A	Power (AC-1)	10
11	Receptacle (BOTTLE COOLER)	20 A	1					228 VA	500 VA	1	20 A	Power (AC-2)	12
13	Receptacle (MICROWAVE)	20 A	1	1550...	180 VA					1	20 A	Receptacle (POS)	14
15	Power (ICE MAKER)	20 A	1			2136...	1344...			1	20 A	Receptacle (FREEZER)	16
17	Receptacle (REFRIGERATOR)	20 A	1					588 VA	900 VA	1	20 A	Receptacle (PATIO)	18
19	Power (DF-1)	20 A	1	1392...	542 VA					1	20 A	Lighting (CONCESSION)	20
21	Lighting (PATIO)	20 A	1			268 VA	1500...			3	20 A	Power (WH-1)	22
23	Lighting (EXTERIOR)	20 A	1					25 VA	1500...	--	--	--	24
25	Receptacle (HEATED DISPLAY)	20 A	2	1220...	1500...					--	--	--	26
27	--	--	--			1220...	1061...			2	20 A	Power (DISPOSER)	28
29	Receptacle (HOT FOOD WELL)	20 A	1					1200...	1061...	--	--	--	30
31	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare	32
33	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	34
35	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	36
37	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare	38
39	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	40
41	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	42
43	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare	44
45	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	46
47	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	48
49	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare	50
51	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	52
53	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	54
55	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare	56
57	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	58
59	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	60
		Total Load:		12969 VA		12950 VA		8340 VA					
		Total Amps:		114 A		114 A		70 A					

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting	824 VA	100.00%	824 VA		
Motor	2440 VA	100.00%	2440 VA	**Total Conn. Load:**	34259 VA
Power	21466 VA	100.00%	21466 VA	**Total Est. Demand:**	34259 VA
Receptacle	9570 VA	100.00%	9570 VA	**Total Conn. Current:**	95 A
				Total Est. Demand Current:	95 A

Notes:

Branch Panel: HV

Location:
Supply From:
Mounting: Surface
Enclosure: Type 1

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 35,000
Mains Type: MLO
Mains Rating: 225 A
MCB Rating:

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	Power (RTU-1)	40 A	3	8591...	8591...					3	40 A	Power (RTU-2)	2
3	--	--	--			8591...	8591...			--	--	--	4
5	--	--	--					8591...	8591...	--	--	--	6
7	Power (RTU-3)	20 A	3	5127...	742 VA					1	20 A	Lighting (CORRIDOR)	8
9	--	--	--			5127...	689 VA			1	20 A	Lighting (EXTERIOR)	10
11	--	--	--					5127...	1537...	1	20 A	Lighting (INTERIOR)	12
13	Spare	20 A	1	500 VA	0 VA					1	20 A	Lighting (EXTERIOR)	14
15	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	16
17	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	18
19	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare	20
21	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	22
23	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	24
25	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare	26
27	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	28
29	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	30
		Total Load:		23514 VA		22997 VA		23773 VA					
		Total Amps:		85 A		83 A		86 A					

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting	2941 VA	100.00%	2941 VA		
Power	66924 VA	100.00%	66924 VA	**Total Conn. Load:**	70282 VA
				Total Est. Demand:	70282 VA
				Total Conn. Current:	85 A
				Total Est. Demand Current:	85 A

Notes:

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PANEL SCHEDULES - ELECTRICAL

REVISIONS

Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1
10-30-19	2	Addendum 2

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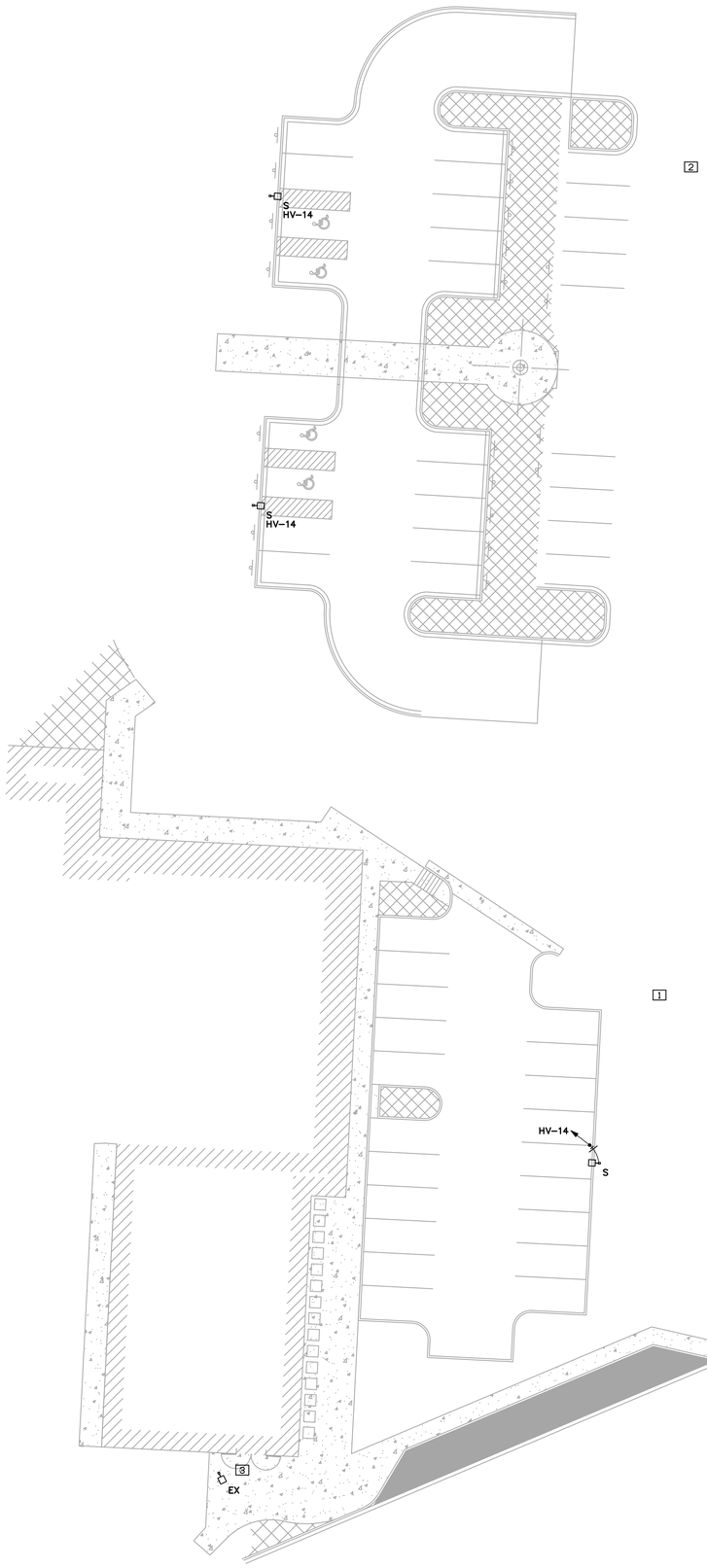
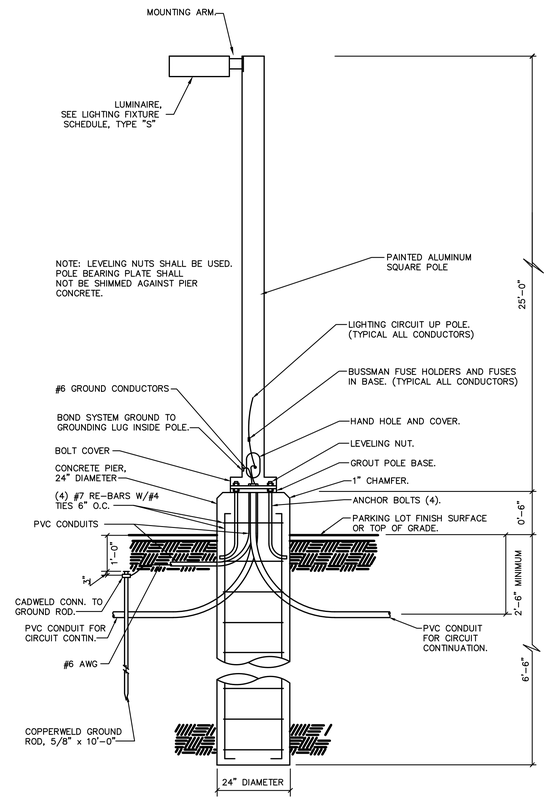


1 SITE LIGHTING PLAN - ELECTRICAL
1/16" = 1'-0"

NOTE:
POLE FOUNDATION SHALL MATCH EXISTING BASES AT ADJACENT PROPERTY AT MCDONALD'S AND BE PER MANUFACTURER'S RECOMMENDED DESIGN STANDARDS.



2 POLE BASE DETAIL - 6"

SITE LIGHTING NOTES

1. SITE LIGHTING CIRCUITS SHALL BE INSTALLED AT A DEPTH OF 18" MINIMUM, USING SCHEDULE 40 PVC.
2. SITE LIGHTING FEEDERS AND BRANCH SHALL HAVE A MINIMUM OF #8 WIRING AND 1" CONDUIT, UOI.
3. SITE LIGHTING FIXTURES SHALL BE CONTROLLED BY LIGHTING CONTROL PANEL .
4. IN AREAS WHERE POLES MAY COME IN CONTACT WITH VEHICLES, BASES SHALL BE EXTENDED ABOVE GRADE TO PROTECT THE POLE FROM PHYSICAL DAMAGE. SEE POLE BASE DETAIL.
5. FOR POLE HEIGHTS, REFER TO FIXTURE SCHEDULE.
6. FOR WALL PACK MOUNTING HEIGHTS, REFER TO FIXTURE SCHEDULE.
7. CIRCUITS SHALL FOLLOW THE APPROXIMATE ROUTE SHOWN ON THESE DRAWINGS. SLIGHT MODIFICATIONS ARE ACCEPTABLE.
8. CONTRACTOR SHALL CHECK DRAWINGS FROM OTHER TRADES TO DETERMINE AND AVOID POTENTIAL CONFLICTS AND DIG-INS.
9. CONTRACTOR SHALL COORDINATE EXACT ENTRANCE INTO BUILDING WITH ARCHITECT. PROVIDE LBS AS REQUIRED AND PAINT ALL EXPOSED CONDUIT TO MATCH EXISTING FINISHES.
10. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO BID.
11. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS OF ALL UNDERGROUND ROUTING TO OWNER.

[#] KEYED NOTES

1. ALL WORK ASSOCIATED WITH THE NEW PARKING IN FRONT OF THE BAND ADDITION WILL BE UNDER ADD ALTERNATE #2.
2. ALL WORK ASSOCIATED WITH THE NEW PARKING IN FRONT OF THE MAIN ENTRY TO THE SCHOOL WILL BE UNDER ADD ALTERNATE #3.
3. CONTRACTOR SHALL RELOCATE EXISTING POLE (+/- 50') AS DIRECTED BY OWNER. EXTEND ALL FEEDERS AND PROVIDE NEW POLE BASE.

SHEET ADDED 10/29/19 (2)

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SITE PLAN - ELECTRICAL

REVISIONS

Revision Date	Rev. #	Revision Description
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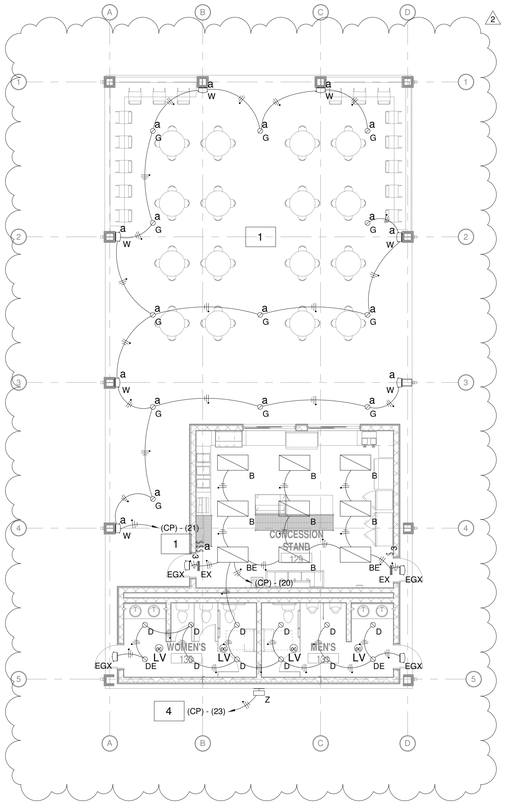
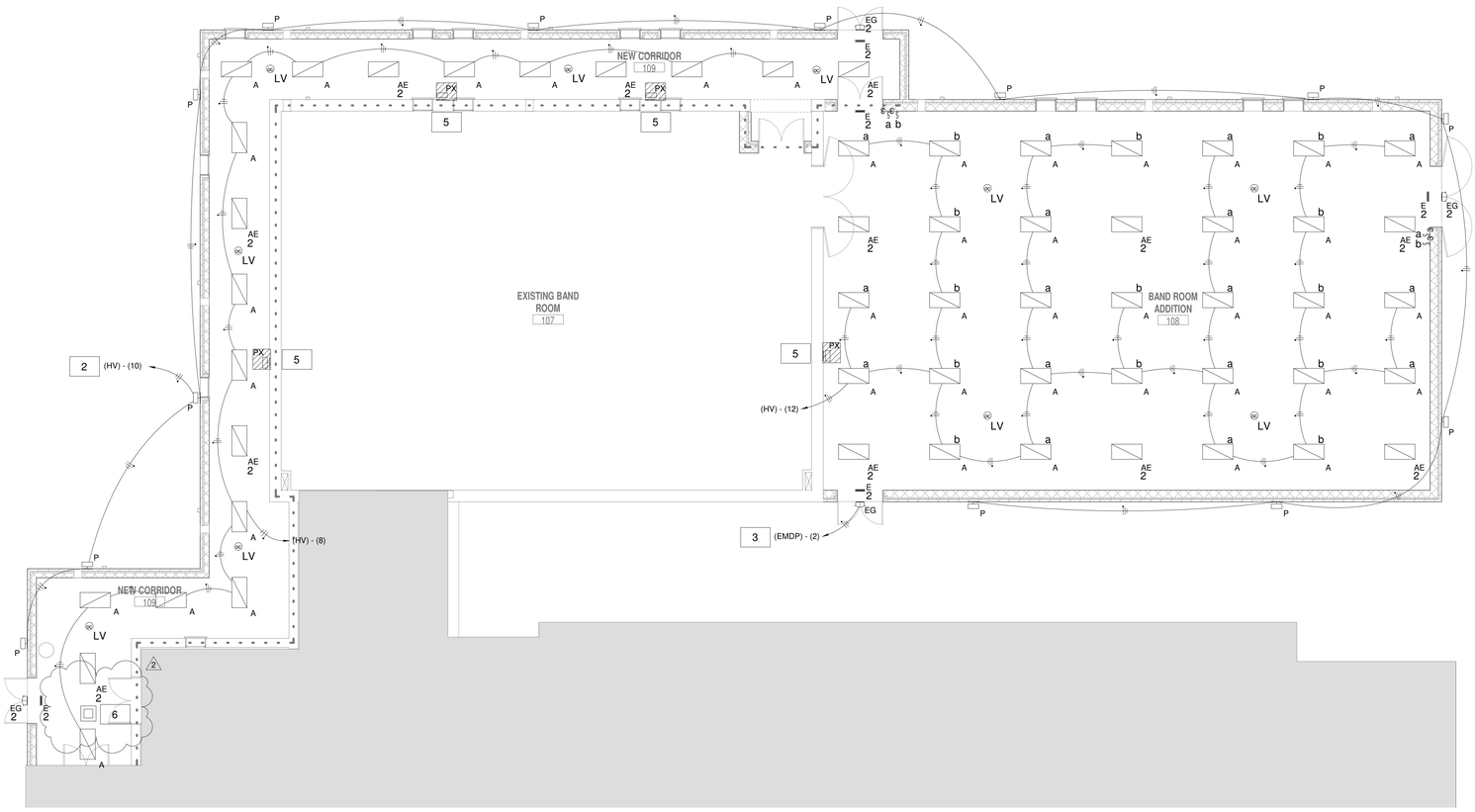


2 CONCESSION STAND FLOOR PLAN - ELECTRICAL - LIGHTING

1/8" = 1'-0"



1 BAND ROOM FLOOR PLAN - ELECTRICAL - LIGHTING

1/8" = 1'-0"

WALL RATING LEGEND

- SMOKE TIGHT PARTITION
- ONE HOUR RATED FIRE BARRIER
- TWO HOUR RATED FIRE BARRIER

WALL RATING LEGEND

NOT TO SCALE

LIGHTING NOTES

1. ALL HOMERUNS, WHERE WIRE SIZE IS NOT SPECIFIED, ARE #12 AWG.
2. ALL EMERGENCY FIXTURES SERVED FROM "EMDP" SHALL SERVE AS A NIGHT-LIGHT AND SHALL REMAIN UNSWITCHED.

KEYED NOTES

1. PROVIDE SWITCH FOR CEILING FAN. SEE FAN LOCATION ON SHEET E3.1.
2. INDICATED CIRCUIT SHALL BE CONNECTED TO NEW LIGHTING CONTROL PANEL "LCP".
3. INDICATED CIRCUIT SHALL BE CONNECTED TO EXISTING PANEL "EMDP" FED FROM CAMPUS GENERATOR FOR EMERGENCY LIGHTING.
4. EXTERIOR FIXTURE "Z" TO BE CONTROLLED VIA PHOTOCELL.
5. EXISTING WALL PACK TO BE DEMOLISHED. REMOVE WIRE BACK TO NEAREST JUNCTION BOX.
6. EXISTING CANOPY FIXTURE TO BE DEMOLISHED.

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FLOOR PLAN - ELECTRICAL - LIGHTING

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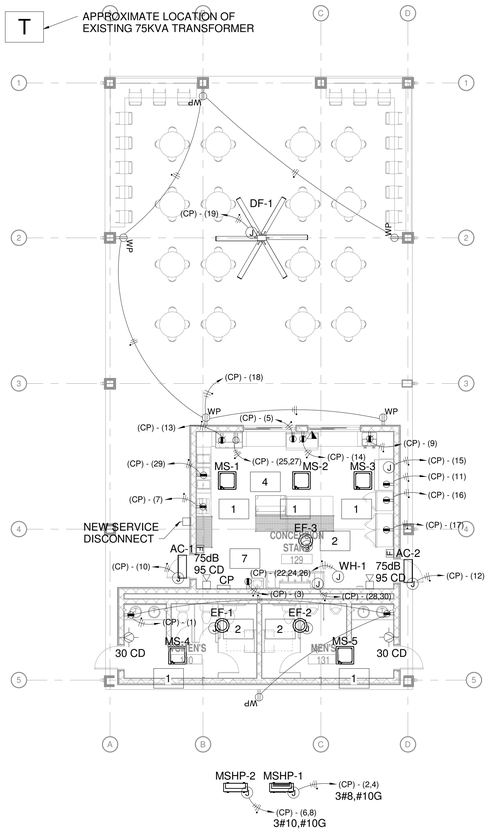
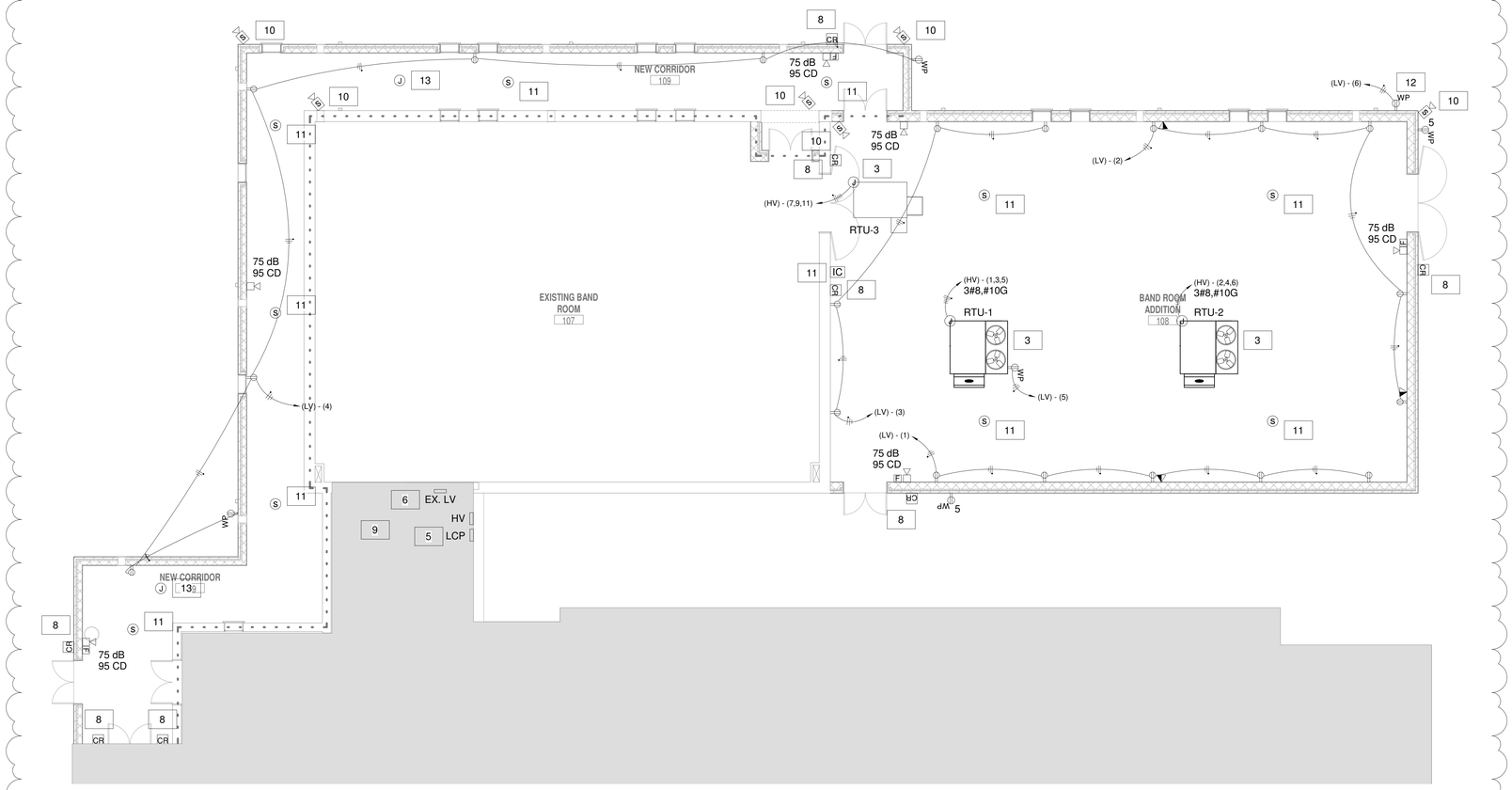


2 CONCESSION STAND FLOOR PLAN - ELECTRICAL - POWER

1/8" = 1'-0"



1 BAND ROOM FLOOR PLAN - ELECTRICAL - POWER

1/8" = 1'-0"

WALL RATING LEGEND

- SMOKE TIGHT PARTITION
- ONE HOUR RATED FIRE BARRIER
- TWO HOUR RATED FIRE BARRIER

WALL RATING LEGEND

NOT TO SCALE

FIRE ALARM NOTES

1. ALL REQUIRED DOCUMENTATION REGARDING THE DESIGN OF FIRE DETECTION, ALARM, AND COMMUNICATIONS SYSTEMS AND THE PROCEDURES OF MAINTENANCE, INSPECTION, AND TESTING OF FIRE DETECTION, ALARM, AND COMMUNICATIONS SYSTEMS SHALL BE MAINTAINED AT AN APPROVED, SECURE LOCATION FOR THE LIFE OF THE SYSTEM.
2. THE FIRE ALARM CONTROL PANEL CIRCUIT BREAKER SHALL BE MARKED WITH RED PAINT, AND SHALL BE ACCESSIBLE ONLY TO AUTHORIZED PERSONNEL, AND SHALL BE IDENTIFIED AS "FIRE ALARM CIRCUIT." THE LOCATION OF THE CIRCUIT BREAKER SHALL BE PERMANENTLY IDENTIFIED AT THE FIRE ALARM CONTROL PANEL.
3. MORE THAN TWO VISIBLE NOTIFICATION APPLIANCES IN THE SAME ROOM OR ADJACENT SPACE WITHIN THE FIELD OF VIEW MUST FLASH IN SYNCHRONIZATION.
4. CONTRACTOR SHALL PROVIDE FIRE ALARM SYSTEMS SECONDARY POWER SOURCE LOAD CALCULATIONS PER NFPA 72 4.4.1.5.3.
5. CONTRACTOR SHALL PROVIDE A STORAGE BATTERY DEDICATED TO THE FIRE ALARM SYSTEM PER NFPA 72 4.4.1.5.
6. FIRE ALARM CONTRACTOR TO PROVIDE & WIRE ALL REQUIRED DUCT SMOKE DETECTORS. MECHANICAL TO MOUNT DETECTOR.
7. COORDINATE LOCATION OF FIRE ALARM ANNUNCIATOR PANEL WITH FIRE MARSHAL.
8. PROVIDE TAMPER & FLOW SWITCHES AS REQUIRED. COORDINATE WITH FIRE PROTECTION DRAWINGS & CONTRACTOR FOR EXACT QUANTITY & LOCATIONS.
9. ALL FIRE ALARM DEVICES TO CONNECT TO EXISTING SIMPLEX CAMPUS SYSTEM. PROVIDE NAC EXTENDED AND EXPANSION/PROGRAMMING AS REQUIRED.

POWER NOTES

1. ALL HOMERUNS, WHERE WIRE SIZE IS NOT SPECIFIED, ARE #12 AWG.

KEYED NOTES

1. INDOOR UNIT TO RECEIVE POWER FROM OUTDOOR UNIT THROUGH FIELD-SUPPLIED INTERCONNECTED WIRING PROVIDED AND INSTALLED BY CONTRACTOR.
2. EXHAUST FAN SHALL BE CIRCUITED AND SWITCHED WITH LOCAL LIGHTING.
3. CONTRACTOR SHALL PROVIDE SUPPLY & RETURN DUCT SMOKE DETECTOR IN MECHANICAL UNIT AS INDICATED.
4. CONTRACTOR SHALL FIELD COORDINATE EXACT LOCATION OF ALL POWER FOR EQUIPMENT LOCATED IN CONCESSION STAND. SEE PANEL SCHEDULE FOR DESIGNATED CIRCUITS.
5. LIGHTING CONTROL PANEL "LCP" SHALL BE ACUITY #ARP-INTENC08-NLT-8SPR-MVOLT-HLK-SM. PROVIDE WITH NLIGHT ECLYPSE #nECY-MVOLT-BAC-ENCGFXK
6. PANEL "LV" IS EXISTING. PROVIDE NEW BREAKERS IN EXISTING PANEL AS REQUIRED.
7. PANEL SHALL RECESS IN WALL. COORDINATE WITH ARCHITECT. PROVIDE (5)-1"C FROM PANEL CAN TO ABOVE CEILING FOR FUTURE CIRCUITS. (2)
8. CONTRACTOR SHALL PROVIDE NEW BOX IN WALL AND CONDUIT ABOVE CEILING FOR CARD READER BY OWNER. CONTRACTOR SHALL PROVIDE BLANK COVER FOR EXISTING CARD READER LOCATIONS.
9. COORDINATE EXACT LOCATION OF ALL NEW PANELS WITH OWNER PRIOR TO ROUGH-IN.
10. CONTRACTOR SHALL RELOCATE EXISTING SECURITY CAMERA. PROVIDE BOX IN EXT. WALL AND 1"C TO ACCESSIBLE CEILING SPACE. FIELD COORDINATE EXACT LOCATION WITH OWNER.
11. CONTRACTOR SHALL PROVIDE INTERCOM PUSH TO CALL BUTTON AND RECESSED CEILING SPEAKERS TO MATCH OWNER'S EXISTING TELECOR SYSTEM. PROVIDE ALL WIRING, PROGRAMMING, AND EXPANSION AS REQUIRED.
12. PROVIDE RECEPTACLE FOR IRRIGATION CONTROLLER. FIELD COORDINATE EXACT LOCATION. (2)
13. CONTRACTOR SHALL RELOCATE EXISTING PARKING LOT LIGHTING IN-GRADE PULLBOX 10' BEYOND NEW BUILDING PAD. EXTEND ALL CONDUCTORS AS REQUIRED. PROVIDE NEW FEEDERS FROM ELECTRICAL ROOM APPROXIMATELY 150'.

HNA ENGINEERING

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HOUSTON HIGH SCHOOL
BAND ROOM ADDITION AND CONCESSION STAND
9755 Wolf River Blvd
Germantown, TN 38139
150119

JOSHUA D. HOLTGREWE
REGISTERED ENGINEER
No. 113280
STATE OF TENNESSEE

REVISIONS		
Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1
10-30-19	2	Addendum 2

PROJECT NUMBER 150119

DATE OF ORIGINAL ISSUE September 2, 2019

SHEET NUMBER E3.1

FLOOR PLAN - ELECTRICAL - POWER

10/29/2019 4:30:43 PM

BID FORM
GMSD BID #FY2020-02
HOUSTON HIGH SCHOOL BAND ROOM ADDITION & CONCESSION STAND ADDITIONS

Project can begin sooner, but ground breaking should take place no later than Friday, December 13, 2019.
Project must be completed no later than Monday, August 31, 2020.
Sequencing of the project shall be as follows:
The Band Room Addition shall be the first phase of work. Substantial Completion must be given on the Band Room before demolition on the Concession Stand can start.

BIDDER:_____

Bid shall be filled in completely, by the Contractor, in the bid schedule by indicating total dollars and cents. All costs, including hourly rates, will be included here and will be fully-burdened to include, but not limited to: wages, transportation, lodging, overhead, and per diem. All figures shall be written in ink or typed. Penciled entries will NOT be accepted, and will be considered irregular and rejected.

Installation and on-site training are required. Installation, testing and training must be completed no later than Wednesday, September 30, 2020. Bidders must indicate project completion time after receipt of order (A.R.O.). Project Completion Date is critical and will be a factor in the evaluation and award of this bid. *Dates of work and schedule must be coordinated with Josh Cathey, Deputy Superintendent, Germantown Municipal School District, josh.cathey@gmsdk12.org, 901-752-7900.*

ITEM	Description	Unit	Project Total
1	Houston High School Band Room Addition and all associated work on the East side of the campus.	**LS**	
Alternate #1	Bid Alternate (Concession Stand Work and all associated work on the West side of the campus).	**LS**	
Alternate #2	New parking area directly to the east of the new Band Room Addition.	**LS**	
Alternate #3	New Parking area directly to the east of the new main school entrance.	**LS**	

Project Completion Date:_____

State your cost per $1000.00 for Performance, Materials and Labor Bond (if required): $_____

Company Name:			**Address:**				
Organized and existing under the laws of the State of :		**and doing business as:**	a corporation	a partnership	an individual	a limited liability company	other
City:	**State:**	**Zip:**	**Telephone (with Area Code):**		**Fax (with Area Code):**		
Name:			**Title:**				
Authorized Signature:				**Date:**			

SECTION 01 21 00
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cash Allowance

B. Inspecting and testing allowances.

1.02 RELATED REQUIREMENTS

A. Section 01 40 00 - Quality Requirements

1.03 CASH ALLOWANCES

A. See Allowance Schedule below.

1.04 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

B. Funds will be drawn from the Contingency Allowance only by Change Order.

C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.05 ALLOWANCES SCHEDULE

A. Door Hardware - Allow $3,000 per new door leaf.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00
ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of Alternates.

1.02 SCHEDULE OF ALTERNATES

A. Alternate No. 1 - Concession stand work and all associated work on the west side of the campus as outlined in the construction documents and specifications.

B. Alternate No. 2 - Parking, as designed in the construction documents, directly to the east of the band room addition.

C. Alternate No. 3 - Parking, as designed in the construction documents, directly to the east of the main school entrance.

END OF SECTION

SECTION 05 58 13
METAL COLUMN COVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish all labor, materials, equipment and incidentals required to install column covers, in accordance with the contract drawings and details to insure a weather-tight system. Column Cover supplier shall be responsible for the design of the Column Cover System, including, but not limited to, the anchorage details, sealant recommendations, and expansion/contraction provisions for system.

B. Provide formed metal column covers and/or beam wraps as shown on drawings. Contractor to coordinate requirements, quantities and sizes with structural drawings.

1.02 RELATED SECTIONS

A. Section 05 12 00 Structural Steel

B. Section 05 40 00 Cold Formed Metal Framing

C. Section 05 50 00 Metal Fabrications

D. Section 07 90 05 Joint Sealers

1.03 REFERENCES

A. The manufacturer will be a firm regularly engaged in the fabrication of custom aluminum columns cover systems with a minimum of 5 years experience in the production of systems as specified herein.

B. The name of the manufacturer and/or installer must specifically be listed by the general contractor at the time of submission of the bid.

C. No bidder of the column cover system will be accepted without the prior written approval of the architect based on submission of a mock-up illustrating the significant conditions of the project.
   1. Scope of the mock-up must be closely coordinated with the architects.
   2. Written approval of all biddes fulfilling these requirements shall be so noted by addendum.

1.04 SUBMITTALS

A. Submit copies of manufacturer's standard guide specifications, standard detail drawings and installation procedures.

B. Submit certified test reports verifying the performance requirements.

C. Submit shop drawings showing small scale layout and elevations of the total project. Details shall include attachment to the support system, include all information necessary for fabrication and recommendation for installation of column covers. Indicate materials, sizes, thickness, fastenings and profiles. Show details of weatherproofing at edges, termination, penetrations and connections to adjacent materials.

D. Submit product samples as directed by the project architect representative of materials to be furnished.

1.05 QUALITY ASSURANCE

A. The installer shall be an experienced installation firm acceptable to the panel manufacturer. Written approval of any subcontract installer must be received by the architect prior to the installation of any materials.

B. Reference to ASTM standards shall mean the latest edition of those standards.

C. Any reference to specific manufacturers is not intended to restrict bidding but rather to establish a minimum standard of quality and offer clarification of panel profiles. Manufacturers not listed must obtain the written approval of the architect a minimum of 7 days prior to the bid. Such request for approval must be in accordance with paragraph 1.3 of this section and the general conditions.

1.06 PROJECT CONDITIONS

A. Field Measurements Verify actual supporting and adjoining construction by field measurements before fabrication, and indicate recorded measurements on final shop drawings. Coordinate construction to ensure that Column Covers fit properly to supporting and adjoining construction and coordinate schedule with construction progress to avoid delaying the work.

B. Established dimensions: where field measurements can not be made without delaying the work, guaranteed dimensions shall be provided to manufacturer to proceed with fabrication of Column Covers corresponding to the established dimensions.

PART 2 PRODUCTS

2.01 2.1 MANUFACTURER

A. Manufacturers: Subject to compliance with requirements, provide products manufactured by:

Basis of Design: Alumafab Metal Sales, LLC Burnsville, MN. www.alumafab.com, Phone: (952)895-5700 Toll Free (800)544-2488 Fax: (952)895-1500

B. The Column Covers shall be installed in accordance with the details illustrated on the contract drawings. The vertical and horizontal joints shall be sealed through the use of exposed sealants as indicated. The column covers shall be positively attached to the building structure on the panel edges.
   1. AF-2000 - Aluminum Column Covers
   2. Alternate systems by other manufacturers/fabricators are to be submitted to the architect not less than 7 working days prior bid.

2.02 PANEL ASSEMBLY

A. The basic panel shall consist of custom fabricated, solid aluminum column covers, in thicknesses, lengths, widths and finish as illustrated on the contract drawings.
   1. Each course to be fabricated in two or more vertical sections (typically halves) with butt joints. Fold back ends of sheet metal to form a 1” wide return leg on the concealed side
   2. AF2000 hairline joint utilizing key slot “Sur-Loc System”. Design and fabricate work to permit its installation on fully concealed mounting devices.
   3. Bump forming of column cover will not be permitted unless prior written approval of Architect.
   4. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise damaging the work.
   5. Provide straps, plates and brackets as required for support and anchorage of fabricated items.

B. Covers shall be .125” aluminum 3003 alloy H14 temper. Top and bottom rings shall be welded construction. Horizontal butt joints with no reveals or caulk reveals shall be a minimum of ½” wide.

2.03 FINISH

A. Exterior surfaces of the metal panels shall be a fluoropolymer coating utilizing 70% KYNAR 500 resins with a total nominal dry film thickness of 1.0 mil. Finish shall be applied in accordance with industry standards.

B. One manufacturer's standard (custom) color shall be selected by the architect.

C. All exposed surfaces shall be protected with a strippable coating.
   1. The strippable coating shall be compatible with the exterior finish.
   2. The strippable coating shall be removed by the erector immediately upon installation of the panels.

2.04 ACCESSORIES

A. Fasteners
   1. All panels shall be positively attached to the structure through the use of concealed fasteners contained within the side joint of the assembly. Installer to provide stainless steel screws and fasteners for aluminum column covers.

2. No exposed fasteners will be accepted, unless noted otherwise.
3. Fastener types and sizes shall be designed to resist negative & positive wind loads.

B. Sealants
1. All sealants shall be in accordance with the latest ASTM standards and shall comply with the sealant specifications of the contract documents.

C. Subgirts & Clips
1. Subgirts and clips shall be furnished as part of the scope of this work as noted on the contract drawings and as required to provide a complete Column Cover assembly.

PART 3 - EXECUTION

3.01 3.1 EXAMINATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation.

B. Substructure shall be structurally sound and shall be free of defects detrimental to work and erected in accordance with established building tolerances.

3.02 INSTALLATION

A. Comply with panel manufacturer's instruction for installation and erection of preformed metal panels. Install in accordance with approved shop drawings.

B. Anchor component parts securely in place, providing for necessary thermal and structural movement.

C. Examine structure and surfaces for defects that would prevent proper installation of the wall system. Report any discrepancies to the architect and contractor. Do not proceed until the remedial work has been completed.

D. All fasteners shall be installed in accordance with the materials specification above.

E. Covers to be secured to substrate by use of formed aluminum clips utilizing angle, adjustable angle or zee shapes. Number of clips required to be determined by manufacturer’s standard practice. Quantity to be approved by Architect.

F. Isolate dissimilar materials in accordance with acceptable industry practices and as recommended by panel manufacturer.

3.03 CLEANING

A. Touch-up damaged finishes.

B. Cleaning and maintenance per maintenance instructions.

3.04 DAMAGED COLUMN COVERS

A. Repair or replace any and all Column Covers and trim that have been damaged upon determination of responsibility.

END OF SECTION

SECTION 07 42 93

SOFFIT AND LINER PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush-profile, concealed fastener, lap-seam metal soffit and liner panels, with related metal trim and accessories.

1.02 RELATED REQUIREMENTS

A. Section 05 12 00 Structural Steel Framing

B. Section 05 40 00 Cold Formed Metal Framing

C. Section 07 21 00 Thermal Insulation

D. Section 07 25 00 Weather Barriers

E. Section 07 62 00 Sheet Metal Flashing and Trim

1.03 REFERENCES

A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org :
   1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
   2. AAMA 809.2 Voluntary Specification Non-Drying Sealants.

B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards :
   1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

C. ASTM International (ASTM): www.astm.org :
   1. ASTM A755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
   2. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
   3. ASTM C920 - Specification for Elastomeric Joint Sealants.
   4. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
   5. ASTM D4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
   6. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

D. International Accreditation Service (IAS):
   1. IAS AC472 Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems, Part B.

E. US Green Building Council (USGBC): www.usgbc.org
   1. Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

1.04 QUALITY ASSURANCE

A. Manufacturer/Source: Provide metal panel assemblies and accessories from a single manufacturer accredited under IAS AC472, Part B.

B. Installer Qualifications: Experienced Installer certified by metal panel manufacturer with minimum of five years experience with successfully completed projects of a similar nature and scope.
   1. Installer's Field Supervisor: Experienced mechanic certified by metal panel manufacturer supervising work on site whenever work is underway.

C. Steel Construction Publications: Comply with published recommendations in the following, unless more stringent requirements are indicated.
   1. American Institute of Steel Construction (AISC): "Steel Construction Manual."
   2. American Iron and Steel Institute (AISI): "Cold Formed Steel Design Manual."

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, metal panel installer, metal panel manufacturer's technical representative, inspection agency and related trade contractors.
   1. Coordinate building framing in relation to metal panel system.
   2. Coordinate openings and penetrations of metal panel system.
   3. Coordinate work of Division 07 Sections "Roof Specialties" and "Roof Accessories" and openings and penetrations and manufacturer's accessories with installation of metal panels.

1.06 ACTION SUBMITTALS

A. Product Data: Manufacturer’s data sheets for specified products. Include data indicating compliance with performance requirements.

B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, and special details. Make distinctions between factory and field assembled work.
   1. Indicate points of supporting structure that must coordinate with metal panel system installation.
   2. Include structural data indicating compliance with performance requirements and requirements of local authorities having jurisdiction.

C. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.

D. Samples for Verification: Provide 12-inch (305 mm) long section of each metal panel profile. Provide color chip verifying color selection.

1.07 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Indicating compliance of products with requirements.

B. Qualification Information: For Installer firm and Installer’s field supervisor.

C. IAS Accreditation Certificate: Indicating that manufacturer is accredited under provisions of IAS AC472 Part B.

D. Manufacturer's warranty: Unexecuted sample copy of manufacturer's warranty.

1.08 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Manufacturer's Warranty: Executed copy of manufacturer's warranty.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping.
   1. Deliver, unload, store, and erect metal panels and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
   2. Store in accordance with Manufacturer's written instruction. Provide wood collars for stacking and handling in the field.
   3. Shield foam insulated metal panels from direct sunlight until installation.

1.10 WARRANTY

A. Special Manufacturer’s Warranty: On manufacturer’s standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within one year from date of Substantial Completion.

B. Special Panel Finish Warranty: On Manufacturer’s standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within the warranty period, as follows:

1. Fluoropolymer Two-Coat System:
2. Basis of Design System: MBCI, Signature 300.
3. Color fading in excess of 5 Hunter units per ASTM D2244.
4. Chalking in excess of No. 8 rating per ASTM D4214.
5. Failure of adhesion, peeling, checking, or cracking.
6. Warranty Period: 30 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Basis of Design: MBCI Metal Roof and Wall Systems, Division of NCI Group, Inc.; Houston TX. Tel: (877)713-6224; Email: info@ecoficientseries.com ; Web: www.mbci.com.
   1. Provide basis of design product, or comparable product approved by Architect prior to bid.

2.02 PERFORMANCE REQUIREMENTS

A. General: Provide metal panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.

B. Recycled Content: For Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

C. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, as determined by ASTM E1592:
   1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
   2. Wind Negative Pressure: Certify capacity of metal panels by actual testing of proposed assembly.
      a. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of 1/120 of the span with no evidence of failure.
      b. Seismic Performance: Comply with ASCE 7 Sections 9, "Earthquake Loads."

D. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.

2.03 FORMED METAL SOFFIT AND LINER PANELS

A. Flush-Profile, Concealed Fastener Metal Soffit and Liner Panels: Metal panels consisting of formed metal sheet with vertical panel edges, with flush joints between panels, field assembled with nested lapped edges, and attached to supports using concealed fasteners.
   1. Basis of Design: MBCI, Artisan Panel.
   2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, structural quality, Grade 50, Coating Class AZ50 (Grade 340, Coating Class AZM150), prepainted by the coil-coating process per ASTM A755/A755M.
   3. Nominal Thickness: 24 gage coated thickness, with smooth surface.
      a. Exterior Finish Fluoropolymer two-coat system.
      b. Color As selected by Architect from manufacturer's standard colors
         1) Panel Width: 12 inches (305 mm.
         2) Panel Thickness: 1 inch (25 mm).

2.04 MISCELLANEOUS MATERIALS

A. General: Provide complete metal panel assemblies incorporating trim, fasciae, and miscellaneous flashings. Provide required fasteners, closure strips, and sealants as indicated in manufacturer's written instructions.

B. Flashing and Trim: Match material, thickness, and finish of metal panels.

C. Fasteners: Self-tapping screws and other acceptable fasteners recommended by metal panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal panels by means of factory-applied coating, with weathertight resilient washers.

2.05 FABRICATION

A. General: Provide factory fabricated and finished metal panels, trim, and accessories meeting performance requirements, indicated profiles, and structural requirements.

B. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings.

2.06 FINISHES

A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

B. Fluoropolymer Two-Coat System: 0.2 - 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621, meeting solar reflectance index requirements.
   1. Basis of Design: MBCI, Signature 300.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine metal panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panels.
   1. Inspect framing that will support insulated metal panels to determine if support components are installed as indicated on approved shop drawings and are within tolerances acceptable to metal panel manufacturer and installer. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal panels.

B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal panel installation.

3.02 METAL PANEL INSTALLATION

A. Concealed-Fastener Formed Metal Soffit Panels: Install metal panel system in accordance with manufacturer's written instructions, approved shop drawings, project drawings, and referenced publications. Install metal panels in orientation, sizes, and locations indicated. Anchor panels and other components securely in place. Provide for thermal and structural movement.

B. Fasten metal panels to supports with fasteners at each location indicated on approved shop drawings, at spacing and with fasteners recommended by manufacturer. Fasten panel to support structure through leading panel flange. Fit back flange of subsequent panel into secured flange of previous panel.
   1. Cut panels in field where required using manufacturer's recommended methods.
   2. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by metal panel manufacturer.

C. Attach panel flashing trim pieces to supports using recommended fasteners.

3.03 ACCESSORY INSTALLATION

A. General: Install metal panel accessories with positive anchorage to building and weather tight mounting; provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install components required for a complete metal panel assembly, including trim, flashings, sealants, closure strips, and similar items.
   2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
   3. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.

3.04 CLEANING AND PROTECTION

A. Clean finished surfaces as recommended by metal panel manufacturer.

B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION

SECTION 08 44 13

GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Kawneer Architectural Aluminum Curtain Wall Systems as a basis of design which includes perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of curtain wall framing.
   1. Types of Kawneer Aluminum Curtain Wall include:
      a. 7500 Wall™ Curtain Wall System – 2-1/2" x 6-5/16" (63.5 x 160.3) or 2-1/2" x 7-5/16" (63.5 x 185.7), outside glazed pressure plate format.
         1) 7550 Wall™ with 2" (50.8) triple glazing.

1.02 RELATED REQUIREMENTS

A. Section 07 25 00 Weather Barriers

B. Section 07 90 05 Joint Sealers

C. Section 08 80 00 Glazing

1.03 DEFINITIONS

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) – AAMA Glossary (AAMA AG).

1.04 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
   1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads. Failure also includes the following:
      a. Thermal stresses transferring to building structure.
      b. Glass breakage.
      c. Loosening or weakening of fasteners, attachments, and other components.
      d. Failure of operating units.

B. Wind loads: Provide Curtain Wall system; include anchorage, capable of withstanding wind load design pressures indicated in Chapter 16 of the 2012 International Building Code for this region.

C. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft2 (0.3 l/s· m2) at a static air pressure differential of 6.24 psf (300 Pa).

D. Water Resistance, (static): The test specimen shall be tested in accordance with ASTM E 331 and ASTM E 547. There shall be no leakage at a static air pressure differential of 15 psf (720 Pa) as defined in AAMA 501.

E. Structural performance shall be based on Aluminum Association “Specification for Aluminum Structures” or CSA Standard CAN3-S157 “Strength Design in Aluminum”. There shall be no deflection in excess of L/175 of the span of any framing member at design load.

F. Energy Efficiency:
   1. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: 0.36 BTU/hr· ft2· ºF (2.02 W/m2· ºC).

G. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than 83frame and 72glass, or Condensation Index (I): when tested to CSA-A440-00, the Condensation Index shall not be less than 76frame and 65glass.

H. Energy Efficiency:

1. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than: 0.17 BTU/hr· ft2· ºF (0.98 W/m2· ºC).

I. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than 85frame and 80glass, or Condensation Index (I): when tested to CSA-A440-00, the Condensation Index shall not be less than 77frame and 76glass.

J. Environmental Product Declaration (EPD): Shall have a Type III Product-Specific EPD created from a Product Category Rule.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
   1. Recycled Content:
      a. Provide documentation that aluminum has a minimum of 50% mixed pre- and post-consumer recycled content with a sample document illustrating project specific information that will be provided after product shipment.
      b. Once product has shipped, provide project specific recycled content information, including:
         1) Indicate recycled content; indicate percentage of pre- and post-consumer recycled content per unit of product.
         2) Indicate relative dollar value of recycled content product to total dollar value of product included in project.
         3) Indicate location recovery of recycled content.
         4) Indicate location of manufacturing facility.
   2. Environmental Product Declaration (EPD).
      a. Include a Type III Product-Specific EPD created from a Product Category Rule.

C. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for glazed aluminum curtain walls, indicating compliance with performance requirements.

G. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed curtain wall systems, made from 12" (304.8) lengths of full-size components and showing details of the following:
   1. Joinery.
   2. Glazing.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Installer who has had successful experience with installation of the same or similar systems required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating glazed aluminum curtain walls that meet or exceed performance requirements.

C. Source Limitations: Obtain aluminum curtain wall system through one source from a single manufacturer.

D. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockups for type(s) of curtain wall elevation(s) indicated, in location(s) shown on Drawings.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination."

1.07 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.08 WARRANTY

A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product:
   1. Kawneer Company Inc.
   2. 7500 Wall™ Curtain Wall System.
      a. 7550 Wall™ for 1-3/4" (44.4) triple glazing.
   3. Frame depth options: 2-1/2" x 6-5/16" (63.5 x 160.3) or 2-1/2" x 7-5/16" (63.5 x 185.7).
   4. Tested to AAMA 501.

B. Architect Approved Equal.

2.02 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8) wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.
   1. Recycled Content: Shall have a minimum of 50% mixed pre- and post-consumer recycled content.
      a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
      b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
      c. Indicate location recovery of recycled content.
      d. Indicate location of manufacturing facility.

B. Aluminum sheet alloy: Shall meet the requirements of ASTM B209.

C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.

D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

E. Pressure Plate: Pressure plate shall be aluminum and fastened to the mullion with stainless steel screws.

F. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or

iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

G. Sealant: For sealants required within fabricated curtain wall system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

H. Thermal Barrier: Kawneer IsoWeb™ Thermal Break: All framing members shall consist of interior and exterior extruded aluminum sections that shall be integrated with two parallel, glass reinforced nylon strips forming a continuous composite assembly.

I. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall members are nominal and in compliance with AA Aluminum Standards and Data.

2.03 CURTAIN WALL FRAMING

A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   1. Glazing System: 4 sided captured.
   2. Glazing Plane: Front.

B. Glass: 1-3/4" (44.4) insulating glass option.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Framing Sealants: Shall be suitable for glazed aluminum curtain wall as recommended by sealant manufacturer.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.

F. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

G. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

H. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle curtain wall material and components to avoid damage. Protect curtain wall material against damage from elements, construction activities, and other hazards before, during and after installation.

2.04 GLAZING

A. Glazing: Comply with Division 08 Section “Glazing”. Following glazing options are available.
   1. System: Outside glazed pressure plate format with 1-3/4" (44.4) triple glazed insulating glass.

B. Glazing Gaskets: Gaskets to meet the requirements of ASTM C864.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: As recommended by manufacturer for joint type.

2.05 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.

5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
7. Internal weeping system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

C. Curtain Wall Framing: Fabricate components for assembly using shear block system following manufacturer's standard installation instructions.

D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.06 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:
1. Kawneer Permanodic™ AA-M10C21A44 / AA-M45C22A44, AAMA 611, Architectural Class I Color Anodic Coating (Color TBD).

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Install curtain wall systems plumb, level, and true to line, without warp or rack of frames with manufacturer’s prescribed tolerances and installation instructions. Provide support and anchor in place.
1. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.
2. Glazing: Glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the mullion using stainless steel fasteners spaced no greater than 9" (228.6) on center.
3. Water Drainage: Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

B. Related Products Installation Requirements:
1. Sealants (Perimeter): Refer to Joint Treatment (Sealants) Section.
2. Glass: Refer to Glass and Glazing Section.
a. Reference: ANSI Z97.1, CPSC 16 CFR 1201 and GANA Glazing Manual

3.03 FIELD QUALITY CONTROL

A. Field Tests: Architect shall select curtain wall units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer’s representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
1. Testing: Testing shall be performed per AAMA 503 by a qualified independent testing agency. Refer to Testing Section for payment of testing and testing requirements.
a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft2, whichever is greater.

b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 8 psf (383 Pa).

B. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

3.04 ADJUSTING, CLEANING AND PROTECTION

A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum curtain wall system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

SECTION 08 51 13

ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Kawneer Architectural Aluminum Windows as a basis of design and includes perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of window units .

1.02 RELATED REQUIREMENTS

A. Section 07 25 00 Weather Barriers

B. Section 07 90 05 Joint Sealers

C. Section 08 44 13 Glazed Aluminum Curtainwalls

1.03 DEFINITIONS

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufactures Association (AAMA) – AAMA Glossary (AAMA AG).

1.04 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed window system shall withstand the effects of the following performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Window Performance Requirements:

1. Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS)
   a. Performance Class and Grade: HS-AW40 - 148" x 79" (3759 x 2007 mm) (OXO).
   b. Performance Class and Grade: HS-AW70 - 99" x 79" (2515 x 2007 mm) (XX).
   c. Performance Class and Grade: HS-AW70 - 148" x 79" (3759 x 2007 mm) (XOX).
2. Air Leakage: The test specimen shall be tested in accordance with ASTM E 283. The air leakage rate shall not exceed 0.30 cfm/ft2 (1.5 L/s·m2) at a static air pressure differential of 6.2 psf (300 PA).
3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331 and ASTM E 547. There shall be no leakage as defined in the test method at a static air pressure differential of 10 psf (479 Pa).
4. Uniform Load Deflection: A minimum static air pressure difference of 70 psf (3352 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member.
5. Uniform Load Structural Test: A minimum static air pressure difference of 105 psf (5027 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. The unit shall be evaluated after each load.
6. Component Testing: Window components shall be tested in accordance with procedures described in AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).
7. Energy Efficiency:
   a. Thermal Transmittance Test: (U-Factor): When tested in accordance with AAMA 1503, the conductive thermal transmittance (U-Factor) shall not be more than:
      1) U-factor not more than .55 BTU/hr/sf/°F per AAMA 507 or NFRC 100 when using project specified glass.
   b. Condensation Resistance Test (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than (CRF) 50frame and 61glass (clear).
8. Windborne-Debris-Impact-Resistance Performance: Shall be tested in accordance with ASTM E 1886 and information in ASTM E 1996 and TAS 201/203.
   a. Large – Missile Impact: For aluminum-framed systems located within 30 feet (9.1 m) of grade.
   b. Small – Missile Impact: For aluminum-framed systems located above 30 feet (9.1 m) of grade.

9. Forced Entry Resistance: All windows shall conform to ASTM F588, Grade 10.
10. Thermal Barrier Tests: Testing shall be in general accordance with AAMA 505 Dry Shrinkage and Composite Thermal Cycling test procedure, AAMA TIR-A8, Structural Performance of Composite Thermal Barrier systems.

C. Environmental Product Declarations (EPD): Shall have a Type III Product-Specific EPD created from a Product Category Rule.

1.05 SUBMITTALS

A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.
   1. Recycled Content:
      a. Provide documentation that aluminum has a minimum of 50% mixed pre- and post-consumer recycled content with a sample document illustrating project specific information that will be provided after product shipment.
      b. Once product has shipped, provide project specific recycled content information, including:
         1) Indicate recycled content; indicate percentage of pre- and post-consumer recycled content per unit of product.
         2) Indicate relative dollar value of recycled content product to total dollar value of product included in project.
         3) Indicate location recovery of recycled content.
         4) Indicate location of manufacturing facility.
   2. Environmental Product Declaration (EPD):
      a. Include a Type III Product-Specific EPD created from a Product Category Rule.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum windows and components required.

E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type, class, grade, and size of

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experiences with installation of the same or similar units required for this project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section “Product Requirements.” Do not modify size and dimensional requirements.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Build mockup for type(s) of window(s) indicated, in location(s) shown on Drawings.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination.”

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.08 WARRANTY

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

B. Insulating Glass: Warranted to be free from defects (excluding breakage) for a period of five (5) years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product:
   1. Kawneer Company Inc.
   2. Series 8400TL Thermal Windows
   3. Model 8470TL Horizontal Sliding Window
   4. 4" (101.6 mm) frame depth
   5. HS-AW40 (OXO)
   6. HS-AW70 (XX or XOX)

B. Architect Approved Equal.

2.02 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.78 mm) wall thickness at any location for the main frame and sash members.
   1. Recycled Content: Shall have a minimum of 50% mixed pre- and post-consumer recycled content.
      a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
      b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
      c. Indicate location recovery of recycled content.
      d. Indicate location of manufacturing facility.

B. Thermal Barrier:
   1. Thermal Barrier: The thermal barrier shall be Kawneer IsoLock™ with a nominal 3/8" (9.53 mm) separation consisting of a two-part, chemically curing high density polyurethane which is mechanically and adhesively bonded to the aluminum.

C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

E. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

F. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.03 WINDOW SYSTEM

A. Series 8400TL Thermal Window - Horizontal Sliding Window.

2.04 GLAZING

A. Glass and Glazing Materials: Refer to Division 08 Section “Glazing” for glass units and glazing requirements applicable to glazed aluminum window units.

B. Glazing System: Glazing method shall be a wet/dry type in accordance with manufacturer’s standards. Exterior glazing shall be silicone back bedding sealant. Interior glazing shall be snap-in type glazing beads with an interior gasket in accordance with AAMA 702 or ASTM C864.

2.05 HARDWARE

A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash weight and dimensions.

B. Horizontal Sliding Window Typical Hardware:
   1. Continuous Integral Pulls
   2. Stainless Steel Ball Bearing Rollers
   3. Stainless Steel Roller Track
   4. Plunger Lock

C. Optional Exterior Panning and Interior Trims: Extruded aluminum, 6063-T6 alloy and temper, extruded to profiles and details indicated. Seal exterior joints with manufacturer's standard sealant to assure water-tight joints.
   1. Exterior Panning and Trims: All panning profiles shall be a minimum thickness of 0.062" (1.57 mm) to match the profiles as shown the drawings. Any profile variations shall be submitted to the architect and/or owner for approval 10 days prior to bid date. All panning shall be factory fabricated for field assembly. All corner joinery shall be factory cut. Joinery at the sill shall be coped and butt-type construction. All preparations for assembly shall be completed by the window manufacturer. Upon assembly, panning frame joints shall be back-sealed to prevent moisture penetration.
   2. Interior Trims: The interior face trim minimum wall thickness shall be 0.062" (1.57 mm). The face trim shall snap-fit onto concealed mounting clip. Exposed fasteners shall not be accepted. The mounting clip shall be extruded aluminum of 6063-T6 alloy and temper. The minimum wall thickness shall be 0.062" (1.57 mm). The trim clips shall be provided in 4" (101.6 mm) lengths and spaced a maximum of 18" (457.2 mm) center to center.

D. Optional Insect Screens: Extruded aluminum frames, 6063-T6 alloy and temper, joined at corners: 18 x 16 mesh aluminum screen cloth; frames finished to match aluminum windows; splines shall be extruded vinyl, removable to permit rescreening.

2.06 FABRICATION

A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fit joints; make joints flush, hairline and weatherproof.
   3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
   4. Physical and thermal isolation of glazing from framing members.
   5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   6. Provisions for field replacement of glazing.
   7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Window Frame Joinery: Screw-spline, factory sealed frame and vent corner joints.

C. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

D. Fabricate aluminum windows that are re-glazable without dismantling sash or framing.

E. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

F. Sub frames: Provide sub frames with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093" (2.4 mm) thick extruded aluminum. Miter or cope corners, and join with concealed mechanical joint fasteners. Finish to match window units. Provide sub frames capable of withstanding design loads of window units.

G. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section “Glazing” and with AAMA/WDMA/CSA 101/I.S.2/A440-08 (NAFS).

H. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section “Glazing” and glazing system indicated. Provide glazing stops to match frame.

2.07 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:
   1. Kawneer Permanodic™ AA-M10C21A31, AAMA 611, Architectural Class II Clear Anodic Coating (Color #17 Clear) (Standard).

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight window installation.
   1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
   2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
   3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
   4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.

B. Install aluminum-framed window system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.

D. Install aluminum-framed window system and components to drain condensation, water penetrating joints, and moisture migrating within system to the exterior.

E. Separate aluminum from dissimilar material to prevent corrosion or electrolytic action at points of contact.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
   1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
   1. Testing Methodology: Testing Standard shall be per AAMA 502 including reference to ASTM E 783 for Air Leakage Test and ASTM E 1105 for Water Penetration Test.
      a. Air Leakage Test: Conduct test in accordance with ASTM E 783 at a minimum uniform static test pressure of 6.2 psf (300 Pa). The maximum allowable rates of air leakage for field testing shall not exceed 1.5 times the project specifications.
      b. Water Infiltration Test: Water penetration resistance tests shall be conducted in accordance with ASTM E 1105 at a static test pressure equal to 2/3 the specified water test pressure.
   2. Testing Extent: Architect shall select window units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present.
   3. Test Reports: Shall be prepared according to AAMA 502.

3.04 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.

B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces

F. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass.

B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames

B. Section 08 14 16 - Flush Wood Doors

C. Section 08 43 13 - Aluminum Framed Storefronts

D. Section 10 28 00 - Toilet & Utility Accessories

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

D. ASTM C1036 - Standard Specification for Flat Glass; 2011.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

F. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.

G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

I. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.

J. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

K. GANA (GM) - GANA Glazing Manual; 2009.

L. GANA (SM) - GANA Sealant Manual; 2008.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Samples: Submit two samples 12" x 12" in size of glass units, showing coloration and design.

E. Samples: Submit 6 inch long bead of glazing sealant, color to be selected by Designer.

F. Certificates: Certify that products meet or exceed specified requirements.

G. Manufacturer's Certificate: Certify that glass meets or exceeds specified requirements.

H. Tennessee Sustainable Guidelines required submittals.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.06 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for additional mock-up requirements.

B. Provide mockup of the following:
   1. Curtain wall systems
   2. Storefront systems

C. Locate where directed by Architect.

D. Mock-up may remain as part of the Work.

1.07 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.08 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

C. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

1.10 MAINTENANCE PRODUCTS

A. Provide two of each glass size and each glass type,.

PART 2 PRODUCTS

2.01 EXTERIOR GLAZING ASSEMBLIES

A. Structural Design Criteria: Select type and thickness to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with International Building code (IBC) 2015 Edition.
   1. Glass thicknesses listed are minimum.

B. Air and Vapor Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier:
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.
   2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

2.02 FLOAT GLASS MATERIALS

A. Float Glass Manufacturers:
   1. Vitro Industries, Inc: www.vitroglazings.com.
   2. ACH Glass/Versalux: www.versaluxglass.com.
   3. Pilkington North America Inc: www.pilkington.com/na.
   4. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

B. Float Glass:
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
   3. Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.
   4. Thicknesses: 1/4".

C. Sealed Insulating Glass Units (Triple panel on Band Room Addition, Double panel on sliding glass windows at the Concession Stand):

1. Application: Exterior glazing where indicated on drawings.
2. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
3. Tint: PPG Solargray.
4. Coating: Same as on vision units, on #2 surface.
5. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
6. Tint: Clear.
7. Total Thickness: 1 inch.

D. Low E Glass: Float type, heat strengthened, tinted gray
1. Coating on surface indicated.
2. Visible light transmittance of 30 percent, solar light transmittance of 17 percent, shading coefficient of.28.
3. Comply with ASTM C 1036, Type I, transparent flat, Quality Q3 (glazing select).
4. Comply with ASTM C 1048.
5. 1/4" (6 mm).

2.03 INSULATING GLASS - STOREFRONT WINDOWS (BAND ROOM ADDITION)

A. General
1. Triple Insulated glass units consist of glass lites separated by a dehydrated airspace that is hermetically dual sealed with a primary seal of polyisobutylene (PIB), or thermo plastic spacer (TPS) and a secondary seal of silicone or an organic sealant depending on the application.
2. Insulating glass units are certified through the Insulating Glass Certification Council (IGCC) to ASTM E2190.

B. Performance Characteristics - Basis of Design Vitro Solarban 60
1. Exterior Lite - 1/4" Vitro Solar Gray
2. Interior Lite - 1/4" Vitro Solarban 60 on Clear Low-E #3
3. Second Interior Lite - 1/4" clear tempered glass
4. 1/2" Cavity - Air Standard
5. Performance Characteristics
   a. Winter U-factor/U-value: 0.29
   b. Visible Light Transmittance: 27%
   c. Summer U-factor/U-value: 0.27
   d. Visible Light Reflectance: 15%
   e. Solar Heat Gain Coefficient: 0.20
   f. Shading Coefficient: 0.23
   g. Total Solar Transmittance: 13%
   h. Light to Solar Gain: 1.35
   i. Total Solar Reflectance (outside): 8%

2.04 GLAZING COMPOUNDS

A. Manufacturers:
1. Tremco, Inc.: www.tremcosealants.com
2. Bostik Inc: www.bostik-us.com/#sle.
3. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com/#sle.
4. Substitutions: Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form..

B. Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; grey color.

C. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

D. Silicone Sealant : Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C 920, Type S, Grade NS, Class 25, Uses M, A, and G; cured Shore A hardness of 15 to 25; color as selected by Designer.

2.05 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.
   1. Manufacturers:
      a. Pecora Corporation: www.pecora.com/#sle.
      b. Tremco Global Sealants: www.tremcosealants.com/#sle.
      c. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; color as selected by Designer.

E. Glazing Clips: Manufacturer's standard type.

2.06 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing for all glass.

B. Test samples in accordance with ANSI Z97.1.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

E. Install sealants in accordance with manufacturer's instructions.

3.03 INSTALLATION - EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

E. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
   1. Place glazing tape on glazing pane of unit with tape flush with sight line.

F. Fill gap between glazing and stop with glazing manufacturer's recommended type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

G. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.04 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

A. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

D. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.

E. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.

F. Trim protruding tape edge.

3.05 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.06 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.07 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 22 07 19
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Domestic recirculating hot-water piping.
4. Domestic chilled-water piping for drinking fountains.
5. Sanitary waste piping exposed to freezing conditions.
6. Storm-water piping exposed to freezing conditions.
7. Roof drains and rainwater leaders.

B. Related Sections:

1. Section 22 07 16 “Plumbing Equipment Insulation.”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water vapor permeance thickness, and jackets (both factory- and field-applied, if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Performed Pipe Insulation Materials: 12 inches (300 mm) long by NPS 2 (DN 50).
2. Jacket Materials for Pipe: 12 inches (300 mm) long by NPS 2 (DN 50).
3. Sheet Jacket Materials: 12 inches (300mm) square.
4. Manufacturer’s Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 22 05 29 “Hangers and Supports for Plumbing Piping and Equipment.”

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in “Piping Insulation Schedule, General,” “Indoor Piping Insulation Schedule,” “Outdoor, Aboveground Piping Insulation Schedule,” and “Outdoor,

Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead mercury, or mercury compounds.

C. Products that come on contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in manufacturing process.

F. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Fibrex Insulations Inc.; Coreplus 1200
   b. Johns Manville; Micro-Lok.
   c. Knauf Insulation; 1000-Degree Pipe Insulation
   d. Manson Insulation Inc.; Alley-K.
   e. Owens Corning; Fiberglas Pipe Insulation
2. Type I, 850 Deg F (454 Deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, [without factory-applied jacket] [with factory-applied ASJ] [with factory-applied ASJ-SSL]. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulation, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
   b. Eagle Bridges – Marathon Industries; 225.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
   d. Mon-Eco Industries, Inc.; 22-25.
2. For indoor applications, adhesive shall have a VOC content of 80g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Dow Corning Corporation; 739, Dow Silicone.

b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.

c. P.I.C. Plastic, Inc.; Welding Adhesive.

d. Speedline Corporation; Polyco VP Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.

b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43 mil (1.09 mm) dry film thickness.

3. Service Temperature Range: Minus 20 to plus 180 Deg F (Minus 29 to plus 82 Deg C).

4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.

5. Color: White.

2.4 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I. Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.

b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.

c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.

4. Service Temperature Range: 0 to plus 180 Deg F (Minus 18 to plus 82 Deg C).

5. Color: White.

2.5 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.6 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. ABI, Ideal Tape Division; 428 AWF ASJ.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
   c. Compac Corporation; 104 and 105.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
2. Width: 3 inches (75 mm).
3. Thickness: 11.5 mils (0.29 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

2.7 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. ITW Insulation Systems; Gerrard Strapping and Seals.
   b. RPR Products, Inc.; Insul-Mate Strapping and Seals.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch (0.38 mm) thick, 1/2 inch (13 mm) wide with wing seal or closed seal.
3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 1/2 inch (13 mm) wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4 inch (19 mm) wide, stainless steel or Monel.

C. Wire: 0.080 inch (2.0 mm) nickel-copper alloy.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. C & F Wire.

2.8 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Engineered Brass Company
    b. Insul-Tect Products Co.; a subsidiary of MVG Molded Products
    c. McGuire Manufacturing
    d. Plumberex
    e. Truebro; a brand of IPS Corporation
    f. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.
2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. TrueBro; a brand of IPS Corporation
    b. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation
2. Description: Manufactured plastic enclosure for covering plumbing hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant. UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    a. Johns Manville; Zeston.
    b. P.I.C. Plastics, Inc.; FG Series.
    c. Proto Corporation; LoSmoke.
    d. Speedline Corporation; SmokeSafe.
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
    a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and ends seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer’s recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3 inch (75 mm) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [2 inches (50 mm)] [4 inches (100 mm)] o.c.
    a. For below-ambient services, apply vapor-barrier mastic over staples.
4. Cover joints and seams with tape, according to insulation material manufacturer's written instruction, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insualtion to the following:
1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor

insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).

4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 07 84 13 “Penetration Firestopping” for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.

2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 “Penetration Firestopping.”

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using performed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of the pipe insulation, or one pipe diameter, whichever is thicker.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

9. Stencil or label the outside insulation jacket of each union with the word “union.” Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flanges and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples 6 inches (150 mm) o.c.

4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flanges.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1 inch (25 mm) overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.8 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below as specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the “Piping Insulation Schedule, General” Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor’s option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.

2. Underground piping.

3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Water (Hot & Cold):

1. Insulation shall be:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (13 mm) thick.

B. Stormwater and Overflow:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (13 mm) thick.

C. Roof Drain and Overflow Drain Bodies:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (13 mm) thick.

D. Floor Drains, Traps, and Sanitary Drain Piping Receiving Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):

1. All Pipe Sizes: Insulation shall be of the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (13 mm) thick.

END OF SECTION

SECTION 22 13 16
SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa)

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owner and Architect no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Owner's and Architect's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service and Extra Heavy classes.

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.

C. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. ANACO-Husky.
    b. Dallas Specialty & Mfg. Co.
    c. Fernco Inc.
    d. Matco-Norca, Inc.
    e. MIFAB, Inc.
    f. Tyler Pipe.
2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. ANACO-Husky.
    b. Clamp-All Corp.
    c. Dallas Specialty & Mfg. Co.
    d. MIFAB, Inc.
    e. Tyler Pipe.
2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

E. Cast-Iron, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. MG Piping Products Company.
2. Standard: ASTM C 1277.
3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 COPPER TUBE AND FITTINGS

A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.

B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

C. Hard Copper Tube: ASTM B 88, Type L and Type M (ASTM B 88M, Type B and Type C), water tube, drawn temper.

D. Soft Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B), water tube, annealed temper.

E. Copper Pressure Fittings:

1. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

2. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

F. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.

1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

G. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.5 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.

2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

3. Unshielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Dallas Specialty & Mfg. Co.

2) Fernco Inc.

3) Mission Rubber Company; a division of MCP Industries, Inc.

4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.

b. Standard: ASTM C 1173.

c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

d. Sleeve Materials:

1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.

2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.

3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

4. Shielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Cascade Waterworks Mfg. Co.

2) Mission Rubber Company; a division of MCP Industries, Inc.

b. Standard: ASTM C 1460.

c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

5. Pressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Cascade Waterworks Mfg. Co.

2) Dresser, Inc.

3) EBAA Iron, Inc.

4) JCM Industries, Inc.

5) Romac Industries, Inc.

6) Smith-Blair, Inc.; a Sensus company.

7) The Ford Meter Box Company, Inc.

8) Viking Johnson.

b. Standard: AWWA C219.

c. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.

d. Center-Sleeve Material: Manufacturer's standard.

e. Gasket Material: Natural or synthetic rubber.

f. Metal Component Finish: Corrosion-resistant coating or material.

B. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

2. Dielectric Unions:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1) Capitol Manufacturing Company.
   2) Central Plastics Company.
   3) Hart Industries International, Inc.
   4) Jomar International Ltd.
   5) Matco-Norca, Inc.
   6) McDonald, A. Y. Mfg. Co.
   7) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   8) Wilkins; a Zurn company.

b. Description:
   1) Standard: ASSE 1079.
   2) Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C)
   3) End Connections: Solder-joint copper alloy and threaded ferrous.

3. Dielectric Flanges:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1) Capitol Manufacturing Company.
   2) Central Plastics Company.
   3) Matco-Norca, Inc.
   4) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   5) Wilkins; a Zurn company.

b. Description:
   1) Standard: ASSE 1079.
   2) Factory-fabricated, bolted, companion-flange assembly.
   3) Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C)
   4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

4. Dielectric-Flange Insulating Kits:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1) Advance Products & Systems, Inc.
   2) Calpico, Inc.
   3) Central Plastics Company.
   4) Pipeline Seal and Insulator, Inc.

b. Description:
   1) Nonconducting materials for field assembly of companion flanges.
   2) Pressure Rating: 150 psig (1035 kPa).
   3) Gasket: Neoprene or phenolic.
   4) Bolt Sleeves: Phenolic or polyethylene.

5) Washers: Phenolic with steel backing washers.

5. Dielectric Nipples:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Elster Perfection.

2) Grinnell Mechanical Products.

3) Matco-Norca, Inc.

4) Precision Plumbing Products, Inc.

5) Victaulic Company.

b. Description:

1) Standard: IAPMO PS 66

2) Electroplated steel nipple.

3) Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).

4) End Connections: Male threaded or grooved.

5) Lining: Inert and noncorrosive, propylene.

2.7 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Standard: ASTM A 674 or AWWA C105/A 21.5.

B. Material: Linear low-density polyethylene film of 0.008-inch (0.20-mm) or high-density, cross-laminated polyethylene film of 0.004-inch (0.10-mm) minimum thickness.

C. Form: Sheet or tube.

D. Color: Black or natural.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

O. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

P. Install aboveground PVC piping according to ASTM D 2665.

Q. Install underground PVC piping according to ASTM D 2321.

R. Plumbing Specialties:

1. Install backwater valves in sanitary waster gravity-flow piping. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."
2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."
3. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

S. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

E. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

F. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

G. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Shielded, nonpressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric unions.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flanges.
4. Dielectric Fittings for NPS 5 (DN 125) and Larger: Use dielectric flange kits.

3.5 VALVE INSTALLATION

A. General valve installation requirements are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves:

1. Install shutoff valve on each sewage pump discharge.
2. Install gate or full-port ball valve for piping NPS 2 (DN 50) and smaller.
3. Install gate valve for piping NPS 2-1/2 (DN 65) and larger.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

C. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Install horizontal backwater valves with cleanout cover flush with floor.
6. Comply with requirements for backwater valves, cleanouts, and drains specified in Section 221319 "Sanitary Waste Piping Specialties."
7. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 (DN 65) and larger.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes

before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.10 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed ABS and PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.11 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

C. Aboveground, vent piping shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

D. Underground, soil, waste, and vent piping shall be any of the following:

1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

E. Condensate and Vent Piping shall be any of the following:

1. 1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); cast- or wrought-copper, solder-joint fittings; and soldered joints.

END OF SECTION

Issuance Date: October 15, 2019
Mandatory Pre-Bid Meeting: October 22, 2019
Deadline for Questions: October 25, 2019
Bid Opening Date: November 5, 2019

Germantown Municipal School District Invitation to Bid
Houston High School
Band Room and Concession Stand Additions
GMSD BID #FY2020-02

3350 South Forest Hill Irene Road
Germantown, TN 38138
(901) 752-7900

3350 South Forest Hill Irene Road. Germantown, Tennessee 38138 (901)752-7900

INVITATION TO BID

October 15, 2019

Germantown Municipal School District (GMSD) will accept Bids for:

Houston High School Band Room and Concession Stand Additions

Bid shall be mailed or hand-delivered in a **sealed envelope marked "Houston High School Band Room and Concession Stand Additions GMSD BID #FY2020-02"** in the lower left-hand corner of the envelope and addressed to: Jackie Saunders, Procurement Analyst, 3350 South Forest Hill Irene Road., Germantown, TN 38138.

If using express mail (FedEx, UPS, Priority Mail, etc.), please place in a sealed envelope inside the express mail packaging. *Bid must be received by GMSD prior to the time indicated below.*

BID DATE: Bid shall be opened at the Germantown Municipal School District Office at 3350 South Forest Hill Irene Road at 2:00 p.m. on November 5, 2019.

All bid responses must be received and time-stamped on or before the required bid-opening time (local time), soon thereafter all bids will be publicly opened and read aloud. **Bids received after the specified date and time will be considered late and will not be opened.**

All purchases are F.O.B. Germantown, Tennessee per attached specifications.

Germantown Municipal School District reserves the right to accept bids in part or whole, reject any or all Bids, or to accept a Bid containing variations from these specifications if the Bid so merits. The Executive Committee or their designee(s) are the final authority and shall have the authority to reject any single Bid or all Bids submitted, and to make awards as deemed to be in its best interest of GMSD. If awarded, awards will be made to the lowest and/or best vendor.

Bids must be submitted on the Bid Schedule Document that the District issues and ***the Document must be signed by an authorized party.***

See attached Specifications, Bid Form, Drug and Alcohol Testing Acknowledgment Statement and Affidavit along with Company's Drug Testing Policy, Iran Divestment Act and Vendor's Qualifications and Reference Form that ***must be returned*** as part of the Bid.

The standard Germantown Municipal School District Services and/or Products Contract and Required Insurance Certifications are included and ***will be required*** from the selected Bidder.

During the competitive bid process, Bidders are instructed to contact only those employees of the associated departments specifically designated in this Invitation to Bid.

Sincerely,

Jackie Saunders
Procurement Analyst
Germantown Municipal School District

GERMANTOWN MUNICIPAL SCHOOL DISTRICT
INVITATION TO BID

GMSD BID #FY2020-02

Houston High School
Band Room and Concession Stand Additions
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GERMANTOWN MUNICIPAL SCHOOL DISTRICT
INVITATION TO BID
GMSD BID #FY2020-02

Houston High School Band Room and Concession Stand Additions

IMPORTANT DATES

DATE	EVENT
October 15, 2019	**INVITATION TO BID PUBLISHED**
October 22, 2019	**MANDATORY PRE-BID MEETING, 2:00 P.M.** *Meet at the front entrance to* *Houston High School* 9755 Wolf River Blvd. Germantown, TN 38139
October 25, 2019	**4:00 P.M. QUESTIONS DEADLINE** All questions must be submitted in writing to jacqueline.saunders@gmsdk12.org
November 5, 2019	**BIDS DUE BEFORE 2:00 P.M. BID OPENING AT 2:00 P.M.** **GMSD DISTRICT OFFICE** **3350 S. Forest Hill Irene Road 38138**
December 13, 2019	**START OF JOB**
August 31, 2020	**COMPLETION OF JOB**
September 30, 2020	**TESTING AND TRAINING**

GERMANTOWN MUNICIPAL SCHOOL DISTRICT
INVITATION TO BID
GMSD BID #FY2020-02
Houston High Band Room and
Concession Stand Additions
CERTIFICATION OF UNDERSTANDING AND AGREEMENT

In compliance with this Invitation to Bid, in consideration of the detailed description attached hereto; and subject to all conditions thereof, the undersigned agrees, if this bid be accepted to furnish any or all of the items upon which prices have been quoted in accordance with the specifications applying at the price set opposite each item.

The undersigned further agrees, if awarded an order or contract, to indemnify, protect, defend and hold harmless Germantown Municipal School District, its Board Members, agents and employees from all judgments, claims, suits or demands for payment that may be brought against Germantown Municipal School District, its agents and employees arising out of the use of any product or article that is provided pursuant to the bid.

The bidder further agrees to indemnify, protect, defend and hold harmless Germantown Municipal School District, its Board Members, agents and employees from all judgments, claims, demands for payments, or suits or actions of every nature and description brought against the aforementioned alleging injuries or damages sustained by any person arising out of or in the course of the bidder performing or failing to perform the service and/or providing or failing to provide the goods related to this Bid.

I further attest and agree to immediately notify the Procurement Analyst, Germantown Municipal School District, if either I or the entity I represent can no longer make the foregoing certification. I understand that failure to notify the District may invalidate any and all agreements I have with the District.

I agree and certify my understanding of the requirements of the below:
The Contractor Licensing Act of 1994 of the General Assembly of the State of Tennessee and Amendments thereto, Tennessee Code Annotated (T.C.A.), Title 62, Chapter 6, Section 62-6-119 requires that all contractors must be licensed contractors in the State of Tennessee. Companies responding to this bid shall provide, in accordance to TCA, Title 62, Chapter 6, Section 62-6-119, Paragraph (b), **"…name, license number, expiration date thereof, and license classification of the contractors applying to bid or the prime contract and for the masonry contract where the total cost of the masonry portion of the construction project exceeds one hundred thousand dollars ($100,000), materials and labor, electrical, plumbing, heating, ventilation, and air conditioning contracts, appear on the outside of the envelope containing the bid or in the submission of an electronic bid except when the bid is in an amount less than twenty-five thousand dollars ($25,000). Only one (1) contractor in such classification may be listed. Prime contractor bidders who are to perform the masonry portion of the construction project which exceeds one hundred thousand dollars ($100,000), material and labor, the electrical, plumbing, heating, ventilation and air conditioning must be so designated upon the outside of the envelope or in the electronic bid. Failure of any bidder to comply therewith shall void such bid and such bid shall not be considered. It is the duty and responsibility of the awarding person or entity who received the envelope containing the bid or the electronic bid to verify only the completeness of the required licensure information. Prior to the opening of the envelope or acceptance of an electronic bid, the names of all contractors listed thereon or therein shall be read aloud at the official bid opening and incorporated into the bid. Prior to awarding a contract, the awarding person or entity and its authorized representatives shall verify the accuracy, correctness and completeness of the information required hereby. The failure of any bidder to comply with all of the provisions hereof shall automatically disqualify such bid. However, bids administered by the Tennessee Department of General Services shall require that the information be furnished within the bid or bid document only. When the bid is less than twenty-five thousand dollars, ($25,000), the name of the contractor only may appear on the outside of the envelope containing the bid or in the electronic bid document, and upon opening the envelope or review of the electronic bid, if such bid is in excess of twenty-five thousand ($25,000), the same shall automatically be disqualified.**

Germantown Municipal School District reserves the right to require a Performance, Materials and Labor Bond from the successful proposer. In such an event the document cost for the Performance, Materials and Labor Bond will be reimbursed to the successful proposer. If a notarized Performance, Materials and labor Bond is required by the Owner the notarized Performance, Materials and Labor Bond must be from an insurance company licensed in the State of Tennessee for 100% of the contract amount awarded. If required, the notarized Performance, Materials and Labor Bond must be provided to:

Mr. Josh Cathey, Deputy Superintendent
Germantown Municipal School District
3350 S. Forest Hill Irene Road
Germantown, TN 38138

State the cost per $1000.00 for Performance, Materials and Labor Bond, if required: $ _____

The successful Bidder shall be prohibited from discriminating against any individual on the basis of race, color, national origin (including ancestry, or any other subcategory or national origin recognized by applicable law), religion, sex (including any subcategory of sex recognized by applicable law), age, disability, veteran status, genetic information, or any other basis protected by applicable law.

Germantown Municipal School District encourages qualified minority and/or women-owned businesses to submit bids.

Germantown Municipal School District offers educational and employment opportunities without regard to race, color, national origin (including ancestry, or any other subcategory or national origin recognized by applicable law), religion, sex (including any subcategory of sex recognized by applicable law), age, disability, veteran status, genetic information, or any other basis protected by applicable law.

_____ TERMS:_____DELIVERY: Days A.R.O._____
COMPANY NAME

_____ _____
ADDRESS PHONE FAX

_____ _____
CITY STATE ZIP EMAIL ADDRESS

Name and Signature below certifies that you understand and agree to all information contained in this bid.

_____ _____
AUTHORIZED REPRESENTATIVE (PRINT) SIGNATURE DATE

GERMANTOWN MUNICIPAL SCHOOL DISTRICT
INVITATION TO BID
GMSD BID #FY2020-02
Houston High School Band Room and Concession Stand Additions

Important Documents to Return to GERMANTOWN MUNICIPAL SCHOOL DISTRICT

Included	Name of Document
	GMSD Vendor Registration Packet, Including COI (SEPARATE ATTACHMENT) (**WITH BID**)
	NIGP Coding Sheets (SEPARATE ATTACHMENT) (**WITH BID**)
	W9 (SEPARATE ATTACHMENT) (**WITH BID**)
	Certification of Understanding and Agreement (**WITH BID**)
	Bid Certification Signature Page (**WITH BID**)
	Bid Form (**WITH BID**)
	Bid Label (**ON BID SUBMISSION**)
	Contractor's Qualifications and References (**WITH BID**)
	Drug and Alcohol Testing Acknowledgement & Affidavit (**WITH BID**)
	Iran Divestment Act- Attachment B- Signed & Notarized (**WITH BID**)
	Bid Bond (If Applicable) (**WITH BID**)
	Addenda (ALL SIGNED) (**WITH BID**)
	Statement of No Bid (IF you choose not to respond to this bid, please fill out and return)

GERMANTOWN MUNICIPAL SCHOOL DISTRICT INVITATION TO BID- GMSD BID #FY2020-02
Houston High School Band Room and Concessions Stand Additions

1. SCOPE OF WORK

1.1 PURPOSE

This bid should include all labor, materials, and all other considerations in the installation of Auditorium Renovations in accordance with the specifications.

Detailed specifications and scope of work are attached. The above description is not intended to be exhaustive and all details pertaining to scope of work and specifications are contained in the attached document.

1.2 SUPPLY REQUIREMENTS

Detailed specifications and scope of work are attached.

1.3 INVOICE TO

GERMANTOWN MUNICIPAL SCHOOL DISTRICT
C/O JOSH CATHEY, DEPUTY SUPERINTENDENT
3350 South Forest Hill Irene Road
GERMANTOWN, TN 38138

1.4 VENDOR'S RESPONSIBILITIES

FOR SEALED BIDS:

ALL DOCUMENTS APPLICABLE AT TIME OF BID **must be signed in ink, dated and returned with your bid documents** to allow your bid to be considered. Documents not returned **will** result in a non-responsive bid.

Disclaimer: *All required documents may or may not be listed. It is the Contractor's responsibility to review all documents and return as specified. All information shall be entered in ink or typewritten. Mistakes may be crossed out and correction inserted before submissions of bid. The person signing the bid shall initial the correction in ink. Corrections and/or modifications received after the designated bid opening time will NOT be accepted.*

FOR SEALED BIDS: (continued)

1) **Vendor Registration Packet, Including Certificate of Liability Insurance Naming the Germantown Municipal School District as Additional Insured-** Please double check checklist on signature page.
2) **NIGP Coding Sheets-** Please check all categories that apply.
3) **W9-** Please complete, sign and date.
4) **Certification of Understanding and Agreement Page-** Page must be completed and signed with an original signature in ink.
5) **Bid Certification Signature Page-** Contractor's License Number(s) must be inserted.

Page must be signed with an original signature in ink by an authorized officer, employee or agent of the bidder.

6) **Bid Form-**Page must be completed and signed with an original signature in ink.
7) **Contractor's Qualifications and References**
8) **Drug and Alcohol Testing Acknowledgement & Affidavit-** Document must be completed and signed with an original signature in ink.
9) **Iran Divestment Act- Attachment B-** Document must be completed, signed **and notarized** with an original signature in ink.
10) **Bid Bond-** (5%)
11) **Addenda (ALL)**
    All must be signed in ink and returned with your bid documents. It is the Bidder's responsibility to verify if an addendum was issued.
12) **All BIDS must be submitted in a sealed envelope with the *Vendor's Name, Bid Number, Bid Open Date, and Project Name* clearly marked on the outside of the envelope**
13) **Bid Label-** Please place on bid package or carton.

NO BID ADJUSTMENTS WILL BE ACCEPTED.

2. TERMS AND CONDITIONS

The terms, conditions and specifications listed in this bid constitute the total terms and conditions that will be acceptable. Germantown Municipal School District will not be bound by conditions other than those stated.

Specifics on start of work must be coordinated with Josh Cathey, Deputy Superintendent, Germantown Municipal School District, josh.cathey@gmsdk12.org, 901-752-7900.

2.1 INFORMATION GIVEN PRIOR TO AWARD

- Oral explanations, instructions and interpretations given to bidders prior to award of contract will not be binding. It is the District's intent to provide all bidders equal opportunity to access and acquire all available pertinent information necessary to formulate a responsive bid. Any information, specifications, plans, data or interpretations which the District discovers is lacking and may be important to all bidders, will be furnished to all bidders in the form of an addendum.

- **Any and all revisions made to this bid prior to the due date will be posted on http://www.gmsdk12.org/BidRFPOpportunities.aspx under Purchasing and will be the responsibility of the Bidder to check for any and all revisions.**

2.2 METHOD OF AWARD

The District reserves the rights to award to the lowest responsive, responsible bidder; to award multiple contracts; and, to award the bid/contract that is deemed to be in the best value (most advantageous to the District) as determined by some, or all, of the following:

- Prices offered
- Quality of product/service offered
- General reputation and performance capabilities of the bidder
- Conformity with specifications herein
- Delivery and/or installation schedule

- Location and availability of service and/or repair facilities, personnel and parts
- Suitability for intended use
- Responses to provided references
- Payment terms/discounts offered
- Demonstrations provided, if required
- Ability to meet contract requirements such as warranty provisions, insurance requirements, bonding requirements, etc.

Germantown Municipal School District reserves the right to award this bid by line item, groups of items or the entire list of items (Lump Sum Total), whichever is deemed to be in the best interest of Germantown Municipal School District. Lump sum totals will be determined by the sum total of the extended unit cost of each item in a lump sum grouping. In all cases, the unit cost multiplied by the quantity bid will determine the extended cost of a line item.

2.3 PRICING

- All pricing must be completed on the bid sheets provided.
- Successful bidder shall furnish all labor, materials, tools and equipment for the installation.
- As deemed necessary, Germantown Municipal School District reserves the right to seek competitive pricing or bid items listed during the duration of the awarded contract.
- Costs not delineated in the bid response will not be negotiated in the contract.

2.4 PERFORMANCE

- All work is to be performed during normal working hours—7:00 a.m. to 3:30 p.m., Monday-Friday. Extended working hours must be approved by the District.
- Completion date must be no later than **August 31, 2020**. Bidders must indicate the date for completion of the project. Completion date may be a factor in the bid award.
- All work should be performed in a neat and workman-like manner. Any and all cleanup of debris is the responsibility of the Contractor.
- If at any time Germantown Municipal School District is dissatisfied with the quality of service provided, a written notice of the specific problem(s) will be furnished to the vendor by certified letter. If the problem is not corrected to the satisfaction of GMSD within 5 days of the written notice, this entire contract may be unilaterally terminated by GMSD with no further obligation on the part of the District.

2.5 SPECIFICATIONS

- The specifications given are not intentionally written around any one manufacturer and are for the purpose of indicating general size and description of the job.
- The District hereby reserves the right to approve as an equal, or to reject as not being equal, any item the bidder proposes to furnish which contains minor variations from specification requirements but may comply substantially therewith. Items exceeding specifications will be considered as meeting specifications.
- The bidder shall abide by and comply with the true intent of the specifications and not take advantage of any unintentional error or omission, but shall fully complete every part as the true intent and meaning of the specifications.
- All bids must meet or exceed the enclosed specifications. Bidder must indicate manufacturer's name and model number offered. If bidder fails to provide this information, and an award is made, then the bidder shall supply the item(s) as specified. All items supplied

by the successful bidder(s) shall be: 1) as per manufacturer's name (or approved equal), model number and description quoted; and, 2) new and unused. Remanufactured and/or reconditioned items will be unacceptable. Items delivered not meeting these requirements shall be subject to return and replaced at no additional cost to the Germantown Municipal School District. Any exceptions to the specifications must be clearly noted and documented, literature to be included with bid for items quoted. Bid will be considered incomplete for failing to include required product literature along with bid and will be rejected.

- Changes to the bid specifications are not valid unless authorized in writing by the District Purchasing Department by means of an Addendum.
- Germantown Municipal School District reserves the right to request any additional information deemed necessary in the evaluation of this bid. Requested information shall be submitted within five (5) business days from date of request.
- Germantown Municipal School District has the right, at its discretion, to terminate or renegotiate this Agreement due to occurrence, event or action beyond its control.
- The District reserves the right to extend the terms, conditions and prices of this contract to other Institutions (such as State, Local and/or Public Agencies and/or School Districts) who express an interest in participating in any contract that results from the bid. Each of the piggyback institutions will issue their own purchasing documents for purchasing of the goods/services by bidding of this service. Bidder agrees that Germantown Municipal School District shall bear no responsibility or liability for any agreements between bidder and the other Institution(s) who desire to exercise this option.

2.6 BIDDING REQUIREMENTS AND CONDITIONS

- Sealed Bids will be received at the GMSD District Office—3350 South Forest Hill Irene Road, Germantown, TN 38138—***before*** **Tuesday, November 5, 2019 at 2:00 p.m**. Timely receipt of bids will be determined by this date and time at the address specified. Hand delivery is encouraged to ensure timely receipt. **No bid will be accepted *after* 2:00 p.m. on November 5, 2019.**
- Questions regarding bid specifications should be directed via email to **Josh Cathey**, Deputy Superintendent, Germantown Municipal School District, josh.cathey@gmsdk12.org, by no later than **4:00 p.m. Central time on Friday, October 25, 2019**. ***All questions must be submitted by email; no oral questions will be accepted.***
- Purchasing questions related to this bid must be submitted electronically to Jackie Saunders, Procurement Analyst,@ jacqueline.saunders@gmsdk12.org, no later than **4:00 p.m. Central time on Friday, October 25, 2019.** ***All questions must be submitted by email; no oral questions will be accepted.***
- **All price quotations and related materials must be received in a sealed envelope and marked with label provided to clearly display time, date, and nature of bid.**
- All material that is submitted in accordance with this solicitation becomes the property of Germantown Municipal School District and will not be returned.
- The bidder shall submit their bid upon the forms furnished by the Purchasing Department of Germantown Municipal School District. **On the bid form**, the bidder shall specify **a unit price** in figures for each pay item for which a quantity is given. The bidder must also show the **products of the respective unit prices and quantities** written in figures in the column "Amount Bid," and the **total amount of the bid** obtained by adding the amounts of the several items. All figures should be written in blue ink or typed. *Penciled entries will not be accepted and the bid will be rejected.*

- The bid as well as the **Certification Agreement** and **Hold Harmless Agreement (included in Vendor's Packet)** shall be signed in ink by the individual or agency authorized to sign and submit this bid for the bidder.
- Mistakes may be crossed out and correction inserted before submission of the bid. The person signing the bid shall initial correction in ink. Any other type of alteration to this bid document by a vendor will deem that vendor's response null and void.
- The bid signature page must include the bidder name and address and the state and address in which the business is domiciled.
- The successful vendor shall be a licensed contractor in the State of Tennessee and shall meet all necessary legal requirements of conducting business with Germantown Municipal School District.
- Bidder must submit a list of three (3) references for projects completed. References shall be for projects of similar size and scope. References shall include: company name, address, telephone number, contact name, email address and date project was completed.
- The successful bidder shall meet the necessary legal requirements for conducting business with the Germantown Municipal School District.
- No bid may be withdrawn for a period thirty (30) days after the bid opening without written approval of the Procurement Analyst.
- Bidder's recommendation must be compliant with local, state and federal laws and regulations including but not limited to seismic. The successful bidder shall perform its obligations hereunder in compliance with any and all applicable federal, state and local laws, rules and regulations, including applicable licensing requirements, according to sound engineering, management and safety practices and in compliance with any and all reasonable rules of the school districts relative to the premises.

2.7 LIABILITIES

- It is understood that the bidder, if awarded an order or contract pursuant to this bid, agrees to protect, defend and save harmless, Germantown Municipal School District from any suits or demands for payment that may be brought against it as a result of the contract.
- The successful bidder agrees that it will function as an independent contractor and agrees to indemnify and hold harmless Germantown Municipal School District, its Board Members, employees, and agents for any and all claims that may arise out of its duties contracted for pursuant to this bid.
- Successful bidders and their employees must adhere to all applicable school policies and procedures.
- The successful bidder will be responsible for obtaining and furnishing any/all permits with local and/or state code enforcement agencies to complete the project as described in this bid.
- The bidder shall hold the District, its officers, agents, servants, and employees harmless from liability of any nature or kind because of use of any copyrighted, or uncopy righted composition, secret process, patented or unpatented invention under this bid, and agrees to defend, at its own expense, any and all action brought against the District because of the unauthorized use of such articles.
- The District, by execution of this Agreement, assumes no liability for damages caused to persons or property by reason of Contractor providing services herein or for injury to any employee, agent or subcontractor of the Contractor performing under this Agreement.

2.8 IRREGULAR BIDS

Bids will be considered non-responsive and shall be rejected for the following reasons:

- If the Bid Form(s) are on a form other than that furnished by the District or if the form is altered or any part thereof is detached.
- If there are unauthorized additions, conditional or alternate bids, omission of addenda, or irregularities of any kind, which tend to make the bid incomplete, indefinite, or ambiguous as to its meaning.
- If the bidder adds any provisions reserving the right to accept or reject an award, or to enter into a contract pursuant to an award.
- If the Bid Form does not contain a unit price for each pay item listed except in the case of alternate pay items.
- If the Bid Documents are not sealed when received by the District.
- If the Signature Page or other documents requiring a signature are not signed in ink.
- If Addenda are not signed, in ink, and returned with the Bid Documents.

2.9 SAMPLES

Requirements for samples are as follows:

- Samples of items, when required, shall be furnished free of cost to the District.
- Samples of items selected may be retained for future comparison.
- Samples that are not destroyed by testing, or that are not retained for future comparison will be returned upon request at the bidder's expense.

2.10 DOCUMENTS INCLUDED IN CONTRACT

The specifications, terms/conditions and detailed requirements shall become a part of any contract agreement and/or purchase order that result from this bid.

2.11 DEFAULT

In case of default by the bidder, the District may procure the articles or services from other sources and may deduct from any monies due, or that may thereafter become due to the bidder, the difference between the price named in the contract or purchase order and actual cost thereof to the District. Prices paid by the District shall be considered the prevailing market prices at the time such purchase is made. Periods of performance may be extended if the facts as to the case of delay justify such extension in the opinion of the District.

2.12 DISQUALIFICATION OF BIDDERS

Any of the following reasons may be considered as being sufficient for the disqualification of a bidder and the rejection of their bid or bids:

- More than one bid, for the same work from an individual, partnership or corporation under the same name or a different name.
- Evidence of collusion among bidders. Participants in such collusion will receive no recognition as bidders for future work with the District until any such participant shall have been reinstated as a qualified bidder.
- Bidder, or its principals or affiliates, is disbarred, suspended, or ineligible from federal contracting.

2.13 BID BOND

When required, bid will be accompanied by a 5% Bid Bond or a Cashier's Check in an amount not less than the amount indicated on the Bid. Bid Bonds shall be signed by the bidder and their surety

company. Power of Attorney for the person who executes the bond on behalf of the surety as Attorney-In-Fact must accompany the bid bond. When required, bidders must supply certificate of insurance or bonds through a company that is authorized to do business in the State of Tennessee.

2.14 PUBLIC RECORDS

Notwithstanding anything to the contrary contained herein or within the other document supplied to Germantown Municipal School District by the Contractor, the Contractor understands and acknowledges that the District is a governmental entity subject to the State of Tennessee Public Records Act and that any reports, data or other information supplied to the District regarding services performed hereunder may be subject to disclosure as a public record in accordance with the laws of the State of Tennessee.

2.15 WARRANTY

The Contractor warrants to the District that all goods/work shall be free from defects in design and faulty or improper materials and/or workmanship, shall be in strict compliance with the terms of this Agreement and shall be fit and sufficient for the purpose intended. This warranty- labor and material-(Manufacturer's Standard) shall be effective for one year from the date of acceptance by the District of such goods and/or services as satisfactorily complete, and shall be in addition to all other warranties, express, implied or statutory. The warranty shall survive the termination or expiration of this Agreement.

2.16 COLLUSION

Bidders, by submitting a signed bid or proposal, certify that the accompanying bid or proposal is not the result of, or affected by, any unlawful act of collusion with any other person or company engaged in the same line of business or commerce, or any other fraudulent act punishable under Tennessee or United States law.

2.17 CONFLICTS OF INTEREST

By submitting a proposal, the Bidder certifies that no amount shall be paid directly or indirectly to an employee or official of Germantown Municipal School District as wages, compensation, or gifts in exchange for acting as an officer, agent, employee, subcontractor, or consultant to the Bidder in connection with the procurement under this Bid.

Any individual, company or other entity involved in assisting the District in the development, formulation, or drafting of this Bid or its scope of services which shall be considered to have been given information that would afford an unfair advantage over other Bidders and said individual, company or entity may not submit a proposal in response to this Bid.

2.18 INDEMNIFICATION

The Contractor shall indemnify, hold harmless and defend regardless of outcome, the District from expenses of and against all suits, action, claims, or costs, expenses, and attorney fees that may be incurred because of any injuries or damages received or sustained by any person, persons or property on account of the operations of the Contractor or their subcontractors; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in the work; or because of any act or omission, neglect, or misconduct of the Contractor or their subcontractors; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the Worker's Compensation Act or any other law, ordinance, order or decree.

2.19 ALCOHOL AND DRUG-FREE WORKPLACE
Along with its bid, the bidder shall submit the affidavit certifying compliance, requiring the Contractor and its subcontractors at the time of bid to provide a drug-free workplace program and to maintain such program throughout the duration of the Contract. *The affidavit form is attached*.

2.20 CONSIDERATION
After the bids are opened and read, they will be compared on the basis of the summation of the products of the approximate quantities shown in the bid form by the unit bid prices. The results of such comparisons will be available on the Purchasing page of www.gmsdk12.org. The District reserves the right to reject any or all bids, to waive technicalities, to advertise for new bids, or to proceed to do the work otherwise, if, in the judgment of the Purchasing Department, it is in the best interest of the District.

2.21 FAILURE TO EXECUTE CONTRACT
Failure to execute the contract, file acceptable bonds and submit acceptable evidence, if required by contract, of good faith efforts to obtain participation by disadvantaged businesses within 15 calendar days after the contract has been received by the bidder shall be just cause for the cancelation of the award of contract and the forfeiture of the cash or bid bond which shall become the property of the District, not as penalty, but in liquidation of damages sustained. Award may then be made to the next lowest responsible bidder or the work may be re-advertised and constructed under contract or otherwise, as the District may decide.

2.22 TERMINATION FOR CONVENIENCE
The performance of work under this contract may be terminated by the District in accordance with this subsection in whole, or from time to time in part, whenever it shall be determined that such termination is in the best interest of the District. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying the extent to which performance of work under the contract is terminated, and the date upon which such termination becomes effective.

2.23 NON-APPROPRIATION OF FUNDS
Notwithstanding any other provision of this contract, funds for this contract are payable from state, federal, and/or local appropriations. In the event that no funds or insufficient funds are appropriated and budgeted for monetary obligations which would otherwise be due and owing under the terms of this contract, this contract shall become null and void. After such termination of this contract, the Customer shall have no continuing obligation under the terms of this contract.
In the event of such termination, the Contractor shall be entitled to receive just and equitable compensation for any satisfactory work performed to the termination date. Such termination by the District shall not be deemed a Breach of Contract by the District, and the Contractor shall have no right to any actual, general, specific, incidental, consequential, or any other damages whatsoever of any description or amount that have not been earned as of the date of termination.

2.24 BID PROTEST
Any protest concerning the award of this bid shall be addressed to the Procurement Analyst. Protest shall be made in writing to the Procurement Analyst and shall be filed within seven (7) days after the intended award is announced. A protest is considered filed when received by the Procurement Analyst. The written protest shall include the name and address of the protester, identification of the procurement, a statement of the specific reasons for the protest and supporting

exhibits. The submitted information will be reviewed with the appropriate Department Head and Superintendent to render a final decision and a formal response provided within seven days. This decision relative to the protest shall be considered final.

2.25 BID WITHDRAWAL

At any time up to the hour and date set for opening of bids, a bidder may withdraw his/her bid. Such withdrawal must be in writing and sent to the Procurement Analyst at the address set forth herein, and delivered in person. Such withdrawal shall be effective only upon receipt by the Procurement Analyst and will not preclude the submission of another bid by such bidder to the hour and date set for the opening of bids.

After the scheduled time for opening of bids, no bidder will be permitted to withdraw his/her bid.

2.26 ADDENDA

Any matter of this bid package that requires explanation or interpretation **must** be submitted **in writing** by **October 25, 2019—i.e. a minimum of three (3) business days (excluding weekends and holidays) prior to the time set for the Bid Opening. Email** all questions to jacqueline.saunders@gmsdk12.org. All questions will be responded to in the form of written addenda to all Bidders and posted on the **District's Purchasing page.** ***It shall be the vendor's responsibility to check the website for published addenda. All addenda that a Bidder receives shall become part of the contract documents.***

No addenda will be issued later than three (3) business days prior to the date for receipt of bids except an addendum withdrawing the request for bids or one which includes a revised date for receipt of bids.

2.27 CONTRACT AWARD

Contract Award may be ALL OR NONE based on the "TOTAL BID AMOUNT" on the Bid Form, or the Contract Award may be awarded to multiple bidders if it is in the District's best interest.

2.28 PAYMENT REQUIREMENTS

The Contractor will be paid in accordance with the Bid Form. Payments otherwise due may be withheld on account of substandard or defective work not remedied.

2.29 CHANGES

The District reserves the right to revise the "Work Locations and Schedule" and to make other changes within the general Scope of Work as may be deemed necessary to best serve the interests of the District. Changes in compensation, which may result from such revisions, shall be documented by an Amendment to the contract and approved by the Deputy Superintendent of the Germantown Municipal School District.

2.30 FORCE MAJEURE

Neither party shall be liable or deemed to be in default for any Force Majeure delay in shipment or performance occasioned by unforeseeable causes beyond the control and without the fault or negligence of the parties, including, but not restricted to, acts of God or the public enemy, fires, floods, epidemics, quarantine, strikes, freight embargoes, or unusually severe weather, provided that in all cases the Contractor shall notify the District promptly in writing of any cause for delay and the District concurs that the delay was beyond the control and without the fault or negligence of the

Contractor. The period for the performance shall be extended for a period equivalent to the period of the Force Majeure delay. Matters of the Contractor's finances shall not be a Force Majeure.

2.31 COMPLIANCE

If a formal and written complaint is registered with the Contractor in respect to unsatisfactory work performance, the Contractor will have 72 hours in which to respond in person to the complaint and to remedy the problem(s). Failure to respond in the prescribed time to the complaint or to remedy the problem may result in termination of the contract as provided in the Termination section (2.32).

If the Contract Administrator is not satisfied with the results and remediation of the complaint, periodic and joint inspections with the Contractor may be required to discuss and point out Contractors violation. Failure of the Contractor to attend these inspections may result in termination of the contract.

2.32 DEFAULT AND TERMINATION OF CONTRACT

Upon thirty (30) days written notice, with or without cause, the District may terminate this Contract. Following such termination, the District and the Contractor shall agree upon an amount of payment for all Contract items properly performed or furnished prior to the effective date of termination.

2.33 ILLEGAL ALIENS

Contractor warrants that any contract resulting from this Bid:

- Does not knowingly hire or engage any illegal aliens or persons not authorized to work in the United States;
- Takes steps to verify that it does not hire or engage any illegal aliens or persons not authorized to work in the United States; and that any misrepresentation in this regard or any employment of persons not authorized to work in the United State constitutes a material breach and shall be cause for the imposition of up to five percent (5%) of the contract price, per violation, and/or termination of its contract.

2.34 IRAN DIVESTMENT ACT

By submission of a bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to T.C.A. § 12-12-106.

2.35 LIQUIDATED DAMAGES

Ground breaking and beginning construction for GMSD BID # FY2020-02: Liquidated damages will be assessed at $500 per calendar day for every day past December 13, 2019. Liquidated damages will be accessed at $1,000 per calendar day for every day substantial completion is not achieved past August 31, 2020.

3. SPECIFICATIONS

3.1 GENERAL SPECIFICATIONS

The specifications provided are not intentionally written around any one manufacturer and are for the purpose of indicating general information needed. The District hereby reserves the right to approve as an equal, or to reject as not being equal, any item the bidder proposes to furnish which contains minor variations from specification requirements but may comply substantially therewith. Items exceeding specifications will be considered as meeting specifications. The bidder shall abide by and comply with the true intentions of the specifications and not take advantage of any unintentional

error or omission, but shall fully complete every part as the true intent and meaning of the specifications.

Changes to the bid specifications are not valid unless authorized in writing by the Germantown Municipal School District Purchasing Department by means of an addendum.

3.2 MATERIAL SPECIFICATIONS

Exceptions:_____
_____
_____
_____
_____
_____

When taking an exception(s) please return the specification page(s) and exception page with your submitted bid package.

3.3 QUESTIONS

Questions concerning specifications should be sent to Mr. Josh Cathey, Deputy Superintendent, Germantown Municipal School District, via e-mail to josh.cathey@gmsdk12.org. All inquiries concerning Purchasing should be directed to Jackie Saunders via email to jacqueline.saunders@gmsdk12.org.

GERMANTOWN MUNICIPAL SCHOOL DISTRICT
BID CERTIFICATION SIGNATURE PAGE
Germantown Municipal School District
3350 South Forest Hill Irene Rd.
Germantown, TN 38138

GMSD # FY2020-02

BID TITLE: Houston High School Band Room and Concession Stand Additions

This response is submitted in accordance with all documents and provisions of the specified Bid Number and Title detailed above. By my signature below, I accept the terms and conditions as incorporated into this bid. As the undersigned, I certify I am authorized to sign and submit this response for the Contractor.

Federal identification Number	Contractor's License No.	Addtl. License Nos. (if Required)	
Company Name		State of Domicile	
Mailing Address	City	State	Zip Code
Contractor or Authorized Representative's Printed Name		Phone Number (with Area Code)	
E-Mail Address		Fax Number (with Area Code)	

By signing, the contractor acknowledges his/her responsibility for this bid, and that he/she will comply with all the terms, conditions, and specifications of this bid.

Contractor or Authorized Representative's Signature	Date Signed

If **not domiciled** in the State of Tennessee, please provide an address where business is conducted in the State of Tennessee, if applicable:

By signing, the contractor acknowledges his/her responsibility for this bid, and that he/she will comply with all the terms, conditions, and specifications of this bid.	Contractor or Authorized Representative's Signature	Date Signed	If **not domiciled** in the State of Tennessee, please provide an address where business is conducted in the State of Tennessee, if applicable:
By signing, the contractor acknowledges his/her responsibility for this bid, and that he/she will comply with all the terms, conditions, and specifications of this bid.	Contractor or Authorized Representative's Signature	Date Signed	If **not domiciled** in the State of Tennessee, please provide an address where business is conducted in the State of Tennessee, if applicable:

This page must be signed with an original signature and returned with your BID documents.

BID FORM
GMSD BID #FY2020-02
HOUSTON HIGH SCHOOL BAND ROOM AND CONCESSION STAND ADDITIONS

Project can begin sooner, but ground breaking must take place no later than Friday, December 13, 2019.
Project must be completed no later than Monday, August 31, 2020.
Sequencing of the project shall be as follows:
The Band Room Addition shall be the first phase of work. Substantial Completion must be given on the Band Room before demolition on the Concession Stand can start.

BIDDER:_____

Bid shall be filled in completely, by the Contractor, in the bid schedule by indicating total dollars and cents. All costs, including hourly rates, will be included here and will be fully-burdened to include, but not limited to: wages, transportation, lodging, overhead, and per diem. All figures shall be written in ink or typed. Penciled entries will NOT be accepted, and will be considered irregular and rejected.

Installation and on-site training are required. Installation, testing and training must be completed no later than Wednesday, September 30, 2020. Bidders must indicate project completion time after receipt of order (A.R.O.). Project Completion Date is critical and will be a factor in the evaluation and award of this bid. *Dates of work and schedule must be coordinated with Josh Cathey, Deputy Superintendent, Germantown Municipal School District, josh.cathey@gmsdk12.org, 901-752-7900.*

ITEM	Description	Unit	Project Total
1	Houston High School Band Room Addition and all associated work on the East side of the campus.	**LS**	
Alternate	Bid Alternate (Concession Stand Work and all associated work on the West side of the campus).	**LS**	

Project Completion Date:_____

State your cost per $1000.00 for Performance, Materials and Labor Bond (if required):$_____

Company Name:			**Address:**				
Organized and existing under the laws of the State of :		**and doing business as:**	a corporation	a partnership	an individual	a limited liability company	other
City:	**State:**	**Zip:**	**Telephone (with Area Code):**			**Fax (with Area Code):**	
Name:			**Title:**				
Authorized Signature:				**Date:**			

All bids must be received, and time stamped at Germantown Municipal School District Administrative Offices, 3350 South Forest Hill Irene Rd. Germantown, TN 38138, prior to stated bid opening date and time. Bids received after the specified date and time will be considered late and will not be opened.

All price quotations and related materials must be received in a sealed envelope. Time, date and nature of bid must be clearly marked on face of sealed envelope as well as appropriate Contractor's License information.

_____

_____

_____

License Number _____
Expiration Date_____
License Classification_____

Jackie Saunders
Procurement Analyst
Germantown Municipal School District
3350 Forest Hill Irene Rd.
Germantown, TN 38138

BID # GMSD FY2020-02
Houston High School Band Room and Concession Stand Additions
Tuesday, November 5, 2019 2:00 p.m. Central Time

CONTRACTOR'S QUALIFICATIONS & REFERENCES

All Contractors/vendors for these services must have adequate industry and professional qualifications. The District will confirm the below qualifications and references prior to awarding the Contract.

1. All contractors/vendors must be in business for a minimum of **at least three continuous years.**

2. Please note contractor license and qualifications(if applicable): _____

Legal Name of Company: _____

Street/Mailing Address: _____

Type of Entity (Corp., LLC, etc.): _____ **State Est:** _____

Main Telephone No.: _____ **Main Fax No.:** _____

Number of Continuous Years in Business: _____

Number of Employees Full-Time: _____ Part-Time: _____

Name of the main contact person and project superintendent (if applicable) planned for this project (including qualifications, experience and technical skills):

_____
_____
_____
_____

Largest similar construction project completed from 2014 to present (if applicable):

- Name of Customer and/or Project and Cost: _____
  _____
  _____
  _____

Project experience with renovations and/or building of similar projects:

- Name of Customer and/or Project and Cost: _____
  _____
  _____
  _____

CONTRACTOR'S QUALIFICATIONS & REFERENCES
(continued)

REFERENCES (Provide three (3) references.)

1. **Name:** _____
   Date of Project (if applicable): _____
   Specific Services Provided: _____
   _____
   Primary Contact Name: _____
   Address: _____
   Telephone: _____

2. **Name:** _____
   Date of Project (if applicable): _____
   Specific Services Provided: _____
   _____
   Primary Contact Name: _____
   Address: _____
   Telephone: _____

3. **Name:** _____
   Date of Project (if applicable): _____
   Specific Services Provided: _____
   _____
   Primary Contact Name: _____
   Address: _____
   Telephone: _____

DRUG AND ALCOHOL TESTING ACKNOWLEDGEMENT STATEMENT AND AFFIDAVIT

Comes_____, for and on behalf of
(Printed Name of Principal Officer of Company)
_____, the "Company" and makes oath that:

(i) the Company has received a copy of the relevant portions of Germantown Municipal School District Vendor Registration Packet and Policies; (ii) the Company understands that it must have a drug and alcohol policy in effect for its employees.

_____
Signature
Title:_____

Sworn to and subscribed before me, a Notary Public, this_____day of_____, 2019.

_____
Notary Public

My Commission Expires:

_____

STATEMENT OF NO BID

Please take a few minutes to complete this form and return it to jacqueline.saunders@gmsdk12.org *if you are submitting a "No Bid" response.*

We ask that you place an "X" on the appropriate blank that corresponds with your company's "No Bid" response.

1. _____ Specifications too "tight," i.e. geared toward one (1) brand or manufacturer only. (Briefly explain below.)

2. _____ Specifications are unclear. (Briefly explain below.)

3. _____ We are unable to meet specifications.

4. _____ Insufficient time to respond to Invitation to Bid (Briefly explain below, if fault of GMSD.)

5. _____ Our schedule would not permit us to perform within the required time.

6. _____ We are unable to meet bond requirements.

7. _____ We are unable to meet insurance requirement.

8. _____ We do not offer this product or service.

9. _____ Other (Specify below.)

Further remarks: _____
_____
_____
_____
_____
_____

Company Name: _____

Date: _____ **Time:** _____

Name: _____ **Title:** _____

Signature: _____

Germantown Municipal School District
Iran Divestment Act Compliance

The Iran Divestment Act of 2016, effective as of July 1, 2016, is codified at TCA § 12-12-101 *et seq.* The Iran Divestment Act, with certain exceptions, prohibits municipalities, including the DISTRICT, from entering into contracts with persons or entities engaged in investment activities in the energy sector of Iran. Pursuant to the terms set forth in TCA § 12-12-105, a person engages in investment activities in the energy sector if:

(1) The person provides goods or services of twenty million dollars ($20,000,000) or more in the energy sector of Iran, including a person that provides oil or liquefied natural gas, for the energy sector of Iran; or

(2) The person is a financial institution that extends twenty million dollars ($20,000,000) or more in credit to another person, for forty-five (45) days or more, if that person will use the credit to provide goods or services in the energy sector in Iran and is identified on a list, created pursuant to §12-12-106, as a person engaging in investment activities in Iran as described in this section.

This Act requires the State of Tennessee's chief procurement officer to publish on the State's website a list of persons it determines engage in investment activities in Iran (the "Prohibited Entities List").[1]

Any BIDDER that is on the Prohibited Entities List will be ineligible to contract with the DISTRICT.

Pursuant to the Act, any BIDDER that attempt to contract with the DISTRICT must certify, at the time the bid is submitted, that the BIDDER is not identified on the Prohibited Entities List. A bid shall not be considered for award, nor shall any award be made where the BIDDER fails to submit a signed and verified Bidder's Certification.

[1] The State of Tennessee's list, published in July 2016, can be found on the following website: https://www.tn.gov/assets/entities/generalservices/cpo/attachments/List_of_persons_pursuant_to_Tenn._Code_Ann._12-12-106,_Iran_Divestment_Act-July.pdf

Germantown Municipal School District
Bidder's Certification of Compliance with Iran Divestment Act
TCA § 12-12-101 *et seq.*

Comes_____, for and on behalf
(Printed name of Principal Office of Company)
_____, (the "Company") and, after being duly authorized by the Company so to do, makes oath that:

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to the Iran Divestment Act, TCA § 12-12-106.

_____
Signature

_____
Title

Sworn to and subscribed before me, a Notary Public, this_____day of_____, 2019.

_____
Notary Public

My Commission Expires:

_____

ITB - GMSD BID #FY2020-02

HOUSTON HIGH SCHOOL BAND ROOM AND CONCESSION STAND ADDITIONS

GMSD Department of Operations

PROJECT MANUAL
for
HOUSTON HIGH SCHOOL
BAND ROOM AND CONCESSION STAND ADDITIONS

9755 WOLF RIVER BLVD.
GERMANTOWN, TN 38139

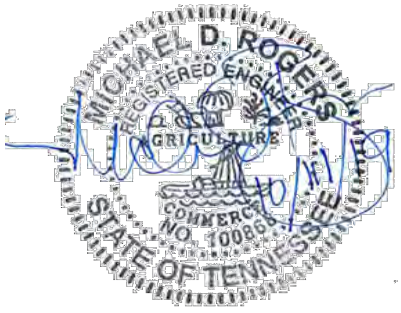
5101 Wheelis Drive, Suite 215
Memphis, Tennessee 38117
901-767-3924

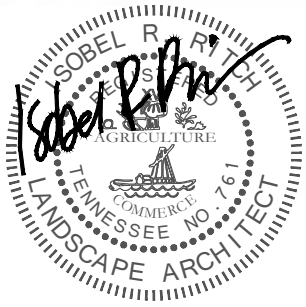
SEPTEMBER 2, 2019

SECTION 00 01 07
SEALS PAGE

ARCHITECT
FLEMING ARCHITECTS
5101 WHEELIS DRIVE, SUITE 215
MEMPHIS, TN 38117
P: 901-767-3924

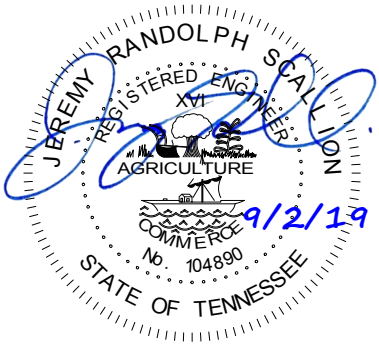
CIVIL AND LANDSCAPE
FISHER ARNOLD
9180 CRESTWYN HILLS DRIVE
MEMPHIS, TN 38125
P: 901-748-1811



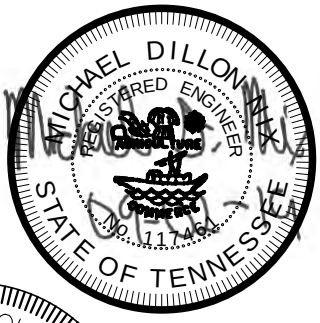


10-11-2019

STRUCTURAL
SCALLION STRUCTURAL ENGINEERING
63 HICKS ROAD
ALAMO, TN 38001
P: 731-217-1614



MECHANICAL/PLUMBING/ELECTRICAL
HNA ENGINEERING, PLLC
11880 CRANSTON DRIVE, SUITE 104
ARLINGTON, TN 38002
P: 901-290-6377



END OF SECTION

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O. 01 45 33 - Code Required Special Inspections 014533-1-6

P. 01 50 00 - Temporary Facilities and Controls 015000-1-2

Q. 01 51 00 - Temporary Utilities 015100-1-2

R. 01 54 00 - Construction Aids 015400-1

S. 01 55 00 - Vehicular Access and Parking 015500-1-2

T. 01 56 00 - Temporary Barriers 015600-1

U. 01 57 21 - Indoor Air Quality Controls 015721-1-2

V. 01 58 13 - Temporary Project Signage 015813-1-2

W. 01 70 00 - Execution and Closeout Requirements 017000-1-7

X. 01 74 00 - Cleaning 017400-1-2

Y. 01 74 19 - Construction Waste Management and Disposal 017419-1-4

Z. 01 78 00 - Closeout Submittals 017800-1-4

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B. 03 20 00 - Concrete Reinforcing 032000-1-2
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C. 04 22 00 - Concrete Unit Masonry 042200-1-9

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C. 05 31 00 - Steel Decking 053100-1-2
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B. 07 13 50 - Fluid-Applied Dampproofing 071350-1-3
C. 07 21 00 - Thermal Insulation 072100-1-3
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E. 07 26 00 - Under Slab Vapor Barrier 072600-1-2
F. 07 46 43 - Composite Cladding 074643-1-3
G. 07 54 23 - TPO Membrane Roofing 075423-1-8
H. 07 62 00 - Sheet Metal Flashing and Trim 076200-1-5
I. 07 84 00 - Firestopping 078400-1-4
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B. 08 14 16 - Flush Wood Doors 081416-1-4
C. 08 31 00 - Access Doors and Panels 083100-1-2
D. 08 43 13 - Aluminum-Framed Storefronts 084313-1-8
E. 08 80 00 - Glazing 088000-1-5

2.08 DIVISION 09 -- FINISHES

A. 09 06 00 - Finish Schedule 090600-1-2
B. 09 21 16 - Gypsum Board Assemblies 092116-1-6
C. 09 22 26 - Metal Suspension Systems 092226-1-3
D. 09 30 00 - Tiling 093000-1-6
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G. 09 51 13 - Acoustical Panel Ceilings (Rockfon Koral Ceiling Panel) 095113-1-2
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J. 09 65 00 - Resilient Flooring and Base 096500-1-4
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B. 10 14 00 - Signage 101400-1-3
C. 10 21 13.19 - Plastic Toilet Compartments 102113.19-1-2
D. 10 28 00 - Toilet & Utility Accessories 102800-1-3
E. 10 44 00 - Fire Protection Specialties 104400-1-3
F. 10 73 13 - Metal Awnings 107313-1-2

2.10 DIVISION 11 -- EQUIPMENT

A. 11 31 00 - Appliances & Equipment 113100-1-111

2.11 DIVISION 12 -- FURNISHINGS

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2.12 DIVISION 21 -- FIRE SUPPRESSION

A. 21 13 13 - Wet-Pipe Sprinkler Systems 211313-1-20

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A. 22 05 19 - Meters and Gauges for Plumbing Piping 220519-1-14
B. 22 05 29 - Hangers & Supports - Plumbing 220529-1-10
C. 22 05 53 - Identification for Plumbing Piping and Equipment 220553-1-4
D. 22 07 19 - Plumbing Piping Insulation 220719-1-12
E. 22 11 16 - Domestic Water Piping 221116-1-10
F. 22 11 19 - Domestic Water Piping Specialties 221119-1-8
G. 22 13 16 - Sanitary Waste and Vent Piping 221316-1-10
H. 22 13 19 - Sanitary Waste Piping Specialties 221319-1-12
I. 22 14 13 - Facility Storm Drainage Piping 221413-1-12
J. 22 34 00 - Fuel-Fired, Domestic Water Heaters 223400-1-8
K. 22 42 13 - Commercial Water Closets 224213-1-4
L. 22 42 14 - Commercial Urinals 224214-1-3
M. 22 42 16 - Commercial Sinks 224216-1-5
N. 22 42 17 - Commercial Lavatories 224217-1-3
O. 22 47 13 - Drinking Fountains 224713-1-2

2.14 DIVISION 23 -- HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

A. 23 01 00 - General Provisions, Mechanical 230100-1-11
B. 23 05 00 - Basic Mechanical Materials and Methods 230500-1-9
C. 23 05 29 - Hangers and Supports for HVAC Piping and Equipment 230529-1-8
D. 23 05 53 - Mechanical Identification 230553-1-4

E. 23 05 93 - Testing, Adjusting, and Balancing for HVAC 230593-1-13
F. 23 07 13 - Duct Insulation 230713-1-8
G. 23 09 00 - Controls 230900-1-7
H. 23 11 23 - Natural Gas Piping 231123-1-8
I. 23 31 13 - Metal Ducts 233113-1-9
J. 23 33 00 - Air Duct Accessories 233300-1-7

2.15 DIVISION 26 -- ELECTRICAL

A. 26 01 00 - General Provisions, Electrical 260100-1-3
B. 26 05 00 - Basic Materials and Methods, Electrical 260500-1-10
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B. 33 11 00 - Water Distribution Systems 331100-1-12
C. 33 30 00 - Sewerage Systems 333000-1-7
D. 33 40 00 - Site Drainage 334000-1-3
E. 33 40 10 - Drainage Manholes, Inlets, and Pipe Endwalls 334010-1-2

END OF SECTION

SECTION 00 31 00

AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of the Contract Documents, as follows:

B. Site and Utility Survey:
   1. Original copy is available for inspection at Architect's offices during normal business hours.
   2. This survey identifies grade elevations prepared primarily for the use of Architect in establishing new grades and identifying natural water shed.

C. Geotechnical Report:
   1. Original copy is available for inspection.
   2. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect.
   3. The recommendations described shall not be construed as a requirements of this Contract, unless specifically referenced in the Contract Documents.
   4. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

Geotechnical Engineering
Services Report

Houston High School – New Band Room Addition
9755 Wolf River Boulevard
Germantown, Tennessee

Prepared for

Fleming Architects
5101 Wheelis Drive
Suite 215
Memphis, Tennessee

Prepared by

Professional Service Industries, Inc.
4161 Ridgemoor Avenue
Memphis, Tennessee

July 31, 2019

PSI Project 0502-1783

Professional Service Industries, Inc.
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Phone: (901) 365-1802
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Mr. Steve Landwehr, AIA
Principal
Fleming Architects
5101 Wheelis Drive
Suite 215
Memphis, Tennessee 38117

Subject: Geotechnical Engineering Services Report
Houston High School – New Band Room Addition
9755 Wolf River Boulevard
Germantown, Tennessee
PSI Project No.: 05021783

Dear Mr. Landwehr:

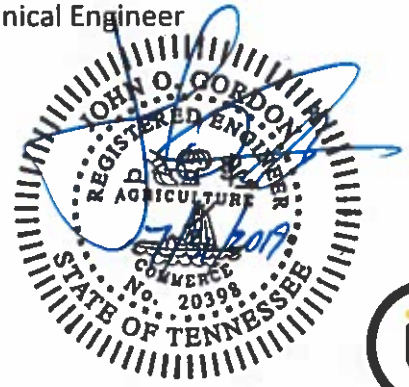
Professional Service Industries, Inc. (PSI) is pleased to transmit our Geotechnical Engineering Services Report for the referenced project. This report includes the results of field and laboratory testing, and recommendations for foundation design, as well as general site development.

We appreciate the opportunity to perform this Geotechnical Study and look forward to continued participation during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

For Professional Service Industries, Inc.

Efrem Emhatsion, E.I.T.
Graduate Engineer

John Gordon, P.E.
Senior Geotechnical Engineer



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1.0 PROJECT INFORMATION

1.1 PROJECT AUTHORIZATION

Intertek-PSI has completed a geotechnical exploration for the proposed New Band Room Addition at Houston High School in Germantown, Tennessee. Our services were authorized by Mr. Steve Landwehr, Principal of Fleming Architects by signing our proposal. This exploration was accomplished in general accordance with PSI Proposal No. 0502-279388, dated June 04, 2019.

1.2 PROJECT DESCRIPTION

Project information was obtained from Ms. Katrina Terrett of Fleming Architects. We have also been furnished with a site plan that shows the proposed existing structures, proposed construction, and boring locations. The proposed building will have a footprint of approximately 4,000 square feet. The building addition will be one-story structure, with block and brick masonry. Detailed structural loading information was not available at the time of the report. PSI has based this report on the following:

- The building will be supported by column loads up to 50 kips and continuous wall loads up to 4 kips per linear foot. Floor slabs will support loads less than 200 psf.
- The proposed grades will be within one feet of the existing grade.
- The structure will be constructed in accordance with the provision of the International Building Code, 2015.

The geotechnical recommendations presented in this report are based on the available project information, building location, and the subsurface materials described in this report. If the noted information is incorrect, please inform PSI in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the client. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

1.3 PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to explore the subsurface conditions to identify soil types and parameters that will be used in calculating the bearing capacity and estimating settlement characteristics of foundation systems to support the proposed building foundation. Our scope of services included drilling 2 soil test borings at the site to depths of about 30 feet below the surface, select laboratory testing, and preparation of this geotechnical report. This report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and presents recommendations regarding the following:

- PSI's understanding of the project
- A geologic overview of the project area
- Description of the site conditions at the time of drilling
- Site vicinity map
- Boring location plan

- Series of boring logs with their associated laboratory testing
- Discussion of subsurface conditions encountered including pertinent soil properties and groundwater conditions
- Code based seismic parameters
- Geotechnical related recommendations for foundation design based on the encountered soils and proposed building construction
- An evaluation of foundation settlements
- Recommendations for overall site/soil preparation, including natural in-place soil and fill and overall suitability of the in-situ soils for use as utility backfill and structural fill
- Discussion on geotechnical issues that may impact the planned construction activities

The scope of services for this geotechnical study did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors, colors or unusual or suspicious items or conditions are strictly for the information of the client.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 SITE LOCATION AND DESCRIPTION

The project site is located at 9755 Wolf River Boulevard in Germantown, Tennessee. The site's general location is at 35.0934° N and 89.7370° W. At the time of drilling, the site was observed to be partially a driveway and partially a lawn immediate to the east of Houston High School.

The site is bounded to the north and west by Houston High School buildings, to the south by a driveway, and to the east by a lawn. Based on the aerial photographs and other information, the existing Houston High School were constructed sometime between the years 1980 and 1997. The building immediate to the proposed site was constructed sometime between January 1997 and February 2004. No apparent changes to the site have been made since then.

2.2 SITE GEOLOGY

Germantown, Shelby County, Tennessee is located in a narrow band that parallels the eastern bluffs of the Mississippi River known as the "Loess Hills". This band lies in a physiographic subdivision known as the East Gulf Section of the Atlantic and Gulf Coastal Plains Province and is included in a portion of the Section called the Mississippi Embayment. The Embayment was a bell-shaped arm of the Gulf of Mexico outlined roughly by Little Rock, Arkansas on the west; Cairo, Illinois on the north; and the Lower Tennessee River on the east.

Structurally, the Mississippi Embayment is a downwarped, partly down-faulted, trough in Paleozoic Era of rocks. The axis of the trough has migrated in past geologic time, but now approximates the course of the Mississippi River Valley. The trough has been filled with unconsolidated gravels, sands, and clays ranging in geological age from upper Cretaceous to Recent.

In Tennessee, the unconsolidated sediments in the Mississippi Embayment reach their maximum thickness at Shelby County where they are from 2,700 to 3,000 feet thick. Subsequently, late in the Tertiary Period and early in the Quaternary Period streams carried extensive quantities of sand and gravel into the area and formed wide-spread terraces of these materials mixed with varying amounts of silt and clay on top of the older Tertiary deposits. Aeolian, or wind-blown silts and clays (loess) comprise the presently exposed surface in the Shelby County area. In general, the loess is 75 feet or more thick at the bluffs of the Mississippi River, but thins out to the east and disappears within about 50 miles.

2.3 SUBSURFACE MATERIALS

The site subsurface conditions were explored with 2 soil test borings drilled generally within the footprint of the building addition. The borings were advanced to depths of 30 feet. The boring locations and depths were selected by Fleming Architects, and the boring locations are illustrated on the Boring Location Plan enclosed in Appendix A. The borings were located in the field by PSI personnel by measuring distances from known site features.

The borings were advanced utilizing hollow stem auger drilling methods, and soil samples were routinely obtained during the drilling process using split spoon and Shelby tube sampling techniques. Drilling and sampling techniques were accomplished in accordance with ASTM procedures. The PSI General Notes for soil borings are enclosed in Appendix B and the boring logs are in Appendix C. Select soil samples were tested in the laboratory to determine material properties for our evaluation. Laboratory testing was accomplished in accordance with ASTM procedures.

Approximately 1 to 2 inches of topsoil was encountered at the top of borings. Although there was a concrete parking area located within the footprint of the proposed addition, PSI did not extend a boring through this material. The soils encountered at the borings beneath the topsoil primarily included predominantly fine-grained soils that extended to the terminal depths of the borings. Based on results of Atterberg limits and visual classification, these soils were classified as silty or lean clay (CL) and clayey silt (ML) in accordance with the Unified Soil Classification System, USCS. The SPT N-values indicated these materials were soft to very stiff in consistency. Moisture contents ranged from about 16 to 28 percent indicating moist to wet soil conditions.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs in the appendix should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratifications, penetration resistances, locations of the samples, and laboratory test data. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on these boring logs. The samples that were not altered by laboratory testing will be retained for 60 days from the date of this report and then will be discarded.

2.4 GROUNDWATER INFORMATION

Groundwater was not encountered during drilling or upon completion of the borings. The water level could change due to precipitation. In addition, trapped water may be encountered in other areas. The groundwater information presented in this report was obtained at the time of drilling, but the groundwater level at the site may be different at the time of construction.

3.0 EVALUATION AND RECOMMENDATIONS

3.1 GEOTECHNICAL DISCUSSION

Plans are being made for the construction of a building addition having a footprint of approximately 4,000 square feet to the Houston High School at 9755 Wolf River Boulevard in Germantown, Tennessee. The new structure will be a one-story, block and brick building.

From a geotechnical standpoint, the primary factor related to foundation design and construction is the relatively weak and wet soil conditions encountered at a depth of 10 feet. The moisture content at this depth ranged from 24 to 25 percent. The unconfined compressive strength and the SPT N-values at this depth were relatively low. PSI anticipates the structure will be founded within the upper 3 feet of the soil profile, and the weak soil will not result in considerable threat to the foundation. If deeper footing depths are desired, some localized undercutting and/or processing may be required. A representative of the geotechnical engineer should be present during the time of foundation excavation to test and observe the foundation soils.

Based on the available soils data, when considered in conjunction with the anticipated structural loads, the structure can be supported on conventional spread footing foundations and a grade supported slab is permissible at this site. This is based on the site being developed in accordance with the recommendations presented in this report.

3.2 SITE PREPARATION

PSI recommends that pavements, organic soil, vegetation, roots, old fill, and any soft soils in the construction areas be stripped from the site. Topsoil was 1 to 2 inches thick. It is not unusual for topsoil thickness to vary across the site. The depth of soil removal and the adequacy of stripping operations should be determined by a representative of the geotechnical engineer at the time of construction.

Since the site adjacent to the proposed addition have been developed, some zones of rubble or other unsuitable materials may have been buried during the earlier construction. Should any such materials be encountered, they should also be removed and replaced with an engineered fill.

Existing utilities should be located and rerouted as necessary and any pipes or utility conduits should be removed. Utility trench excavations must be cut to competent bearing soils suitable for support of fill placement and then backfilled with properly compacted fill that is constructed as outlined in this report.

After stripping and excavating to the proposed subgrade level, as required, the construction areas should be proof-rolled with a moderately heavy pneumatic-tired vehicle such as a loaded tandem axle dump truck or similar rubber-tired vehicle (9 ton/axle). Soils that are observed to rut or deflect excessively (more than about 1 inch) under the moving load, or are otherwise judged to be unsuitable, should either be processed and re-compacted or undercut and replaced with properly compacted fill. The decision as to the most appropriate method of remedial action where problems are encountered

should be made by the geotechnical engineer based on the site conditions at the time of construction. The proof-rolling and undercutting operations should be witnessed by the geotechnical engineer and should be performed during a period of dry weather.

Following the undercutting and proof-rolling, the subgrade soils in the building and pavement areas should be scarified and compacted to at least 95 percent of the standard Proctor (ASTM D 698) maximum dry density for a depth of at least 6 inches below the surface. If fill is required, the structural fill should then be placed on the prepared subgrade.

Good site management techniques can reduce potential undercut requirements. These techniques include improving and maintaining site drainage throughout construction and limiting site traffic during periods of wet soil conditions.

It is common for construction equipment to severely disturb the upper several feet of the subgrade during initial phases of site earthwork operations, especially if site preparation work is performed while the soils are wet. This may result in the need for either deep undercutting and replacement of the disturbed soils or drying and re-compaction of the affected soils.

It is anticipated that the moisture content and strength characteristics of the upper soils may be adequately improved via processing and re-compaction. However, should the contractor have difficulty in obtaining the required subgrade support due to inclement weather or a fast track construction schedule, consideration may be given to subgrade stabilization via the use of lime or cement. These materials can also be used to lower the moisture content of wet borrow soils. A specialty contractor will have to be retained if these methods are to be used, and laboratory tests will have to be conducted to determine if either cement or lime will be beneficial in stabilization of the soils. Additional recommendations will be required from the geotechnical engineer during construction regarding these operations.

3.3 FILL REQUIREMENTS

After subgrade preparation and observation have been completed, fill placement may begin. Fill material should be placed in a relatively uniform horizontal lift on the prepared subgrade. Fill materials should be primarily fine-grained, free of organic or other deleterious materials, have a maximum particle size of 3 inches, be relatively well graded, and have a liquid limit less than 45 and a plasticity index less than 25. If a fine-grained silt or clay soil is used for fill, close moisture content control will be required to achieve the recommended degree of compaction.

Structural fill should be compacted to at least 95 percent of standard Proctor (ASTM D 698) maximum dry density. If granular fill soils are used and are of a free draining type (i.e., less than about 12 percent fines) for which impact compaction will not produce a well-defined moisture-density relationship curve, they should be compacted to at least 70 percent relative density (ASTM Designations D 4253 and D 4254).

Fill should be placed in maximum lifts of 8 inches of loose material and should be compacted within the range of 2 percentage points below to 3 percentage points above the optimum moisture content value. If the fill is too dry, water should be uniformly applied across the affected fill area. If the fill is too wet, it must be dried. In either event, the fill should be thoroughly mixed by disking to obtain a relatively uniform moisture content throughout the lift immediately prior to compaction.

Each lift of fill should be tested by a representative of the geotechnical engineer prior to placement of subsequent lifts. The properly compacted fill should extend horizontally outward beyond the exterior perimeter of the building and foundations a distance equal to the height of fill or 5 feet, whichever is greater, prior to significant sloping. However, as noted in Section *DRAINAGE AND GROUNDWATER CONSIDERATIONS* of this report, the grades should be sloped away (gentle slopes) from the building area to allow proper drainage of areas adjacent to foundations and slabs-on-grade. Permanent slopes should be constructed with a maximum slope of 3H:1V to provide long term stable slopes and also provide for easy maintenance of the vegetated slope face.

3.4 SEISMICITY

The site (35.0934° N and 89.7370° W) is located in the central portion of the Central Eastern United States (CEUS) source model which contains several finite faults with a potential for high levels of seismicity. The finite faults included in this region are near New Madrid, Missouri, Charleston, South Carolina, Meers, Oklahoma, and Cheraw, Colorado.

Based on data obtained from the United States Geological Survey (USGS), the deaggregation of the seismic hazards indicated that two principal sources influence the seismicity in Shelby County, Tennessee. These principal sources include the New Madrid Seismic Zone (NMSZ) no clustering and the CEUS gridded. The NMSZ contributes the majority of the seismicity within this region.

Using this information and the ATC Hazards by Location (https://hazards.atcouncil.org/) and the requirements of International Building Code (IBC) 2012 and Minimum Design Loads for Buildings and Other Structures (ASCE 7-10), the following are mapped acceleration parameters for this site.

Period	Mapped MCE_R, 5% Damped, Spectral Response Parameter
S_S	0.796
S_1	0.282
PGA	0.443

MCE_R, Risk-Targeted Maximum Considered Earthquake

Quantitative determination of the site class in accordance with IBC 2012 requires specific actions, testing, analyses and subsurface investigation including a 100-foot deep boring. The available subsurface data suggests that Site Class D is appropriate for this site and we recommend that it be used. The following table is code based reported values for mapped accelerations parameters and risk coefficients.

Site Coefficient			Code Based Maximum Considered Earthquake (MCE) Spectral Response			Code Based Design Spectral Accelerations Parameters	
F_a	F_v	F_{PGA}	S_{MS}	S_{M1}	PGA_M	S_{DS}	S_{D1}
1.182	1.835	1.057	0.940	0.518	0.469	0.627	0.346

3.5 GEOLOGIC HAZARDS

According to IBC, sites supporting structures in design category "C" and below must be evaluated for slope instabilities, liquefaction and surface rupture due to faulting or lateral spreading. The following present qualitative assessments of these issues.

Liquefaction Screening

In order for liquefaction to occur site conditions must include a layer of saturated soil which is susceptible to liquefaction (a loose sand or possibly non-plastic silt). In addition, the layer of loose, saturated soil must have the capacity for buildup of excess pore pressures. Based on our borings, the soils at this site to the depths explored have a low potential to liquefy under design ground motions.

Surface Rupture

Based on current information, the site is not underlain by a mapped Holocene-aged fault.

Slope Stability

At the time of this report, no known significant slopes are planned for this project. However, any details as to slope height required for this project should be provided to PSI for our review and comments in the final geotechnical report.

3.6 FOUNDATION RECOMMENDATIONS

Once the site has been properly prepared as discussed earlier, the planned construction can be supported on conventional spread footing foundations bearing on the natural firm to stiff fine-grained soils or on properly compacted fill. Spread footings for building columns and strip footings for bearing walls can be designed for allowable net soil bearing pressures of 2,400 psf and 1,900 psf, respectively, based on dead load plus design live load. However, the bearing pressures may be increased by one-third for transient loading conditions involving wind or earthquake forces. Minimum dimensions of 30 inches for column footings and 18 inches for continuous footings should be used in the foundation design process to minimize the possibility of a local bearing capacity failure.

Exterior footings and foundations in unheated areas should be located at a depth of at least 18 inches below the final exterior grade to provide adequate frost protection and overburden. If the building is constructed during the winter months or if the foundation soils will likely be subjected to freezing temperatures after foundation construction, then the foundation soils should be adequately protected

from freezing. Otherwise, interior foundations can be located at nominal depths compatible with architectural and structural considerations.

Foundation Excavations

The foundation excavations should be observed by a representative of PSI prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the bearing materials recommended in this report. Unsuitable soil zones encountered at the bottom of the foundation excavations should be removed to the level of borderline firm to stiff natural fine-grained soils or properly compacted fill as recommended by the geotechnical engineer. Cavities formed as a result of excavation of unsuitable soil zones should be backfilled with lean concrete or properly compacted fill.

If it is desired to use compacted fill to backfill the over excavated areas, then the backfill shall be placed, compacted and tested in accordance with the guidelines presented in this report and the recommendations of the geotechnical engineer based on the site conditions at the time of construction.

After opening, foundation excavations should be observed, and concrete placed as quickly as possible to avoid exposure of the excavation bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond. If possible, the foundation concrete should be placed during the same day the excavation is made. If it is required that the foundation excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture.

Based on the project information, known subsurface conditions and site geology, laboratory testing and past experience, we anticipate that properly designed and constructed foundations supported on the recommended materials should experience maximum total and differential settlements between adjacent footings on the order of 1 inch and 3/4 inches, respectively.

Be advised that as part of the foundation selection process, there is always a cost/benefit evaluation. Although we are recommending a specific foundation type we have not accomplished the cost/benefit evaluation.

3.7 FLOOR SLAB RECOMMENDATIONS

The floor slabs can be grade supported on the proof-rolled and compacted in-situ soil or on properly compacted new fill. Site preparation activities including proof-rolling, as discussed earlier in this report, should be accomplished to identify any soft, unsuitable or unstable soils which should be removed from the slab areas prior to fill placement and/or floor slab construction.

We recommend that a minimum 4-inch thick free draining granular mat be placed beneath the slabs on grade to enhance drainage and provide increased subgrade strength. A suitable vapor barrier or vapor retarder should be placed on the granular mats as required by the designer or applicable codes.

The slabs on grade should have an adequate number of joints to reduce cracking resulting from any differential movement and shrinkage.

Based on the existing soil conditions and the site preparation specified herein, the design of slabs on grade can be based on a subgrade modulus (k) of 100 pci; however, this value may be increased to 130 pci if a minimum 4-inch thick granular mat is placed below the floor slabs as recommended above. These subgrade modulus values represent anticipated values that would be obtained in a standard in-situ plate test with a 1-foot square plate. Use of these subgrades moduli for design of other on-grade structural elements should include appropriate modification based on dimensions as necessary.

The value should be adjusted for larger areas using the following expression for cohesive and cohesionless soil:

Modulus of Subgrade Reaction,

$$k_s = \left(\frac{k}{B}\right) \text{ for cohesive soil and}$$

$$k_s = k\left(\frac{B+1}{2B}\right)^2 \text{ for cohesionless soil}$$

where: k_s = coefficient of vertical subgrade reaction for loaded area,
k = coefficient of vertical subgrade reaction for 1x1 square foot area, and
B = width of area loaded, in feet.

4.0 CONSTRUCTION CONSIDERATIONS

PSI should be retained to provide observation and testing of construction activities involved in the foundations, floor slabs, earthwork and related activities of this project. PSI cannot accept any responsibility for any conditions that deviate from those described in this report, nor for the performance of the foundations or floor slabs if not engaged to also provide construction observation and testing for this project.

4.1 MOISTURE SENSITIVE SOILS/WEATHER RELATED CONCERNS

The upper fine-grained soils encountered at this site are expected to be relatively sensitive to changes in moisture content. If these fine-grained soils become wet, they are also expected to be sensitive to disturbances caused by construction traffic.

During wet weather periods increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction during dry weather.

Also, some of the existing in-situ soils that will be present near the top of exposed subgrades or will be cut and used for fill may have to be dried to a suitable moisture content. Dry weather with favorable drying conditions (sunshine, low relative humidity, and/or wind) are best suited for these operations. This is especially important for this site considering the wet soils encountered in some areas.

4.2 DRAINAGE AND GROUNDWATER CONSIDERATIONS

Water should not be allowed to collect in excavations (foundations, utilities, etc.) or on prepared subgrades for floor slabs during construction. Positive site drainage should be maintained throughout construction activities. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff.

The site grading plan should be developed to provide rapid drainage away from the building area and to inhibit infiltration of surface water around the perimeter of the building and beneath the floor slab. The grades should be sloped away from the building area. Careful consideration should be given to the potential impact of landscaped areas and/or sprinkler systems on adjacent foundations and floor slabs. Roof runoff should be piped to a storm sewer, discharged upon a paved surface, or conveyed at least 10 feet away from the building perimeter prior to discharge upon unpaved surfaces.

Providing proper drainage both during construction and throughout the service life of the facility is especially important at this site because of the moist fine-grained soils identified in the borings. Increases in the moisture content of the fine-grained soils will result in reduced support capacity.

It is possible that seasonal variations will cause fluctuations or a water table to be present in the upper soils nearer the surface. Any water accumulation should be promptly removed from excavations by

pumping. The Geotechnical Engineer should be consulted if excessive or uncontrolled amounts of seepage occur.

4.3 EXCAVATIONS

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR Part 1926, Subpart P". This document and subsequent updates were issued to better enhance the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations (e.g., utility trenches, undercut areas, basement excavations, footing excavations, etc.) be constructed in accordance with the applicable OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person," as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in current local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor's compliance with local, state, and federal safety or other regulations.

5.0 REPORT LIMITATIONS

The recommendations submitted in this report are based on the available subsurface information obtained by PSI and design details furnished by Fleming Architects for the proposed project. If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not retained to review these changes, PSI will not be responsible for the impact of those conditions on the project.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made after being prepared in accordance with generally accepted professional engineering practice in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At this time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Fleming Architects for the specific application to the proposed New Band Room Addition at Houston High School in Germantown, Tennessee.

APPENDIX A

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VICINITY MAP

HOUSTON HIGH SCHOOL – NEW BAND ROOM ADDITION
9755 WOLF RIVER BOULEVARD
GERMANTOWN, TENNESSEE

FIGURE NO. 1

PSI PROJECT NO.: 0502-1783
DRAWN BY: G. LEWIS
DATE: JULY 2019

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BORING LOCATION DIAGRAM

HOUSTON HIGH SCHOOL – NEW BAND ROOM ADDITION
9755 WOLF RIVER BOULEVARD
GERMANTOWN, TENNESSEE

FIGURE NO. 2

PSI PROJECT NO.: 0502-1783
DRAWN BY: G. LEWIS
DATE: JULY 2019

APPENDIX B

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
RC: Rock Core
TC: Texas Cone
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
N_{60}: A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
Q_u: Unconfined compressive strength, TSF
Q_p: Pocket penetrometer value, unconfined compressive strength, TSF
w%: Moisture/water content, %
LL: Liquid Limit, %
PL: Plastic Limit, %
PI: Plasticity Index = (LL-PL),%
DD: Dry unit weight, pcf
▼,▽,▼ Apparent groundwater level at time noted

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N - Blows/foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50 - 80
Extremely Dense	80+

ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular:	Particles are similar to angular description, but have rounded edges
Subrounded:	Particles have nearly plane sides, but have well-rounded corners and edges
Rounded:	Particles have smoothly curved sides and no edges

GRAIN-SIZE TERMINOLOGY

Component	Size Range
Boulders:	Over 300 mm (>12 in.)
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.40)
Silt:	0.005 mm to 0.075 mm
Clay:	<0.005 mm

PARTICLE SHAPE

Description	Criteria
Flat:	Particles with width/thickness ratio > 3
Elongated:	Particles with length/width ratio > 3
Flat & Elongated:	Particles meet criteria for both flat and elongated

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% Dry Weight
Trace:	< 5%
With:	5% to 12%
Modifier:	>12%

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APPENDIX C

BORING B-1

DATE STARTED:	7/10/19	**DRILL COMPANY:**	PSI
DATE COMPLETED:	7/10/19	**DRILLER:** RS	**LOGGED BY:** RS
COMPLETION DEPTH	30.0 ft	**DRILL RIG:**	CME55
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	SS/ ST
LATITUDE:	35.093415°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-89.737043°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** 15' S	**REVIEWED BY:**	

REMARKS:

Water

While Drilling	None
Upon Completion	None
Delay	N/A

BORING LOCATION: Building Footprint

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS) Push Pressure (ST)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					**Topsoil: 1.5 inches**					
				1		**Silty Clay (CL)**, Brown and Gray, Firm		5-4-4 N=8	16		
				2				1-3-5 N=8	22		
	5						CL		20		
				3				4-4-4 N=8			
				4	21				24		DD = 96 pcf LL = 30 PL = 18 q_u= 0.529 tsf
	10										
						Clayey Silt (ML), Brown, Firm					
				5			ML	2-3-4 N=7	27		
	15										
						Silty Clay (CL) with Trace Sand, Brown to Brown and Gray, Soft to Stiff					
				6				2-3-4 N=7	20		
	20										
							CL		28		
				7				1-2-1 N=3			
	25										
				8				3-4-5 N=9	25		
	30					**Boring Terminal Depth: 30 feet**					

Professional Service Industries, Inc.
4161 Ridgemoor Avenue
Memphis, TN 38118
Telephone: (901) 365-1802

PROJECT NO.: 05021783
PROJECT: Houston High School - Band Room
LOCATION: 9755 Wolf River Boulevard
Germantown, Tennessee 38139

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-2

DATE STARTED:	7/9/19	**DRILL COMPANY:**	PSI
DATE COMPLETED:	7/9/19	**DRILLER:** RS	**LOGGED BY:** RS
COMPLETION DEPTH	30.0 ft	**DRILL RIG:**	CME55
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	SS
LATITUDE:	35.093254°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-89.73698°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	

REMARKS:

Water		
	While Drilling	None
	Upon Completion	None
	Delay	N/A

BORING LOCATION: Building Footprint

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					**Topsoil: 1 inch**					
				1		**Silty Clay (CL)**, Brown to Brown and Gray, Soft to Very Stiff		5-7-9 N=16	17		
				2				3-5-5 N=10	18		LL = 32 PL = 21
	5			3				3-4-4 N=8	23		
				4				2-1-2 N=3	25		
	10			5			CL	2-2-3 N=5	27		
	15			6				2-3-4 N=7	20		
	20			7		with Trace Sand 23.5'-25'		1-2-2 N=4	21		
	25			8				4-5-8 N=13	24		
	30					**Boring Terminal Depth: 30 feet**					

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Professional Service Industries, Inc.
4161 Ridgemoor Avenue
Memphis, TN 38118
Telephone: (901) 365-1802

PROJECT NO.: 05021783
PROJECT: Houston High School - Band Room
LOCATION: 9755 Wolf River Boulevard
Germantown, Tennessee 38139

The stratification lines represent approximate boundaries. The transition may be gradual.

SECTION 00 50 00

CONTRACTING FORMS AND SUPPLEMENTS

PART 1 GENERAL

1.01 CM/GC IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.

1.02 AGREEMENT AND CONDITIONS OF THE CONTRACT

A. See Section 00 52 00 - Agreement Form for the Agreement form to be executed.

B. See Section 00 72 00 - General Conditions of the Contract for Construction.

C. See Section 00 73 00 - Supplementary Conditions for Amendment to the General Conditions.

D. This Agreement is based on AIA A133-2009 Standard Form of Agreement Between Owner and Construction Manager where the basis of payment is the Cost of Work Plus a Fee with a Guaranteed Maximum Price.

E. The General Conditions are based on AIA A201, 2007.

1.03 FORMS

A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the Contract Documents.

B. Post-Award Certificates and Other Forms:
   1. Schedule of Values Form: AIA G703.
   2. Application for Payment Forms: AIA G702 with AIA G703 (for CM/GCs).

C. Clarification and Modification Forms:
   1. Architect's Supplemental Instructions Form: AIA G710.
   2. Construction Change Directive Form: AIA G714.
   3. Change Order Form: AIA G701.

D. Closeout Forms:
   1. Certificate of Substantial Completion Form: AIA G704.
   2. Affidavit of Release of Liens Form: AIA G706A.
   3. Consent of Surety to Final Payment Form: AIA G707.

1.04 REFERENCE STANDARDS

A. AIA A133 - Standard Form of Agreement Between Owner and Construction Manager where the basis of payment is the Cost of Work Plus a Fee with a Guaranteed Maximum Price.

B. AIA A201 - General Conditions of the Contract for Construction; 2007.

C. AIA A312 - Performance Bond and Payment Bond; 2010.

D. AIA G701 - Change Order; 2001.

E. AIA G702 - Application and Certificate for Payment; 1992.

F. AIA G703 - Continuation Sheet; 1992.

G. AIA G704 - Certificate of Substantial Completion; 2000.

H. AIA G710 - Architect's Supplemental Instructions; 1992.

I. AIA G714 - Construction Change Directive; 2007.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

THE OWNER:
(Name, legal status and address)

THE ARCHITECT:
(Name, legal status and address)

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3 CONTRACTOR

4 ARCHITECT

5 SUBCONTRACTORS

6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

7 CHANGES IN THE WORK

8 TIME

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13 MISCELLANEOUS PROVISIONS

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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User Notes: (1114592100)

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

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G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

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§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

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§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

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§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

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§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

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delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely

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upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

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§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

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§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

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ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

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§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- **.1** The change in the Work;
- **.2** The amount of the adjustment, if any, in the Contract Sum; and
- **.3** The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;
- **.3** Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- **.4** As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

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.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

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§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

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§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

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.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

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§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

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§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

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.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

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promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or

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expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

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§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during

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that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

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§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

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§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- **.1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;

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.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

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§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

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§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

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§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

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I, E. Scott Fleming, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 11:35:02 on 05/18/2018 under Order No. 6458068986 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2017, General Conditions of the Contract for Construction , as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

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(Dated)

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SECTION 00 73 00

SUPPLEMENTARY CONDITIONS 2007

PART 1 GENERAL

THESE SUPPLEMENTARY CONDITIONS ARE WRITTEN BY FAA TO APPLY TO THE A201 GENERAL CONDITIONS 2007 VERSION OF STANDARD OWNER CONTRACTOR AGREEMENT

2.01 SUMMARY

A. These Supplementary Conditions amend and supplement the General Conditions and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

B. The terms used in these Supplementary Conditions which are defined in the General Conditions have the meanings assigned to them in the General Conditions.

2.02 MODIFICATIONS TO GENERAL CONDITIONS

A. The General Conditions of the Contract for Construction, Standard Form of the American Institute of Architects, Document A201, 2007 edition, Articles 1 through 14, inclusive, (a copy of which is bound herein) is hereby a part of the Contract, except as the same may be inconsistent herewith.

B. The AIA Document A201, these Supplementary Conditions and all applicable provisions listed within Division 1, govern all technical specification sections within this Project Manual and are as binding as if repeated within each section.

C. These Supplementary Conditions modify, change, delete from or add to the General Conditions of the Contract for Construction, AIA Document A201, 2007 edition. Where any article of the General Conditions is modified or any paragraph, subparagraph or clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of that article, paragraph, subparagraph or clause shall remain in effect.

2.03 ARTICLE 1 - GENERAL PROVISIONS

A. Amend paragraph 1.1.1 as follows;
   1. The Contract Documents, to include the Bidding Requirements and Separate Booklets as a part of the Contract, all as identified in the Project Manual Table of Contents. In case of discrepancies or any conflicts among the Contract Documents, precedence of the various documents shall be as follows:
      a. Agreement
      b. Addenda
      c. General Conditions and Supplementary Conditions
      d. Detail Specifications
      e. Figures dimensions of the drawings
      f. Large scale details on the drawings over smaller scale details of same

B. Amend paragraph 1.1.3, The Work as follows:
   1. If there is any conflict within or between any of the Contract Documents involving the quality or quantity of work required, it is the intention of the Contract that the work of highest quality or greater quantity shown or specified shall be furnished. Whether or not the word "all" is used in the specification, coverage is intended to be complete, except where partial coverage is specifically and expressly noted. In all cases where an item is referred to in the singular number, it is intended that the reference shall apply to as many such items as are required to complete the work.

C. Amend paragraph 1.1.6, of The Specifications as follows:
   1. The term "specifications" refers to the technical specifications sections of this Project Manual, Divisions 02 through 39.

D. Add paragraph 1.1.9 Miscellaneous Definitions as follows:
   1. The term "product" includes materials, systems and equipment.

E. Make the following changes to paragraph 1.2:

1. Add subparagraph 1.2.4;Intent of Contract Documents is to provide complete installation. Accessory construction and apparatus necessary or advantageous to operation and testing of work shall be included. Omission of specific reference to any part of work necessary for such complete installation shall not be interpreted as relieving Contractor from furnishing and installing such parts.
2. Add subparagraph 1.2.5;Several similar conditions may be illustrated by a single detail drawing. Accordingly, the drawing may be subject to minor adjustments, as directed by the Architect, to satisfy the exact conditions. If discrepancies do appear, the Contractor shall request interpretation from the Architect before proceeding with the Work. The Contractor shall not himself make such interpretations except at his own risk, responsibility and expense.
3. Add subparagraph 1.2.6;If there should be any discrepancy between scale and figured dimensions, figured dimensions shall supersede such dimensions. Although drawings are drawn to scales noted and dimensions are given, the Contractor shall verify and work to actual dimensions of existing conditions.
4. Add subparagraph 1.2.7;Should conflict occur in or between drawings and specifications, the Contractor shall be deemed to have assumed the more expensive way of doing the work unless prior to signing of the agreement, the Contractor shall have asked for and obtained a decision as to which method or material is intended.

F. Make the following changes to Article 1 of the General Provisions:
   1. Add Paragraph 1.7;Existing Conditions:
      a. Prior to the commencement of the work, the Contractor shall verify all existing conditions, control points, principal lines and elevations at or related to the site and existing structures and shall examine all adjacent facilities upon which the work is in any way dependent. In the event of any inconsistency or conflict between existing conditions and the Contract Documents, immediate notice of such inconsistency or conflict shall be given to the Architect. The Contractor shall not undertake any phase of the work affected by such inconsistency or conflict pending the issuance of instructions by the Architect.

2.04 ARTICLE 3 - CONTRACTOR

A. Make the following changes to Paragraph 3.2, Review of Contract Documents:
   1. Add subparagraph 3.2.5;No verbal agreement or conversation with any officer, representative agent, or employee of the Owner or Architect, either before or after the execution of this Contract, shall affect or modify the terms or obligations herein contained.

B. Make the following changes to Paragraph 3.4, Labor and Materials:
   1. Add subparagraph 3.4.4;No later than 10 days from the Contract Date, the Contractor shall provide a list showing the name of the manufacturer proposed to be used for each of the products identified in the technical sections of the specifications and, where applicable, the name of the installing subcontractor.
   2. Add subparagraph 3.4.5;The Architect will promptly reply in writing to the Contractor stating whether the Owner or the Architect, after due investigation, has reasonable objection to any such proposal. If adequate data of any proposed manufacturer or installer is not available, the Architect may state that action will be deferred until the Contractor provides further data. Failure of the Owner or the Architect to reply promptly shall constitute notice of the requirements of the Contract Documents, and all products furnished by the listed manufacturer must conform to such requirements.
   3. Add subparagraph 3.4.6;After the Contract has been executed, the Owner and the Architects will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in Section 01 60 00 - Product Requirements of this Project Manual.
   4. Add subparagraph 3.4.7;By making requests for substitutions based on subparagraph 3.4.5 above, the Contractor:
      a. Represents that he has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified.

b. Represents that he will provide the same warranty for the substitution that he would for that specified.
c. Certifies that the cost data presented are complete and include all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
d. Will coordinate the installation of the acceptable substitute, making such changes as may
    1) be required for the work to be complete in all respects.

C. Make the following changes to Paragraph 3.5, Warranty:
1. Add subparagraph 3.5.2;All work under this Contract shall be guaranteed for one (1) year from date of the authorization of final settlement under this Contract, except when a different period is specifically prescribed. All guarantees embraced in or required by this Contract are subject to the terms of this paragraph unless otherwise expressly agreed upon in writing by the parties of this Contract. Whenever guaranteed work is found faulty, the Contractor, when notified by the Architect, must immediately (1) place in satisfactory condition, on every particular, any of the guaranteed work, and (2) make good all damage to the work, grounds or the equipment or contents thereof if such unsatisfactory condition or if damage develops within the period stipulated by the guaranty, and is due to the use of materials or workmanship which is inferior, defective or not in accordance with the Contract, and must make good any work or materials or the equipment and contents of said ground, which is disturbed in fulfillment of the requirements of this Contract or any guaranty embraced in or required hereby. If this Contractor disturbs any work under another Contract, he must restore such disturbed work to a condition satisfactory to the Architect and guarantee such restored work. Upon the contractor's failure to so proceed promptly to comply with the terms of any guaranty under this Contract or still running upon work executed by other contractors, the contracting Officer will have such work performed as he deems necessary to fulfill such guarantees, and the Contractor shall promptly pay the Owner such sums as were expended so as to fulfill such guaranty. All guarantees under this Contract, unless otherwise specifically stated, shall run from the date of authorization by the contracting Officer of final settlement under this Contract. Unless otherwise specifically prescribed in the particular guaranty, usual wear and tear and the result of accident not chargeable to the Contractor or his agents are expected from the requirements of this paragraph. Everything done in the fulfillment of any guaranty shall be without additional expense the to the Owner.

D. Make the following changes to paragraph 3.6, Taxes:
1. Add the following sentence to subparagraph 3.6.1:
    a. The Contractor shall pay for all taxes, including state sales tax, Social Security and unemployment taxes, as required by State and Federal Governments.

E. Make the following changes to Paragraph 3.9, Superintendent:
1. Add subparagraph 3.9.4;The Contractor's superintendent shall be experienced in the supervision of the construction work of general character and the magnitude of this project. He shall submit his experience record and other qualifying facts to the Architect for approval prior to his employment in this capacity. He shall be at the jobsite at all times work is in progress.
2. Add Subparagraph 3.9.5;Owner reserves right to have Contractor replace superintendent with acceptable replacement should said superintendent prove to be unqualified, incompetent or otherwise incapable of fulfilling his duties.

F. Make the following changes to Paragraph 3.14, Cutting and Patching of the Work:
1. Add subparagraph 3.14.3;Do not cut structural members under any circumstances except where expressly and particularly authorized by the Architect/Engineer.
2. Add subparagraph 3.14.4;Cutting of work necessary for installation of mechanical and electrical work is specified in Divisions 15 and 16, but patching of finished work required because of such cutting, shall be included in the general building construction and shall meet the requirements specified for the specific type of patching.

2.05 ARTICLE 5 - SUBCONTRACTORS

A. Make the following changes to Paragraph 5.2
   1. In subparagraph 5.2.1, delete the last sentence and replace with the following:
      a. No work shall be commenced until approval of all subcontractors has been given in writing by the Architect. If required, the Contractor shall furnish evidence satisfactory to the Architect, showing each proposed subcontractor is competent to execute the work covered by this subcontract. Subcontractors listed on the bid envelope shall be used for the project identified and in the capacity listed.

2.06 ARTICLE 7 - CHANGES IN THE WORK

A. Make the following changes in Paragraph 7.3
   1. Add subparagraph 7.3.11;
      a. In subparagraph 7.3.7, the allowance for the combined overhead and profit included in the total cost to the Owner shall be based on the following schedule:
         1) For the Contractor, for work performed by the Contractor's own forces, ten (10%) percent of the cost.
         2) For the Contractor, for work performed by the Contractor's subcontractor, five (5%) percent of the amount due the subcontractor.
         3) For each subcontractor or subcontractor's own forces, ten (10%) percent of the cost.
         4) Change orders involving multiple (two or more) tiers of subcontractors: Multiple tier mark-up shall not be allowed.
         5) Cost to which overhead and profit is to be applied shall be determined in accordance with subparagraph 7.3.6.
         6) In order to facilitate checking of quotations for extras or credits, all proposals shall be accompanied by a complete itemization of costs including labor, materials, and subcontracts. Labor and materials shall be itemized in the manner prescribed above.

2.07 ARTICLE 9 - PAYMENTS & COMPLETION

A. Make the following changes to Paragraph 9.2
   1. Add subparagraph 9.2.1.1:Upon completion of project, Contractor shall revise and update schedule of values to accurately account for project expenditures as they apply to various building components and trades.
   2. Add subparagraph 9.2.1.2:Revised Schedule of Values shall incorporate changes to the Contract, corrected bidding inaccuracies and other unforeseen cost discrepancies.

B. Make the following changes to Paragraph 9.3:
   1. Add subparagraph 9.3.1.3:Submittals: Upon execution of Construction Contract the following submittals shall be made and/or following documents shall be executed by General Contractor, Subcontractors and Owner as applicable. No review of Requests for Payment will be made until initial and monthly submittals have been made and approved by Owner and Architect and document executed. (Form copies are available upon written request to Owner.)
      a. Construction Schedules
      b. List of subcontractor and subcontract amounts
      c. Certificates of Insurance
      d. Schedule of Construction submittals indicating:
         1) Item
         2) Proposed submittal date
         3) Proposed shipping date of approved item
      e. Item
         1) Proposed submittal date
         2) Proposed shipping date of approved item
         3) Products proposed for substitution
      f. General Contractor's and Subcontractor's monthly and final waivers of lien

g. Contractor's Consent Agreement
h. Contractor's Subordination Agreement
i. Subcontractor's Agreement

2. Add subparagraph 9.3.1.4; The form of Application of Payment shall be AIA Document G702 Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet, submitted in quadruplicate.
3. Add subparagraph 9.3.1.5; The application for monthly payment will be made on approximately the 23rd of each month, based on work-in-place by the 20th of the month.
4. Add subparagraph 9.3.1.6; The Owner will retain 5% of the amount due the Contractor on the account of progress payments.
5. Add subparagraph 9.3.1.7; If the Owner receives the application for payment no later than the first of the month, then he shall make payment no later than the fifteenth day of the month. Unless otherwise stated in Agreement, Owner will retain until 30 days after substantial completion accumulated retainage due to Contractor on account of progress payments. No retainage will be paid until all submittals, including warranties required by General Conditions and Project Requirements are made.
6. Add subparagraph 9.3.4;Contractor shall obtain and deliver to Owner lien waivers and releases as may be required by Owner. This provision shall be a condition precedent to Contractor's right to receive draws on the Contract and shall have control over any conflicting provisions in the specifications or contract.

2.08 ARTICLE 11 - INSURANCE AND BONDS

A. Make the following changes to Paragraph 11.1, Contractor's Liability Insurance:
1. Add the following to the end of paragraph 11.1.1:
a. "...including private entities performing work at all the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the project."
2. Make the following changes to Paragraph 11.1.2:
a. Add subparagraph 11.1.2.1Work shall not be commenced under any Contract until the Contractor has obtained all insurance required under this heading, nor shall the Contractor allow any subcontractor to commence work under any subcontract until similar insurance required of the subcontractor has been obtained. Nothing under this heading shall be considered as limiting or being inconsistent with the contractor's obligations under the AIA General Conditions of the Contract for Construction, paragraphs under 11.1 and 3.18.
b. Add subparagraph 11.1.2.2If a subcontractor does not take out insurance in his own name and his principal Contractor wishes to provide insurance protection for such subcontractor's employees, a rider must be attached to the principal Contractor's policy. Such rider must take out appropriate policies in the name of the subcontractor.
c. Add subparagraph 11.1.2.3The Contractor shall maintain throughout the life of this Contract liability insurance written in a comprehensive form, satisfactory to the Owner in the following minimum requirements:
1) Workmen's Compensation Insurance:
(a) According to Statute:The Contractor shall purchase and maintain during the life of the Contract. Workmen's Compensation Insurance for all of his employees employed at the site of the project, in accordance with the laws of the State of the project. Evidence of the coverage of all persons employed directly or indirectly by the Contractor or any subcontractor at the site of the project shall be submitted to the Owner.
2) Contractor's Public Liability and Property Damage Insurance:
(a) The Contractor shall purchase and maintain during the life of the Contract, such insurance as to protect himself and the Owner from claims for damage for bodily injury (including accidental death), personal injury, as well as from claims for property damages, which may arise from operations under this

Contract, whether such operation be performed by the Contractor, or by subcontractors or by anyone employed by either of them directly or indirectly or by anyone for whose acts any of them may be liable. Such coverage shall be:

(1) $1,000,000. limits for bodily injury
(2) $500,000. for property damage
(3) $1,000,000. bodily injury ($50,000. property damage) for motor vehicle liability.

3) Excess Umbrella Liability:
   (a) The Contractor shall purchase and maintain, during the life of the Contract, excess umbrella liability.
      (1) Such coverage shall be $1,000,000. each occurrence.
4) Proof of Insurance:
   (a) The Contractor shall, before construction commences, furnish the Owner with satisfactory evidence of coverage of required insurance, any insurance company to be acceptable must be licensed in the state of the project and agents must be licensed in that state.
5) Attorney's Fees
   (a) If, by reason of the failure of the Contractor to carry out and perform any of the provisions or obligations of this Contract, it should become necessary or desirable, in the judgment of the Owner, for the Owner to employ an attorney or incur any other reasonable cost or expense, then the Contractor agrees to pay such reasonable attorney's fees, costs and expenses so incurred by the Owner, and to hold the Owner harmless against any loss on account thereof.

3. Make the following changes to Paragraph 11.3 - Property Insurance: (Builder's Risk)
   a. Add subparagraph 11.3.1.6;The Contractor shall purchase and maintain, during the life of the Contract, builder's risk completed value fire, and extended coverage, and all risk insurance in an amount sufficient to protect all parties to the Contract for the full insurable value of the entire work including the Owner, Contractor and subcontractors as their interests may appear during the course of construction.

2.09 ARTICLE 12 - UNCOVERING AND CORRECTION OF THE WORK

A. Make the following changes to Article 12
   1. Add subparagraph 12.2.6;Two weeks before guarantee period expires for the various works requiring guarantee, the Owner shall be notified by the Contractor and shall upon request accompany an employee of the contractor on an inspection through all the work covered under the guarantee. In the event this inspection is not made, the guarantee shall be extended until such inspection is completed.

2.10 ARTICLE 13 - MISCELLANEOUS PROVISIONS

A. Make the following changes to Article 13
   1. Add subparagraph 13.5.7;In addition, testing laboratory services for quality control shall be performed during the progress of the work. Testing laboratory services for quality control are outlined in Section 01455 and other sections of the Project Manuals. Testing laboratory services required by Section 01455 and other sections of the Project Manuals shall be performed by recognized testing agencies approved by the Architect and paid for by the Contractor.
   2. Add subparagraph 13.5.8;Contractor shall be responsible for certain additional testing and design mixes for concrete, mortar, and grout as enumerated in the Project Manual.

2.11 ARTICLE 14 - TERMINATION OF THE CONTRACT

A. Make the following changes to Article 14
   1. Add subparagraph 14.2.5;If Contractor should neglect, fail or refuse to complete work within the time specified herein or any proper extension granted by the Owner, then the Contractor shall be liable for any and all damages sustained by such delay.

2. Delete subparagraph 14.4.3 in its entirety and insert the following in its place:
    a. In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the work performed prior to such termination executed, but Contractor shall not be entitled to any other sums such as lost profits.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SUPPLEMENTARY CONDITIONS

SECTION 01 10 00
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Houston High School - Band Room and Concession Stand Additions
   1. 9755 Wolf River Blvd.

B. Owner's Name: Germantown Municipal School District.

C. Architect's Name: Fleming Architects.

D. The Project consists of an addition to the band storage room to replace the stand alone PEMB band storage room that is being renovated into the new concession stand building.

1.02 CONTRACT DESCRIPTION

A. Contract Type: A single Contractor with sub-contractor agreements as described in Section 005000 Construction Subcontract Agreement.

1.03 DESCRIPTION OF WORK

A. Abbreviated Written Summary of Work, summarized as follows:
   1. Building Package
      a. Demolition and Infrastructure
      b. Civil
      c. Landscape
      d. Architectural
      e. Structural
      f. Mechanical
      g. Plumbing
      h. Fire Protection
      i. Electrical

1.04 WORK BY OWNER

A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Substantial Completion.

1.05 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

A. Arrange use of site and premises to allow:
   1. Work by Others.
   2. Work by Owner.

B. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

1.07 SPECIFICATION SECTIONS APPLICABLE TO ALL CONTRACTS

A. Unless otherwise noted, all provisions of the sections listed below apply to all contracts. Specific items of work listed under individual contract descriptions constitute exceptions.

B. Section 01 20 00 - Price and Payment Procedures.

C. Section 01 22 00 - Unit Prices.

D. Section 01 23 00 - Alternates.

E. Section 01 30 00 - Administrative Requirements.
F. Section 01 32 16 - Construction Progress Schedule.
G. Section 01 40 00 - Quality Requirements.
H. Section 01 50 00 - Temporary Facilities and Controls.
I. Section 01 51 00 - Temporary Utilities.
J. Section 01 55 00 - Vehicular Access and Parking.
K. Section 01 58 13 - Temporary Project Signage.
L. Section 01 60 00 - Product Requirements.
M. Section 01 70 00 - Execution and Closeout Requirements.
N. Section 01 78 00 - Closeout Submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Change procedures.

D. Correlation of Contractor submittals based on changes.

E. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 00 52 00 - Agreement Form: Contract Sum, retainages, payment period, monetary values of unit prices.

B. Document 00 72 00 - General Conditions and Document 00 73 00 - Supplementary Conditions: Additional requirements for progress payments, final payment, changes in the Work.

C. Section 01 21 00 - Allowances: Payment procedures relating to allowances.

D. Section 01 22 00 - Unit Prices: Monetary values of unit prices; Payment and modification procedures relating to unit prices.

1.03 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.

B. Forms filled out by hand will not be accepted.

C. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.

D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

E. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Present required information in typewritten form.

E. Form: AIA G702 Application and Certificate for Payment and AIA G703 Continuation Sheet including continuation sheets when required.
   1. Show work in progress for each separate schedule of values (Shell and Interior).

F. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

G. Execute certification by signature of authorized officer.

H. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

J. Submit electronic copies of each Application for Payment.

K. Include the following with the application:
   1. Transmittal letter as specified for submittals in Section 01 30 00.
   2. Construction progress schedule, revised and current as specified in Section 01 30 00.
   3. Partial release of liens from major subcontractors and vendors.

L. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

B. Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710.

C. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

D. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 7 days.

E. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Sections 01 25 13 and 01 25 33.

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
   1. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
   2. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.

G. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.

d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
1. All closeout procedures specified in Section 01 70 00.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 21 00
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cash Allowance

B. Inspecting and testing allowances.

1.02 RELATED REQUIREMENTS

A. Section 01 40 00 - Quality Requirements

1.03 CASH ALLOWANCES

A. See Allowance Schedule below.

1.04 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

B. Funds will be drawn from the Contingency Allowance only by Change Order.

C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.05 INSPECTING AND TESTING ALLOWANCES

A. Costs Included in Inspecting and Testing Allowances: Cost of engaging an inspecting or testing agency; execution of inspecting and tests; and reporting results.

B. Costs Not Included in the Inspecting and Testing Allowances:
   1. Costs of incidental labor and facilities required to assist inspecting or testing agency.
   2. Costs of testing services used by Contractor separate from Contract Document requirements.
   3. Costs of retesting upon failure of previous tests as determined by Architect.

1.06 ALLOWANCES SCHEDULE

A. Door Hardware

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 22 00

UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids.

B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

C. Defect assessment and non-payment for rejected work.

1.02 RELATED REQUIREMENTS

A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.04 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.05 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Take all measurements and compute quantities. Measurements and quantities will be verified by Architect.

C. Take all measurements and compute quantities. Measurements and quantities will be verified by Owner.

D. Architect will take all measurements and compute quantities accordingly.

E. Owner will take all measurements and compute quantities accordingly.

F. Assist by providing necessary equipment, workers, and survey personnel as required.

G. Measurement Devices:
   1. Weigh Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
   2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
   3. Metering Devices: Inspected, tested and certified by the applicable state department within the past year.

H. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

I. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

J. Measurement by Area: Measured by square dimension using mean length and width or radius.

K. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

L. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

M. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.

N. Contractor's Engineer Responsibilities: Sign surveyor's field notes or keep duplicate field notes, calculate and certify quantities for payment purposes.

1.06 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.

B. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

1.07 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not complying with specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct one of the following remedies:
   1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Architect.
   2. The defective Work will be partially repaired to the instructions of the Architect, and the unit price will be adjusted to a new unit price at the discretion of Architect.

C. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct one of the following remedies:
   1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Owner.
   2. The defective Work will be partially repaired to the instructions of the Owner, and the unit price will be adjusted to a new unit price at the discretion of Owner.

D. The individual specification sections may modify these options or may identify a specific formula or percentage price reduction.

E. The authority of Architect to assess the defect and identify payment adjustment is final.

F. The authority of Owner to assess the defect and identify payment adjustment is final.

1.08 SCHEDULE OF UNIT PRICES

A. Undercut: 700 CY

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of Alternates.

1.02 SCHEDULE OF ALTERNATES

A. Alternate No. 1 - Parking

END OF SECTION

SECTION 01 24 64
WEATHER DELAYS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 EXTENSIONS OF CONTRACT TIME

A. If the basis exists for an extension of time in accordance with paragraph 8.3 of the Conditions, an extension of time on the basis of weather may be grated only for the number of Weather Delay Days in excess of the number of days listed as the Standard Baseline for that month.

1.03 STANDARD BASELINE FOR AVERAGE CLIMATIC RANGE

A. The Architect has reviewed weather data available from the National Oceanic and Atmospheric Administration and determined a Standard Baseline for average climate range.

B. Standard Baseline is defined as the normal number of calendar days for each month during which construction activity exposed to weather conditions is expected to be prevented and suspended by cause of adverse weather. Suspension of construction activity for the number of days each month as listed in the Standard Baseline included in the Work and is not eligible for extension of Contract Time.

C. Standard Baseline is as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
12	11	8	7	7	6	7	5	4	5	6	11

1.04 ADVERSE WEATHER AND WEATHER DELAY DAYS

A. Adverse Weather is defined as the occurance of one or more of the following conditions within a twenty-four (24) hour day that prevents construction activity exposed to weather conditions or access to the site:
   1. Precipitation (rain, snow or ice) in excess of one-tenth inch (0.10") liquid measure.
   2. Temperatures that do not rise above the required for the day's construction activity, if such temperature requirement is specified or accepted as standard industry practice.
   3. Sustained wind in excess of twenty-five (25) m.p.h.

B. Adverse Weather may include, if appropriate, "dry-out" or "mud" days:
   1. Resulting from precipitation days that occur beyond the standard baseline;
   2. only if there is a hindrance to site access or sitework and Contractor has taken all reasonable accommodations to avoid such hindrance; and
   3. at a rate no greater that 1 make-up date for each day or consecutive days or precipitation beyond the standard baseline that total 1.0 inch or more, liquid measure, unless specifically recommended otherwise by the Architect.

C. A Weather Delay Day may be counted if adverse weather prevents work on the project for fifty percent (50%) or more of the contractor's scheduled work day and critical path construction activities were included in the day's schedule, including a weekend day or holiday if Contractor has scheduled construction activity that day.

D. Contractor shall take into account that certain construction activities are more affected by adverse weather and seasonal conditions than other activities, and that "dry-out" or "mud" days are not eligible to be counted as a Weather Delay Day until the standard baseline is exceeded. Hence, Contractor should allow for an appropriate number of additional days associated with the Standard Baseline days in which such applicable construction activities are expected to be prevented and suspended.

1.05 DOCUMENTATION AND SUBMITTALS

A. Submit daily jobsite work logs showing which and to what extent critical path construction activities have been affected by weather on a monthly basis.

B. Submit actual weather data to support claim for time extension obtained from nearest NOAA weather station or other independently verified source approved by Architect at beginning of project.

C. Use Standard Baseline data provided in this section when documenting actual delays due to weather in excess of the average climatic range.

D. Organize claim and documentation to facilitate evaluation on a basis of calendar month periods, and submit in accordance with the procedures for Claims established in paragraph 4.3 of the Conditions.

E. If an extension of the Contract Time is appropriate, such extension shall be made in accordance with the provisions of Article 7 of the Conditions, and the applicable General Requirements.

END OF SECTION

SECTION 01 25 13

PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SUBSTITUTIONS:

A. Procedures:
   1. Instructions to Bidders specify time restrictions for submitting requests for substitutions during bidding period. Reference this section 3.3 Substitutions.
   2. No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

B. Substitute products should not be ordered and shall not be installed without written approval or acceptance from Designer. Contractor assumes all risks associated with premature ordering and installation of substitute products.

C. The specifically named manufacturers, products, and systems, and descriptive characteristics used in the Contract Documents normally serve only to establish a level of quality and a performance standard. Unless specific restriction is placed upon an item in the specifications, Contractor may submit proposals for substitutions. The Owner reserves the right to disallow substitutions. Contractor assumes risks associated with possible rejection of proposals for substitution submitted during the life of the contract.

D. Delays caused by tardiness of Contractor in preparing and forwarding submittals do not constitute an acceptable basis for consideration of substitute products. Delays due to factors which were in effect prior to project bidding do not constitute an acceptable basis for consideration of substitute products.

1.02 SUBSTITUTION REQUEST FORM:

A. Requests for substitutions shall be submitted to Designer on the form exhibited as Section 01 25 33, or in a similar format which provides the same or more information.

B. When making requests for substitutions, Contractor assumes the following responsibilities:
   1. To have personally investigated the proposed substitute product and determined it is equal or superior in all respects to that specified;
   2. To provide the same warranty for substitute that Contractor would for that specified;
   3. To provide complete cost data, and waive all claims for additional costs related to substitution which subsequently become apparent; and
   4. To coordinate installation of the accepted substitute, making such changes as may be required for Work to be complete in all respects.

END OF SECTION

SECTION 01 25 33
PRODUCT SUBSTITUTION REQUEST FORM

To:	**Project:**
Attn:	
Specified Item:	**Proposed Substitute:**

1. The following are attached (Mark all that apply):

- ☐ **Complete Description**
- ☐ **Laboratory Tests**
- ☐ Information on the availability of maintenance services and replacement materials for proposed substitute(s)
- ☐ **Catalog**
- ☐ **Spec Data**
- ☐ Names, addresses, and phone numbers of fabricators and suppliers for proposed substitute(s)

2. This substitution will have the following effects on dimensions, guages, weights, etc.:

3. This substitution will have the following effects on wiring, piping, ductwork, etc.:

4. This substitution will have the following effects on other trades:

5. This substitution will have the following effect on construction Schedules:

6. The proposed substitute(s) differs from the specified product(s) in quality and performance as follows:

7. Manufacturers guarantees for the substitute(s) and the specified product(s) are (check one):

☐ **the same** ☐ **different** (if different, explain below)

8. If the proposed substitution is accepted, it will result in:

☐ **no cost impact** ☐ **a cost increase of**

☐ **a cost decrease of** _____

(If change in cost is indicated, itemization on specified Cost Itemization Form is attached)

9. License fees or royalties are pending on the proposed substitute.

☐ **No** ☐ **Yes** (if yes, explain below)

10. The undersigned or the firm represented shall pay for additional studies, investigations, submittals, redesign, and analysis by the Designer necessitated by this substitution request.

Substitutions must be requested in accordance with applicable Contract requirements. After bidding, substitutions are to be submitted only by Contractor. Substitute products should not be ordered or installed without written acceptance.

Submitted by: **Date:**

Sign here: _____ _____

Name: **Telephone:**

type or print: _____ _____

for:

Name of firm: _____

Address:

Street address: _____

and mailing address if different: _____

City, State, and Zip Code: _____

Designer's Review Comments:

☐ **Accepted** ☐ **Rejected**

☐ **Accepted as noted** ☐ **Rejected (received too late)**

☐ **Rejected (submittal incomplete)**

Additional comments:

For the Designer: **Date:**

Signature here: _____ _____

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Construction progress schedule.

D. Progress photographs.

E. Coordination drawings.

F. Requests for Information (RFI's)

G. Submittals for review, information, and project closeout.

H. Number of copies of submittals.

I. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Drawings and General Provisions of Contract, including General Conditions and other Division 01 Specifications apply to work of this section.

B. Document 00 72 00 - General Conditions of the Contract for Construction

C. Section 01 74 19 - Construction Waste Management and Disposal

D. Section 01 70 00 - Execution & Closeout Requirements

E. Section 01 78 00 - Closeout Submittals

1.03 PROJECT COORDINATOR

A. Project Coordinator: responsibilities are under the jurisdiction of the Construction Manager/General Contractor.

B. Coordinate both the procedural timing and the listing (naming and sequencing) of reports/activities required by provisions of this section and other sections, to afford consistency and logical coordination between submitted reports or lists. Maintain coordination and correlation between separate reports by updating at monthly or shorter time intervals. Make appropriate distribution of each report and updated report to entities involved in the work including Designer and Owner. In particular, provide close coordination of progress schedule, schedule of values, listing of subcontracts, schedules of submittals, progress reports, and payment requests.

C. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for storage of materials & Vehicular access, traffic, and parking facilities.

D. During construction, coordinate use of site and facilities through the Project Coordinator.

E. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

F. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 10 00 - Summary.

G. Coordinate field engineering and layout work under instructions of the Project Coordinator.

H. Make the following types of submittals to Designer through the Project Coordinator:
   1. Requests for Interpretation.
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.

5. Manufacturer's instructions and field reports.
6. Applications for payment and change order requests.
7. Progress schedules.
8. Coordination drawings.
9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Project Coordinator will schedule a meeting after Notice of Award.

B. Designer will schedule a meeting after Notice of Award.

C. The Pre-Construction Conference shall be attended by the Contractor's:
   1. (Office) Job Manager
   2. (Field) Job Superintendent
   3. Major subcontractors' representatives
   4. Major suppliers' representatives
   5. Others, as desired

D. Agenda:
   1. Execution of Owner -General Contractor Agreement.
   2. Relation to coordination of Prime Contractor.
   3. Designation of responsible personnel.
   4. Submission of executed bonds and insurance certificates.
   5. Distribution of Contract Documents.
   6. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   7. Designation of personnel representing the parties to Contract, Owner and Architect.
   8. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures and close out documents.
   9. Handling of materials to permit inspection.
   10. Scheduling.
   11. Distribution of Submittals
   12. Sequence of critical work. Review of schedules
   13. Trades whose work will require pre-start up and workmanship review meetings.
   14. Use of Premises
      a. Access to site
      b. Field Office and Storage Areas
      c. Owner's Requirements
   15. Major equipment deliveries and priorities
   16. Storage of material off - site
   17. Construction waste management, recycling, and disposal
   18. Security procedures affecting owner's property
   19. Payment procedures after substantial completion
   20. Additional items and subjects requested by the owner, Designer and General Contractor

E. Designer (or designated construction administrator) will act as chairperson of the meetings. Chairperson will distribute and forward Records of meeting minutes and distribute copies within four (4) days after meeting to participants, with One (1) copy to General Contractor, Owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

A. Designer (or designated construction administrator) to schedule and administer meetings throughout progress of the Work at maximum bi-weekly intervals.

B. General: In addition to specific coordination meetings for each element of work and other regular project meetings for other purposes, hold a general progress meeting each month. Require each entity then involved in planning, coordination or performance of work to be properly represented at each meeting. Review each entity's present and future needs including interface requirements, time, sequences, deliveries, access, site utilization, temporary facilities and services, hours of work, hazards and risks, house-keeping, change orders, and documentation of information for payment requests. Discuss whether each element of current work is ahead of schedule, on time, or behind time in relation to updated progress schedule. Determine how behind-time work will be expedited, and secure commitments from entities involved in doing so. Discuss whether schedule revisions are required to ensure that current work and subsequent work will be completed within Contract Time. Review everything of significance which could affect progress of the work

C. Project Coordinator will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

D. Designer (or designated construction administrator) will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

E. Attendance Required:
   1. (Office) Job Manager
   2. (Field) Job Superintendent
   3. Subcontractors' representatives, as befits the agenda
   4. Suppliers' representatives, as befits the agenda
   5. Others, as appropriate

F. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Review of off-site fabrication and delivery schedules.
   7. Maintenance of progress schedule.
   8. Corrective measures to regain projected schedules.
   9. Planned progress during succeeding work period.
   10. Maintenance of quality and work standards.
   11. Effect of proposed changes on progress schedule and coordination.
   12. Other business relating to Work. Other current business

G. Designer (or designated construction administrator) to distribute record meeting minutes and distribute copies within (4) Four days after meeting to participants, with (1) One copy to General Contractor, Owner, participants, and those affected by decisions made.

3.03 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within (21) Twenty One days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

F. Submit updated schedule with each Application for Payment.

3.04 SCHEDULE OF VALUES

A. General: Prepare schedule of values, as required by General Conditions, in coordination with the preparation of progress schedule. Correlate line items with other administrative schedules and forms required for the work, including progress schedule, payment request form, listing of subcontractors, schedule of allowances, schedule of alternates, listing of products and principal suppliers and fabricators, and schedule of submittals. Provide breakdown of Contract Sum in sufficient detail to facilitate continued evaluation of payment requests and progress reports. Break down principal subcontract amounts into several line items. Round off the nearest whole dollar, but with total equal to Contract Sum. Submit copies of schedule of values to Designer and Owner on AIA Form G703 - Continuation Sheet.

3.05 PAYMENT REQUESTS

A. General: Except as otherwise indicated, sequence of progress payments is to be regular, and each must be consistent with previous applications and payments. It is recognized that certain applications involve extra requirements, including initial application, application at times of substantial completion, and final payment application.
   1. Waivers of lien: Each progress payment must be submitted with Contractor's waiver and Subcontractor's waivers as may be required by Owner.
   2. Waiver Forms: Submit and execute in a manner, acceptable to the Owner.

B. Application Preparation: Except as otherwise indicated, complete every entry provided for on the form, including notarization and execution by authorized persons. Incomplete applications will be returned by Architect, without action. Entries must match current date of schedule of values and progress schedule and report. Listing must include amount of change orders issued prior to first date of the "period of construction" covered by application. Also attach form breaking application down by CSI Divisions.

C. Stored materials
   1. Materials stored on-site but not yet incorporated into the work may be claimed for payment.
   2. Materials suitably stored off-site may be claimed for payment provided that the following is attached to each copy of application.
      a. A statement identifying where materials are stored, and that materials are tagged to identify them for use in the project.
      b. Copies of bills of sale for materials claimed.
      c. A certificate of insurance covering materials claimed, recognizing Owner's right to make claims.
   3. Application at time of Substantial Completion: Following issuance of Designer's final "certificate of substantial completion" and also in part as applicable to prior certificates on portions of completed work as designed, a payment application may be prepared and submitted by Contractor. The principal administrative actions and submittals which must proceed or coincide with such special applications can be summarized as follows, but not necessarily by way of limitation.
      a. Occupancy permits and similar approvals or certificates by governing authorities and franchised services, assuring Owner's full access and use of completed work.
      b. Warranties, guarantees, maintenance agreements and similar provisions of contract documents
      c. Test/adjust/balance records, maintenance instructions, meter readings, start-up performance reports, and similar change-over information germane to Owner's occupancy, use, operation and maintenance of completed work.
      d. Final cleaning of the work.
      e. Application for reduction (if any) of retainage.
      f. Advise to Owner on coordination of shifting insurance coverages, including proof of extended coverages as required.
      g. Listing of Contractor's incomplete work, recognized as exceptions to Designer's certificate of substantial completion.

4. Final Payment Application: the administrative actions and submittals which must preceded or coincide with submittal of final payment application can be summarized as follows, but not necessarily by way of limitation:
    a. Completion of project closeout requirements.
    b. Completion of items specified for completion beyond time of substantial completion (regardless of whether payment application was previously made).
    c. Assurance, satisfactory to the Owner, that unsettled claims will be settled and that work not actually completed and accepted will be completed without undue delay.
    d. Transmittal or required project construction records to Owner.
    e. Proof, satisfactory to Owner, that taxes, fees and similar obligations of Contractor have been paid.
    f. Removal of temporary facilities, services, surplus materials, rubbish and similar elements.
    g. Change over of door locks and other Contractor's access provisions to Owner's property.
5. Application Transmittal: Submit four (4) executed copies of each payment application, one copy of which is completed with waivers of lien and similar attachments. Transmit each copy with a transmittal form listing those attachments, and recording appropriate information related to application in a manner acceptable to Designer. Transmit to Designer (one additional copy to Owner) by means ensuring receipt within 24 hours.

3.06 COORDINATION DRAWINGS

A. Provide information required by Project Coordinator for preparation of coordination drawings.

B. As-built documents are to be updated by the Superintendent and forwarded to the owner in the close out documents for their use and record. As-Built documents are to be kept on site and reviewed periodically by the Designer or designated construction administrator.

3.07 REQUESTS FOR INFORMATION (RFI'S)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified or on the contractor's letterhead in numerical order.
    1. Designer will return RFI's submitted to Designer by other entities controlled by Contractor with no response.
    2. Coordinate and submit RFI's in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
    1. Project Name
    2. Project Number/SBC Number
    3. Date
    4. Name of Contractor
    5. Name of Designer and Construction Manager
    6. RFI number, numbered sequentially
    7. RFI subject
    8. Specification section number and title and related paragraphs, as appropriate
    9. Drawing number and detail reference, as appropriate
    10. Field dimensions and conditions, as appropriate
    11. Contractors suggested resolution, If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
    12. Contractor's signature
    13. Attachments: Include sketches, descriptions, measurements, photos, product data, shop drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. Designer's and Construction Manager's Action: Designer and Construction Manager will review each RFI, determine action required, and respond. Allow fourteen (14) working days for Designer's response for each RFI.

D. If Contractor believes the RFI response warrants change in Contract Time or Contract Sum, notify Designer and Construction Manager in writing within Ten (10) days of receipt of the RFI response.

3.08 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Designer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with Submittal Procedures article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.09 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Sustainable Design Guidelines submittals and reports.
   3. Certificates.
   4. Test reports.
   5. Inspection reports.
   6. Manufacturer's instructions.
   7. Manufacturer's field reports.
   8. Other types indicated.

3.10 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. All other items required by specifications for closeout.
   6. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.11 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:
   1. Electronic submittals in PDF format preferred.

B. Documents for Information:
   1. Electronic submittals in PDF format preferred. If paper, submit only 2 copies.

C. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.

D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Designer
   1. After review, produce duplicates.

2. Retained samples will not be returned to General Contractor unless specifically so stated.

3.12 SUBMITTAL PROCEDURES

A. General Requirements:

B. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
   2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.

C. Transmit each submittal with a copy of approved submittal form.

D. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

E. Identify Project, General Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

F. Apply General Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

G. Deliver submittals to Designer at business address.

H. Schedule submittals to expedite the Project, and coordinate submission of related items.

I. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

J. Provide space for general Contractor and Designer review stamps.

K. When revised for resubmission, identify all changes made since previous submission.

L. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

END OF SECTION

SECTION 01 31 90
ADMINISTRATIVE LOGS

PART 1 GENERAL

1.01 SUBMITTALS LOG

A. If any shop drawings, product data, or sample submittals are required by the Contract Documents, maintain a submittal log to record the status of submittals made to the Designer.
   1. Submit one (1) copy with each application for payment.
   2. Clearly identify the Project.
   3. Record activities with respect to shop drawings, product data, samples, and such other submittals which are required by the Contract Documents.
   4. Indicate for each submittal made to date:
      a. Title or name, and type of submittal.
      b. Date submitted to the Designer.
      c. Date returned by the Designer.
      d. General nature of the Designer's response.

END OF SECTION

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

1.02 RELATED SECTIONS

A. Section 01 10 00 - Summary: Work sequence.

1.03 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule.

1.04 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

1.05 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Diagram Sheet Size: Maximum 22 x 17 inches.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

D. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit reports required to support recommended changes.

3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. References and standards.
B. Quality assurance submittals.
C. Mock-ups.
D. Control of installation.
E. Tolerances.
F. Testing and inspection services.
G. Manufacturers' field services.

1.02 RELATED REQUIREMENTS

A. Section 00 31 00 - Available Project Information
B. Section 00 72 00 - General Conditions of the Contract for Construction
C. Section 01 25 13 - Product Substitution Procedures
D. Section 01 25 33 - Product Substitution Request Form
E. Section 01 30 00 - Administrative Requirements
F. Section 01 41 00 - Regulatory Requirements
G. Section 01 45 33 - Code Required Special Inspections

1.03 REFERENCE STANDARDS

A. ASTM C 1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008.
B. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2009.
C. ASTM C 1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2009.
D. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2008.
E. ASTM E 329 - Standard Specification for Agencies Engaged Construction Inspection and/or Testing; 2009.
F. ASTM E 543 - Standard Specification for Agencies Performing Nondestructive Testing; 2009.

1.04 SUBMITTALS

A. Testing Agency Qualifications:
    1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer (in the state where the work is being performed) and responsible officer.
    2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
B. Design Data: Submit for Designer's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
C. Test Reports: After each test/inspection, promptly submit two copies of report to Designer and to Contractor.
    1. Include:
        a. Date issued.

b. Project title and number.
c. Name of inspector.
d. Date and time of sampling or inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of test/inspection.
h. Results of test/inspection.
i. When requested by Designer, provide interpretation of results.

2. Test report submittals are for Designer's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Designer, in quantities specified for Product Data.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Designer.

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Manufacturer's Field Reports: Submit reports for Designer's benefit as contract administrator or for Owner.
1. Submit report in duplicate within 30 days of observation to Designer for information.
2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

G. Erection Drawings: Submit drawings for Designer's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by Designer or Owner.

1.05 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Designer before proceeding.

1.06 TESTING AND INSPECTION AGENCIES

A. Refer to Section 01 45 33 Code Required Special Inspections.

B. Testing Agency Duties:
1. Provide qualified personnel at site. Cooperate with Designer and Contractor in performance of services.

2. Perform specified sampling and testing of products in accordance with specified standards.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Designer and Contractor of observed irregularities or non-conformance of Work or products.
5. Perform additional tests and inspections required by Designer or Owner.
6. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the Work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
   a. To provide access to Work to be tested/inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
   c. To facilitate tests/inspections.
   d. To provide storage and curing of test samples.
4. Notify Designer and laboratory 48 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Designer. Payment for re-testing will be charged to Contractor by deducting testing charges from the Contract Price.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Designer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Designer and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Designer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. See individual specification sections for testing required.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Designer and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Designer and Contractor of observed irregularities or non-conformance of Work or products.
   5. Perform additional tests and inspections required by Designer.
   6. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Designer and laboratory 48 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Designer.

F. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

G. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Designer. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Price.

3.05 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Designer 30 days in advance of required observations.
   1. Observer subject to approval of Owner.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Designer, it is not practical to remove and replace the Work, Designer will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY OF REFERENCE STANDARDS

A. Regulatory requirements applicable to this project are the following:

B. 28 CFR 35 - Nondiscrimination on the Basis of Disability in State and Local Government Services; Final Rule; Department of Justice; current edition.

C. 28 CFR 36 - Nondiscrimination by Public Accommodations and in Commercial Facilities; Final Rule; Department of Justice; current edition.

D. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

E. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

F. 29 CFR 1910 - Occupational Safety and Health Standards; current edition.

G. State of Tennessee amendments to some or all of the following.

H. ICC (IFC) - International Fire Code; 2015

I. ICC (IBC) - International Building Code: 2015.

J. ICC (IPC) Plumbing Code: 2015.

K. ICC (IMC) - International Mechanical Code; 2015

L. ICC (IFGC) - International Fuel Gas Code; 2015

M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

N. ICC (IECC) - International Energy Conservation Code; 2015

1.02 RELATED REQUIREMENTS

A. Section 01 40 00 - Quality Requirements.

1.03 QUALITY ASSURANCE

A. Contractor's Designer Qualifications: Refer to Section - 01 40 00 - Quality Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 45 10
QUALITY CONTROL

PART 1 GENERAL

1.01 GENERAL

A. All materials entering into construction of structure covered by this Contract shall be securely anchored and/or secured together in accordance with best quality for intended purposes. Wythes of masonry and corners of masonry walls and partitions shall be bonded together if possible, unless otherwise specifically shown, and where not bonded shall be secured with appropriate metal ties or anchors. Masonry walls shall be anchored to adjacent columns unless otherwise specifically shown. All wood, steel, concrete, or other framing shall be securely anchored and tied together and to supporting or abutting masonry. All veneers, finishes, and applied items shall be securely anchored and tied to the backing material. The Contractor shall ensure that, except for expansion joints or otherwise where materials are purposely separated, each and every piece of material entering into structures shall be bonded, anchored, tied, or otherwise secured in place in a permanent manner that will permit expansion, contraction, and other minor movements and normal use of structure without structural features becoming impaired or loose.

B. All items shall be installed in a workmanship manner in accordance with best recognized practice. Manufactured items shall be installed in strict accordance with manufacturer's printed directions, specifications, and/or recommendations for an installation, shall be properly adjusted after installation and be left in perfect working order. All items in walls, floors, or roofs exposed to weather, or that shall otherwise subjected to flooding or wetting, shall be installed in such a manner as to ensure a permanent watertight and weather tight installation. Unless otherwise indicated, items exposed to weather, or subject to flooding or wetting, shall be installed so as to shed and not hold water. Items shall, in all cases, be installed plumb and/or in proper relationship to surrounding materials.

C. When standard specifications such as American Society for Testing and Materials, Federal Specifications, Department of Commerce (Commercial Standards), American Institute of Steel Construction, or other well-known public or trade associations are cited as standard to govern materials and/or workmanship, such specifications, or portion thereof as referred to, shall be equally as binding and have full force and effect as though it were copied into these specifications.

D. Such standard specifications as are mentioned are generally recognized by and available to trades concerned. Designers will, however, upon request of a bidder or Contractor, furnish for inspection a copy of any standard specification mentioned or direct bidder or Contractor to any easily available copy.

E. Unless otherwise expressly stated, standard specifications referred to shall be considered as latest edition and/or revision of such specifications that is in effect on date of invitation for bids. In case of any conflicts between standard specifications and written portions of Contract Documents, the Contract Documents shall govern.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 45 33

CODE-REQUIRED SPECIAL INSPECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

D. Manufacturers' field services.

E. Fabricators' field services.

1.02 DEFINITIONS

A. Code or Building Code: ICC (IBC)-2012 Edition of the International Building Code and specifically, Chapter 17 - Special Inspections and Tests.

B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.

C. National Institute of Standards and Technology (NIST).

D. Special Inspection:
   1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.
   2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.03 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).

B. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.

C. AISC 341 - Seismic Provisions for Structural Steel Buildings; 2010.

D. AISC 360 - Specification for Structural Steel Buildings; 2010.

E. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2015ae1.

F. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete; 2014a.

G. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.

H. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.

I. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (with March 2016 Errata).

J. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2008.

K. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

L. ICC (IBC)-2012 - International Building Code; 2012.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency shall:

1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Submit certification that Special Inspection Agency is acceptable to AHJ.

C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency shall:
1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
3. Submit certification that Testing Agency is acceptable to AHJ.

D. Manufacturer's Qualification Statement: Manufacturer shall submit documentation of manufacturing capability and quality control procedures. Include documentation of AHJ approval.

E. Fabricator's Qualification Statement: Fabricator shall submit documentation of fabrication facilities and methods as well as quality control procedures. Include documentation of AHJ approval.

F. Special Inspection Reports: After each special inspection, Special Inspector shall promptly submit two copies of report; one to Architect and one to the AHJ.
1. Include:
a. Date issued.
b. Project title and number.
c. Name of Special Inspector.
d. Date and time of special inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of special inspection.
h. Date of special inspection.
i. Results of special inspection.
j. Compliance with Contract Documents.
2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.

G. Test Reports: After each test or inspection, promptly submit two copies of report; one to Architect and one to AHJ.
1. Include:
a. Date issued.
b. Project title and number.
c. Name of inspector.
d. Date and time of sampling or inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of test or inspection.
h. Date of test or inspection.
i. Results of test or inspection.
j. Compliance with Contract Documents.

H. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, in quantities specified for Product Data.
1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

I. Manufacturer's Field Reports: Submit reports to Architect and AHJ.

1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents.

1.05 SPECIAL INSPECTION AGENCY

A. Owner or Architect will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.

B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.06 TESTING AND INSPECTION AGENCIES

A. Owner or Architect may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.

B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.07 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.

B. Testing Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.

C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
   1. Continuous Special Inspection: Special Inspection Agency shall be present in the area where the work is being performed and observe the work at all times the work is in progress.
   2. Periodic Special Inspection: Special Inspection Agency shall be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.
   3. See structural drawings for list of special inspections required for this project.

3.02 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

A. Structural Steel and Cold Formed Steel Deck Material:
   1. Structural Steel: Verify identification markings comply with AISC 360, Section M3.5; periodic.
   2. Other Steel: Verify identification markings comply with ASTM standards specified in the approved contract documents; periodic.
   3. Submit manufacturer's certificates of compliance and test reports; periodic.

B. Welding:
   1. Structural Steel and Cold Formed Steel Deck:
      a. Complete and Partial Joint Penetration Groove Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
      b. Multipass Fillet Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
      c. Single Pass Fillet Welds Less than 5/16 inch Wide: Verify compliance with AWS D1.1/D1.1M; periodic.
      d. Plug and Slot Welds: Verify compliance with AWS D1.1/D1.1M; continuous.

e. Single Pass Fillet Welds 5/16 inch or Greater: Verify compliance with AWS D1.1/D1.1M; continuous.
f. Floor and Roof Deck Welds: Verify compliance with AWS D1.3/D1.3M; continuous.

2. Reinforcing Steel: Verify items listed below comply with AWS D1.4/D1.4M and ACI 318, Section 3.5.2.
   a. Verification of weldability; periodic.
   b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames as well as boundary elements of special structural walls of concrete and shear reinforcement; continuous.
   c. Shear reinforcement; continuous.
   d. Other reinforcing steel; periodic.

3.03 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

A. Reinforcing Steel, Including Prestressing of Tendons and Placement: Verify compliance with approved contract documents and ACI 318, Sections 3.5 and 7.1 through 7.7; periodic.

B. Reinforcing Steel Welding: Verify compliance with AWS D1.4/D1.4M and ACI 318, Section 3.5.2; periodic.

C. Design Mix: Verify plastic concrete complies with the design mix in approved contract documents and with ACI 318, Chapter 4 and 5.2; periodic.

D. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M and ACI 318, Sections 5.6 and 5.8 and record the following, continuous:
   1. Slump.
   2. Air content.
   3. Temperature of concrete.

E. Specified Curing Temperature and Techniques: Verify compliance with approved contract documents and ACI 318, Sections 5.11 through 5.13; periodic.

F. Concrete Strength in Situ: Verify concrete strength complies with approved contract documents and ACI 318, Section 6.2, for the following.

G. Formwork Shape, Location and Dimensions: Verify compliance with approved contract documents and ACI 318, Section 6.1.1; periodic.

3.04 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION

A. Verify each item below complies with approved contract documents and the applicable articles of ACI 530/530.1/ERTA.
   1. Inspections and Approvals:
      a. Verify compliance with the required inspection provisions of the approved contract documents; periodic.
      b. Verify approval of submittals required by contract documents; periodic.
   2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction unless specifically exempted by code; periodic.
   3. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.
   4. Joints and Accessories: When masonry construction begins, verify:
      a. Proportions of site prepared mortar; periodic.
      b. Construction of mortar joints; periodic.
      c. Location of reinforcement, connectors, prestressing tendons, anchorages, etc; periodic.
   5. Structural Elements, Joints, Anchors, Protection: During masonry construction, verify:
      a. Size and location of structural elements; periodic.
      b. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; periodic.
      c. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.

d. Welding of reinforcing bars; continuous.

6. Grouting Preparation: Prior to grouting, verify:
   a. Grout space is clean; periodic.
   b. Correct placement of reinforcing, connectors, prestressing tendons and anchorages; periodic.
   c. Correctly proportioned site prepared grouts and prestressing grout for bonded tendons; periodic.
   d. Correctly constructed mortar joints; periodic.
7. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; periodic.

3.05 SPECIAL INSPECTIONS FOR SOILS

A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
   1. Design bearing capacity of material below shallow foundations; periodic.
   2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
   3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
   4. Subgrade, prior to placement of compacted fill; periodic.

B. Testing: Classify and test excavated material; periodic.

3.06 SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE

A. Structural Steel: Comply with the quality assurance plan requirements of AISC 341.

B. Designated Seismic System Verification: Verify label, anchorage or mounting complies with certificate of compliance provided by manufacturer or fabricator.

C. Structural Observations for Seismic Resistance: Visually observe structural system for general compliance with the approved contract documents; periodic.

3.07 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

A. Special Inspection Agency shall:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified reference standards.
   3. Ascertain compliance of materials and products with requirements of Contract Documents.
   4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Submit reports of all tests or inspections specified.

B. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

C. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.08 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Submit reports of all tests or inspections specified.

B. Limits on Testing or Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the work.

C. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.

D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

3.09 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. Contractor Responsibilities, General:
   1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
   2. Cooperate with agency and laboratory personnel; provide access to the work, to manufacturers' facilities, and to fabricators' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to work to be tested or inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
      c. To facilitate tests or inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
   5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary telecommunications services.

C. Temporary telephone and internet service.

D. Temporary support and sanitary facilities.

E. Temporary Controls: Barriers, enclosures, and fencing.

F. Security requirements.

G. Vehicular access and parking.

H. Waste removal facilities and services.

I. Project identification sign.

J. Field offices.

1.02 RELATED REQUIREMENTS

A. Section 01 55 00 - Vehicular Access and Parking

B. Section 01 58 13 - Temporary Project Signage

1.03 TEMPORARY UTILITIES

A. Provide all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

B. Owner shall pay for all utility connection fees. Contractor to coordinate utilities.

C. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.04 TELECOMMUNICATIONS SERVICES

A. Telecommunications services shall include:
   1. Internet Connections: Minimum of one; DSL modem or faster.
   2. Email: Account/address reserved for project use.
   3. Facsimile Service: Minimum of one dedicated fax machine/printer.

1.05 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

1.06 BARRIERS

A. Provide protection for plants designated to remain. Replace damaged plants.

B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

C. Traffic Controls: See Civil.

1.07 FENCING

A. Construction: Contractor's option.

B. Provide 6 foot high construction fence around construction site; equip with vehicular and pedestrian gates with locks.

1.08 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.09 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with governing authorities and Owner.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering streets.

D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

E. Existing parking areas located at temporary designated area may be used for construction parking until new parking lot is available.

1.10 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.11 PROJECT SIGNS - SEE SECTION 01 58 13

1.12 VERMIN CONTROL

A. Provide necessary treatment to prevent an infestation of vermin. Maintain sanitary conditions to eliminate an environment which attracts and breeds vermin.

1.13 CONTROL OF DUST AND MUD

A. Establish One Entry Point: Control construction vehicle traffic by establishing only one entry/exit point.

B. Watering to Control Dust: Use watering trucks to apply water on exposed dirt which could become airbone dust. Use as often as necessary to control dust on the site.

C. Cleaning Mud off Construction Vehicles: Develop cleaning point with water hoses and catchment basin to pressure wash vehicles before they leave the site with mud on their wheels. Develop plan showing use of a filtering device at each storm drain inlet on adjacent streets to prevent clogging the storm sewer pipes with mud. If the adjacent road(s) becomes muddy, the Contractor shall wash down the road(s) to the satisfaction of the Owner. This cleaning shall extend as far as necessary to remove all mud and dirt generated by this project. Use water trucks and sweeping trucks as necessary to provide water for washing roads.

1.14 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.

B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

C. Provide (1) dedicated office space within temporary office for Architect.

D. Locate offices a minimum distance of 30 feet from existing and new structures.

1.15 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 51 00
TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Provision of electricity, lighting, heat, ventilation, and water.

1.02 RELATED REQUIREMENTS

A. Section 01 50 00 - Temporary Facilities and Controls:
   1. Temporary telecommunications services for administrative purposes.

1.03 TEMPORARY ELECTRICITY

A. Cost: By Owner. Contractor to coordinate utilities

B. Provide power service required from utility source.

C. Power Service: See Electrical Division 26.

D. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.

E. Provide main service disconnect and over-current protection at convenient location and meter.

F. Permanent convenience receptacles may be utilized during construction.

G. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain lighting for construction operations to achieve a minimum lighting level of 3/4 watt/sq ft .

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lighting and provide routine repairs.

D. Permanent building lighting may be utilized during construction.

1.05 TEMPORARY HEATING

A. Cost of Energy: By Owner. Contractor to coordinate utilities

B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.

C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

D. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

1.06 TEMPORARY COOLING

A. Cost of Energy: By Owner. Contractor to coordinate utilities

B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.

1.07 TEMPORARY VENTILATION

A. Existing ventilation equipment may not be used.

1.08 TEMPORARY WATER SERVICE

A. Cost of Energy: By Owner. Contractor to coordinate utilities

B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.

C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 54 00
CONSTRUCTION AIDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Section 01 41 00 - Basic Regulatory Requirements

B. Section 01 50 00 - Temporary Facilities and Controls

1.02 RELATED REQUIREMENTS

A. Furnish, install and maintain required construction aids, and remove upon completion of work.

PART 2 PRODUCTS

2.01 PRODUCTS

A. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

B. Provide construction aids and equipment requirements by personnel and to facilitate the execution of work; scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment.

C. Maintain all facilities and equipment in a first class condition.

D. Provide temporary weather tight enclosure of exterior walls for successive areas of the building as work progresses. As necessary to provide acceptable working conditions, provide weather protection for interior materials, allow for effective temporary heating, and prevent entry of unauthorized persons.
   1. Provide temporary exterior doors with self-closing hardware and padlocks.
   2. Other enclosures shall be removable as necessary for work and for handling of materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Review site conditions and inform the Designer of any factors which will affect construction procedures and construction aids, including adjacent properties and public facilities which may be affected by execution of the work.

B. Comply with Federal, State and Local Codes and Regulations.

C. Comply with applicable requirements specified in sections of Division 02 through 33.

D. Relocate construction aids as required by progress of construction, by storage of work requirements, and to accommodate legitimate requirements of Owner and other contractors employed at the site.

E. Completely remove temporary materials, equipment and services:
   1. When construction needs can be met by use of permanent construction.
   2. At completion of the project.

F. Clean and repair damage caused by installation or by use of temporary facilities.
   1. Remove foundations and underground installations for construction aids.
   2. Grade the areas of the site affected by temporary installations to required elevations and slopes, and clean the area.

G. Restore permanent facilities used for temporary purposes to specified condition or to conditions prior to when work commenced.

END OF SECTION

SECTION 01 55 00
VEHICULAR ACCESS AND PARKING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Access roads.

B. Parking.

C. Existing pavements and parking areas.

D. Permanent pavements and parking facilities.

E. Construction parking controls.

F. Traffic signs and signals.

G. Maintenance.

H. Removal, repair.

I. Mud from site vehicles.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary

B. Section 01 50 00 - Temporary Facilities and Controls

C. Section 01 58 13 - Temporary Project Signage

D. Section 31 20 00 - Earthwork

PART 2 PRODUCTS

2.01 SIGNS, SIGNALS, AND DEVICES

A. Post Mounted and Wall Mounted Traffic Control and Informational Signs: Specified in Section 01 58 13.

B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

C. Flag Person Equipment: As required by local jurisdictions.

PART 3 EXECUTION

3.01 PREPARATION

A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

3.02 ACCESS ROADS

A. Use of designated existing on-site streets and driveways for construction traffic is permitted.

B. Tracked vehicles not allowed on paved areas.

C. Extend and relocate as Work progress requires, provide detours as necessary for unimpeded traffic flow.

D. Location as indicated on Civil Drawings.

E. Provide unimpeded access for emergency vehicles. Maintain Min. 20'-0" foot width driveways with turning space between and around combustible materials. Cooperate with local fire officials and inspectors.

F. Provide and maintain access to fire hydrants free of obstructions.

3.03 PARKING

A. Arrange for temporary parking areas to accommodate use of construction personnel.

B. Locate as approved by Owner.

3.04 NEW PERMANENT PAVEMENTS

A. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

3.05 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.

B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.06 FLAG PERSONS

A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.07 TRAFFIC SIGNS AND SIGNALS

A. Relocate as Work progresses, to maintain effective traffic control.

3.08 MAINTENANCE

A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.

B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.09 REMOVAL, REPAIR

A. Repair existing facilities damaged by use, to original condition.

B. Repair all broken sidewalk and curbs damaged during construction.

C. Remove equipment and devices when no longer required.

D. Repair damage caused by installation.

3.10 MUD FROM SITE VEHICLES

A. Provide means of removing mud from vehicle wheels before entering streets.

END OF SECTION

SECTION 01 56 00

TEMPORARY BARRIERS

PART 1 - GENERAL

1.01 WORK INCLUDES:

A. Scope - Construct and maintain substantial barricades and fences as shall be required for the protection of all designated areas, trees and plant material to remain. Fenced area shall be at the drip line of trees.

B. Silt fencing for SWPPP to be addressed by Civil Engineering & landscape documents & specifications. Contractor to maintain those barriers in a similar manner on a constant basis. Reference state environmental guidelines for additional maintenance requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide 6'-0" temporary chain link fence with mesh fabric in locations as shown on civil drawings.

B. Orange security mesh, Sentry Secura by Tenax Corporation min. of 6'-0" in height or Architect approved equal. Metal posts to be at 6'-0" min
   1. Fencing to be in rolls of 100'-0" lengths.
   2. Material to be high density polyethylene (HDPE), ultraviolet resistant, fully stabilized.
   3. Temperature range for this material is -60 degrees F to 180 degrees F
   4. Tensile Yield = 3,200 p.s.i., Ultimate Tensile Strength = 2,600 p.s.i.
   5. Nominal mesh opening 3" x 1 1/4", weight approx. 14 lbs per roll

C. 4 x 4 treated wood posts at entrances. Posts to be a min. of 6'-0" in length at adequate depth to facilitate control of the drive areas.

D. Plastic zip ties recommended and supplied by manufacturer for particular application.

PART 3 - EXECUTION

3.01 INSTALLATION AND WORKMANSHIP

A. All material to be new and not reused from another construction project.
   1. All work under this heading shall be done by competent personnel. Contractor's work force to be adequately supervised.
   2. Remove all barriers at the completion of the work and clean up area to leave it in a clean, neat, orderly condition.

B. If engineer specified a specific fence installation, those supercede the recommendations below.

C. Installation
   1. Posts to be installed at no more than 6'-0" apart.
   2. Posts to be installed a min. of 2'-0" into the earth or as necessary to ensure stability for the purpose required.
   3. Metal U post and or Rebar not recommended as supports for safety fencing.
   4. Safety fencing to be pulled taught and secure to posts. Fencing to be attached with plastic zip ties. Loop the ties through the available holes or "teeth" in the post to prevent the fence from sliding down the post.
   5. For additional longevity, pull the safety fence taught and secure between flat side of the posts. When necessary, suspend the mesh fencing from a wire strung between the posts. Wire to be weaved through the mesh. Wire to be secured through both ends of the posts.
   6. To connect fence sections, overlap two ends by at least 6" and weave a wood slat through the overlapped strands. Secure the joined area to the post.

END OF SECTION

SECTION 01 57 21
INDOOR AIR QUALITY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Construction procedures to promote adequate indoor air quality before, during & after construction.

1.02 RELATED REQUIREMENTS

A. Section 01 40 00 - Quality Requirements

B. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC

1.03 PROJECT GOALS

A. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
   1. Cleaning of ductwork is not contemplated under this Contract.
   2. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.

B. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
   1. Furnish products meeting the specifications.
   2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

1.04 REFERENCE STANDARDS

A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2007.

B. ASHRAE Std 62.1 - Ventilation For Acceptable Indoor Air Quality; 2007 (errata 2008).

C. SMACNA (OCC) - IAQ Guideline for Occupied Buildings Under Construction; 2007.

1.05 DEFINITIONS

A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.

B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.

C. Particulates: Dust, dirt, and other airborne solid matter.

D. Wet Work: Concrete, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Indoor Air Quality Management Plan: Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA IAQ Guidelines for Occupied Buildings Under Construction as a guide.
   1. Submit not less than 60 days before enclosure of building.
   2. Identify potential sources of odor and dust.
   3. Identify construction activities likely to produce odor or dust.
   4. Identify areas of project potentially affected.
   5. Evaluate potential problems by severity and describe methods of control.
   6. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
   7. Describe cleaning and dust control procedures.
   8. Describe coordination with commissioning procedures.

C. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.

D. Duct and Terminal Unit Inspection Report.

PART 3 EXECUTION

2.01 CONSTRUCTION PROCEDURES

A. Prevent the absorption of moisture and humidity by adsorptive materials by:
   1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
   2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
   3. Provide sufficient ventilation for drying within reasonable time frame.

B. Begin construction ventilation when building is substantially enclosed.

C. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems for the duration; remove dust and dirt completely before restarting systems.

D. HVAC equipment and supply air ductwork may be used for ventilation during construction:
   1. Operate HVAC system on 100 percent outside air, with 1.5 air changes per hour, minimum.
   2. Ensure that air filters are correctly installed prior to starting use; replace filters when they lose efficiency.

E. Do not store construction materials or waste in mechanical or electrical rooms.

F. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
   1. Inspect duct intakes, return air grilles, and terminal units for dust.
   2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
   3. Clean tops of doors and frames.
   4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
   5. Clean return plenums of air handling units.
   6. Remove intake filters last, after cleaning is complete.

G. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.

H. Use other relevant recommendations of SMACNA IAQ Guideline for Occupied Buildings Under Construction for avoiding unnecessary contamination due to construction procedures.

I. Smoking or use of tobacco products in the building (including chewing tobacco) is prohibited. Contractor to designate an area outside the project for smoking / use of tobacco. Location of designated tobacco use area to be a minimum of 25'-0" away from entrances, intakes or windows.

J. Ductwork to be covered w/ plastic sheeting after installation. Limit dust & particulate matter from entering the ducts.

K. Ductwork & mechanical components stored on site are to be covered w/ plastic sheeting and protected prior to installation.

END OF SECTION

SECTION 01 58 13
TEMPORARY PROJECT SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project identification sign.

B. Project informational signs.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary

B. Section 01 30 00 - Administrative Requirements

1.03 QUALITY ASSURANCE

A. Design sign and structure to withstand 50 miles/hr wind velocity.

B. Sign Painter: Experienced as a professional sign painter for minimum three years.

C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Show content, layout, lettering, color, sizes and grades of members.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

A. Structure and Framing: New, wood, structurally adequate. Sign posts are to be a minimum of 4" x 4" . Sign framing to be composed of 2" x 4' (or stronger) components.

B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, standard large sizes to minimize joints.

C. Rough Hardware: Galvanized.

D. Paint and Primers: Exterior quality, two coats; sign background of designer designated, owner approved color to be determined.

E. Lettering: Exterior quality paint, contrasting colors.

2.02 PROJECT IDENTIFICATION SIGN

A. Two painted signs mounted in a V-shape, bottom 3 inches above ground. Text and graphics by designer and approved by owner. Signs to be 4'-0" x 4'-8" x 3/4". Allow for (1) location.

B. Content:
   1. Building Rendering.
   2. Project number, title, and name of Owner as indicated on Contract Documents.
   3. Names and titles of Architect and Consultants and logos.
   4. Name of Contractor.
   5. Houston High School logo.
   6. Final Design to be determined by Fleming.

C. Graphic Design, Colors, Style of Lettering: Designated by Designer.

2.03 PROJECT INFORMATIONAL SIGNS

A. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering to provide legibility at 100 foot distance.

B. Provide at each field office, storage shed, and directional signs to direct traffic into and within site. Relocate as Work progress requires.

C. Provide municipal traffic agency directional traffic signs to and within site.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.

B. Erect at designated locations.

C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

D. Install sign surface plumb and level, with butt joints. Anchor securely.

E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

3.03 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION

SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Pre-installation meetings.

C. Cutting and patching.

D. Surveying for laying out the work.

E. Cleaning and protection.

F. Starting of systems and equipment.

G. Demonstration and instruction of Owner personnel.

H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

B. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.

C. Section 01 50 00 - Temporary Facilities and Controls: Temporary exterior enclosures.

D. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
   2. Identify demolition firm and submit qualifications.
   3. Include a summary of safety procedures.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.

1.04 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

1.05 PROJECT CONDITIONS

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

E. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

F. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Sections 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

E. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

F. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

G. Utilize recognized engineering survey practices.

H. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.

I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

J. Periodically verify layouts by same means.

K. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. Provide temporary connections as required to maintain existing systems in service.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
   1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
   2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
   3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
   4. Trim existing wood doors to remain as necessary to clear new floor finish. Refinish trim as required.

H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

I. Refinish existing surfaces as indicated:
   1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
   2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
   3. Patch as specified for patching new work.

J. Clean existing systems and equipment.

K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

L. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. See Alterations article above for additional requirements.

B. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.

C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing.

D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

E. Restore work with new products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.

H. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

I. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

J. Make neat transitions. Patch work to match adjacent work in texture and appearance.

K. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

3.12 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.13 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

D. Clean filters of operating equipment.

E. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

F. Clean site; sweep paved areas, rake clean landscaped surfaces.

G. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 01 74 00

CLEANING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 01 Specifications apply to work of this section.

1.02 GENERAL

A. Execute cleaning, during progress of the work, and at completion of the work, as required by General Conditions.

B. Related Requirements in other parts of the Project Manual:
   1. Conditions of the Contract.

C. Related Requirements specified in other sections:
   1. Section 01 10 00 - Summary
   2. Section 01 74 19 - Construction Waste Management and Disposal
   3. Cleaning for specific products of work: The specification section for that work.

D. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 PRODUCTS

2.01 PRODUCTS

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 EXECUTION

A. Execute daily cleaning to keep the work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris resulting from construction operations.

B. Provide on site containers for the collection of waste materials, debris and rubbish.

C. Remove waste materials, debris and rubbish from the site periodically and dispose at a legal disposal area away from the site.

D. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

E. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly coated surfaces.

F. Employ skilled cleaning personnel for final cleaning.

G. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces, including toilet fixtures, accessories, doors, windows and equipment.

H. Wash and shine glazing and mirrors.

I. Polish glossy surfaces to a clean shine.

J. Ventilating Systems:
   1. Clean permanent filters and replace disposable filters if units were operated during construction.
   2. Clean ducts, blowers and coils if units were operated without filters during construction.

K. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

L. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight exposed interior and exterior surfaces, and all work areas, to verify that the entire work is clean.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

E. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.

F. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

G. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary

B. Section 01 50 00 - Temporary Facilities and Controls

C. Section 01 70 00 - Execution & Closeout Requirements

D. Section 31 10 00 - Site Clearing

1.03 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements.

B. Landfill Alternatives Proposal: Within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner, submit a projection of trash/waste that will require disposal and alternatives to landfilling, with net costs.
   1. Submit to Designer for Owner's review and approval.
   2. Include an analysis of trash/waste to be generated and landfill options as specified for Waste Management Plan described below.
   3. Describe as many alternatives to landfilling as possible:
      a. List each material proposed to be salvaged, reused, or recycled.
      b. List the proposed local market for each material.
      c. State the estimated net cost resulting from each alternative, after subtracting revenue from sale of recycled or salvaged materials and landfill tipping fees saved due to diversion of materials from the landfill.
   4. Provide alternatives to landfilling for at least the following materials:
      a. Aluminum and plastic beverage containers.
      b. Corrugated cardboard.
      c. Wood pallets.
      d. Land clearing debris, including brush, branches, logs, and stumps.
      e. Concrete.
      f. Bricks.
      g. Concrete masonry units.
      h. Asphalt paving.
      i. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.

C. Submit Waste Management Plan within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to landfilling.

D. Waste Management Plan: Include the following information:
   1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
   2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
   3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
      a. State the estimated net cost, versus landfill disposal.
   4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.

5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.

E. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
2. Submit Report on a form acceptable to Owner.
3. Landfill Disposal: Include the following information:
   a. Identification of material.
   b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
   c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
4. Incinerator Disposal: Include the following information:
   a. Identification of material.
   b. Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.
   c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
5. Recycled and Salvaged Materials: Include the following information for each:
   a. Identification of material, including those retrieved by installer for use on other projects.
   b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
   c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
   d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
6. Material Reused on Project: Include the following information for each:
   a. Amount, in tons or cubic yards.
   b. Include weight tickets as evidence of quantity.
7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 50 00 for additional requirements related to trash/waste collection and removal of facilities and services.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Designer.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Pre-construction meeting.
   2. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 00 72 00 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Section 01 78 00 - Execution & Closeout Requirements.

D. Individual Product Sections: Specific requirements for operation and maintenance data.

E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS (SUBMIT ONE ELECTRONIC FILE OF ALL INFORMATION REQUIRED, ALONG WITH FINAL 2 SETS OF PRINTED SUBMITTALS).

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Field changes of dimension and detail.
   3. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Provide control diagrams by controls manufacturer as installed.

J. Include test and balancing reports.

K. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

D. Prepare data in the form of an instructional manual.

E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

L. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

M. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Form-facing material for cast-in-place concrete.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

A. As-Cast Surface Form-Facing Material:

1. Provide continuous, true, and smooth concrete surfaces.
2. Furnish in largest practicable sizes to minimize number of joints.
3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 03 30 00 "Cast-In-Place Concrete, and as follows:
   a. Plywood, metal, or other approved panel materials.
   b. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
      1) APA HDO (high-density overlay).
      2) APA MDO (medium-density overlay); mill-release agent treated and edge sealed.
      3) APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
      4) APA Plyform Class I, B-B or better; mill oiled and edge sealed.

2.02 RELATED MATERIALS

A. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
2. Form release agent for form liners shall be acceptable to form liner manufacturer.

F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

PART 3 - EXECUTION

3.01 INSTALLATION OF FORMWORK

A. Comply with ACI 301.

B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 03 30 00 "Cast-In-Place Concrete" for as-cast finishes.

C. Limit concrete surface irregularities as follows:

1. Surface Finish-1.0: ACI 117 Class D, 1 inch.
2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch.
3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch.

D. Construct forms tight enough to prevent loss of concrete mortar.

1. Minimize joints.
2. Exposed Concrete: Symmetrically align joints in forms.

E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.

1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
3. Install keyways, reglets, recesses, and other accessories, for easy removal.

F. Do not use rust-stained, steel, form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.

1. Provide and secure units to support screed strips.
2. Use strike-off templates or compacting-type screeds.

H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.

1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.

2. Locate temporary openings in forms at inconspicuous locations.

I. Chamfer exterior corners and edges of permanently exposed concrete.

J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.

K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.

1. Determine sizes and locations from trades providing such items.
2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.

L. Construction and Movement Joints:

1. Construct joints true to line with faces perpendicular to surface plane of concrete.
2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
3. Place joints perpendicular to main reinforcement.
4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
   a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings.
   a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.

1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
5. Clean embedded items immediately prior to concrete placement.

3.03 INSTALLATION OF WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm.

1. Install in longest lengths practicable.
2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
3. Allow clearance between waterstop and reinforcing steel of not less than 2 times the largest concrete aggregate size specified in Section 03 30 00 "Cast-In-Place Concrete."
4. Secure waterstops in correct position at 12 inches on center.
5. Field fabricate joints in accordance with manufacturer's instructions using heat welding.
   a. Miter corners, intersections, and directional changes in waterstops.
   b. Align center bulbs.
6. Clean waterstops immediately prior to placement of concrete.
7. Support and protect exposed waterstops during progress of the Work.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated on Drawings, according to manufacturer's written instructions, by adhesive bonding, mechanically fastening, and firmly pressing into place.

1. Install in longest lengths practicable.
2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
3. Protect exposed waterstops during progress of the Work.

3.04 SHORING AND RESHORING INSTALLATION

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

END OF SECTION

SECTION 03 20 00
CONCRETE REINFORCING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

1.2 ACTION SUBMITTALS

A. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60 Grade 100, deformed.

B. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.2 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
2. Stagger splices in accordance with ACI 318.
3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.

G. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
   a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.
2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement.
2. Continue reinforcement across construction joints unless otherwise indicated.
3. Do not continue reinforcement through sides of strip placements of floors and slabs.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 03 10 00 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
2. Section 03 20 00 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
3. Section 31 20 00 "Earth Moving" for drainage fill under slabs-on-ground.

2.01 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

3.01 ACTION SUBMITTALS

A. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

B. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
    a. Location of construction joints is subject to approval of the Architect.

4.01 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

5.01 QUALITY ASSURANCE

6.01 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

7.01 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1.

PART 2 - PRODUCTS

1.01 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.01 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I.
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C33/C33M, coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:
   a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
   b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
   c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.
2. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C260/C260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride .

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.

E. Water and Water Used to Make Ice: ASTM C94/C94M, potable

3.01 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Total of Fly Ash or Other Pozzolans, Slag Cement: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass.
3. Total of Fly Ash or Other Pozzolans: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing admixture in pumped concrete,.

4.01 CONCRETE MIXTURES

A. Class A: Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: ACI 318 F0 .
2. Minimum Compressive Strength: As indicated at 28 days.
3. Maximum w/cm: 0.54.
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Slump Flow Limit:.
6. Air Content:
   a. Exposure Class F1:.
   b. Exposure Classes F2 and F3:.
7. Limit water-soluble, chloride-ion content in hardened concrete to percent by weight of cement.

B. Class C: Normal-weight concrete used for interior slabs-on-ground.

1. Exposure Class: ACI 318.
2. Minimum Compressive Strength: at 28 days.
3. Maximum w/cm:.
4. Minimum Cementitious Materials Content:.
5. Slump Limit:.
6. Slump Flow Limit:.
7. Air Content:
   a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

8. Limit water-soluble, chloride-ion content in hardened concrete to percent by weight of cement.

5.01 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

PART 3 - EXECUTION

1.01 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

2.01 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.
   a. Continue reinforcement across construction joints unless otherwise indicated.
   b. Do not continue reinforcement through sides of strip placements of floors and slabs.
3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action

does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

3.01 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.

4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

4.01 FINISHING FORMED SURFACES

A. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

5.01 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.

6.01 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.

2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 6 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.
   a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   b. Cast anchor-bolt insert into bases.
   c. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Screed, tamp, and trowel finish concrete surfaces.

7.01 TOLERANCES

A. Conform to ACI 117.

8.01 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
   a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
      1) Project name.
      2) Name of testing agency.
      3) Names and certification numbers of field and laboratory technicians performing inspections and testing.

4) Name of concrete manufacturer.
5) Date and time of inspection, sampling, and field testing.
6) Date and time of concrete placement.
7) Location in Work of concrete represented by samples.
8) Date and time sample was obtained.
9) Truck and batch ticket numbers.
10) Design compressive strength at 28 days.
11) Concrete mixture designation, proportions, and materials.
12) Field test results.
13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

B. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

C. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
   a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M:
   a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   b. Perform additional tests when concrete consistency appears to change.
3. Slump Flow: ASTM C1611/C1611M:
   a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   b. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; .
   a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C1064/C1064M:
   a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.

a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C31/C31M:
   a. Cast and laboratory cure two sets of three6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
   b. Cast, initial cure, and field cure two sets of three standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C39/C39M.
   a. Test one set of three laboratory-cured specimens at seven days and one set of two specimens at 28 days.
   b. Test one set of three field-cured specimens at seven days and one set of two specimens at 28 days.
   c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:
    a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
       1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 48 hours of completion of floor finishing and promptly report test results to Architect.

9.01 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.

7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION

SECTION 04 05 11
MORTAR AND MASONRY GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

1.02 RELATED REQUIREMENTS

A. Section 04 20 00 - Unit Masonry

B. Section 08 11 13 - Hollow Metal Doors and Frames

1.03 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.

B. ACI 530.1/ASCE 6/TMS 602 - Specification for Masonry Structures; American Concrete Institute International; 2005.

C. ASTM C5 - Standard Specification for Quicklime for Structural Purposes; 2010.

D. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.

E. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

F. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.

G. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

H. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).

I. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.

J. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2011b.

K. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.

L. ASTM C476 - Standard Specification for Grout for Masonry; 2010.

M. ASTM C 595 - Standard Specification for Blended Hydraulic Cements; 2005.

N. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.

O. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.

P. ASTM C1019 - Standard Test Method for Sampling and Testing Grout; 2013.

Q. ASTM C1142 - Standard Specification for Extended Life Mortar for Unit Masonry; 1995 (Reapproved 2013).

R. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry; 2010.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.

C. Samples: Submit two samples of mortar, illustrating mortar color and color range.

D. Reports: Submit reports on mortar indicating compliance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.

E. Reports: Submit reports on grout indicating compliance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
   1. Maintain one copy of each document on project site.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.07 FIELD CONDITIONS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Masonry Cement: ASTM C91, for general and high strength uses. The free alkali content shall be 0.50 percent or less. In seismic performance category D neither type N at mortar nor masonry cement shall be used as part of the lateral force resisting system.

B. Portland Cement: ASTM C150, Type I, II, or III; color as required to produce approved color sample. The free alkali content shall be 0.05 percent or less.

C. Mortar: ASTM C387 commercially prepared type, mortar type N, using gray or white cement, as required by project conditions.

D. Hydrated Lime: ASTM C207, Type N.

E. Quicklime: ASTM C5, non-hydraulic type.

F. Mortar Aggregate: ASTM C144 standard masonry type clean, dry and protected against dampness, freezing and foreign matter.

G. Grout Aggregate: ASTM C404.

H. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
   1. Color(s): As selected by Architect from manufacturer's full range.
   2. Manufacturers:
      a. Davis Colors: www.daviscolors.com.
      b. Lambert Corporation: www.lambertusa.com.
      c. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

I. Water: Clean and potable.

J. Accelerating Admixture: Nonchloride type for use in cold weather.

K. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.

L. Bonding Agent: Latex type.

2.02 MORTAR MIXES

A. Mortar for Unit Masonry: ASTM C270, Property Specification.
   1. Exterior, loadbearing masonry: Type S.
   2. Interior, loadbearing masonry: Type S.

2.03 MORTAR MIXING

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.

B. Maintain sand uniformly damp immediately before the mixing process.

C. Do not use anti-freeze compounds to lower the freezing point of mortar.

D. If water is lost by evaporation, re-temper only within two hours of mixing.

E. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

2.04 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C94M.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

D. Do not use anti-freeze compounds to lower the freezing point of grout.

2.05 PRECONSTRUCTION TESTING

A. Testing will be conducted by an independent test agency, in accordance with provisions of Sections 01 40 00 and 01 45 33. Testing to be paid for by contractor.

B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.

PART 3 EXECUTION

3.01 PREPARATION

A. Apply bonding agent to existing concrete surfaces.

B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.02 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

B. Work grout into masonry cores and cavities to eliminate voids.

C. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.

D. Do not displace reinforcement while placing grout.

E. Remove excess mortar from grout spaces.

3.03 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of contract documents.

B. Low-Lift Grouting:
   1. Limit height of pours to 12 inches.
   2. Limit height of masonry to 16 inches above each pour.
   3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
   4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

C. High-Lift Grouting:
   1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
   2. Hollow Masonry: Limit lifts to maximum 4 feet and pours to maximum height of 24 feet.
   3. Place grout for spanning elements in single, continuous pour.

3.04 FIELD QUALITY CONTROL

A. An independent testing agency will perform field tests, in accordance with provisions of Sections 01 40 00 and 01 45 33.

B. Test and evaluate mortar in accordance with ASTM C780 procedures.

C. Test and evaluate grout in accordance with ASTM C1019 procedures.

END OF SECTION

SECTION 04 20 00

BRICK UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Brick Units.

B. Reinforcement and Anchorage.

C. Flashings.

D. Accessories.

E. Lintels.

1.02 RELATED REQUIREMENTS

A. Section 01 25 13 - Product Substitution Procedures

B. Section 03 30 00 - Cast-in-Place Concrete

C. Section 04 05 11 - Mortar and Masonry Grout.

D. Section 05 50 00 - Metal Fabrications & Castings

E. Section 06 10 00 - Rough Carpentry

F. Section 07 21 00 - Thermal Insulation

G. Section 07 27 26 - Fluid Applied Membrane Weather Barriers

H. Section 07 62 00 - Sheet Metal Flashing and Trim

I. Section 07 84 00 - Firestopping

J. Section 07 90 05 - Joint Sealers

K. Section 09 90 00 - Painting and Coating

1.03 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.

B. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 2008.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a (Reapproved 2014).

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

F. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale); 2013.

G. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.

H. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.

I. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2011.

J. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.

K. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

L. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).

M. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.

N. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.

O. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.

P. ASTM C476 - Standard Specification for Grout for Masonry; 2010.

Q. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale); 2014.

R. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.

S. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2013.

T. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.

U. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.

V. IMIAWC (CW) - Recommended Practices & Guide Specifications for Cold Weather Masonry Construction; International Masonry Industry All-Weather Council; 1993.

W. UL (FRD) - Fire Resistance Directory; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Samples: Submit one sample of facing brick, engineering stone, and CMU units to illustrate color, texture, and extremes of color range.

D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

B. Fire Rated Assemblies: Conform to applicable code for requirements for fire rated masonry construction.

1.07 MOCK-UPS

A. Construct different types of masonry walls as a mock-up panel each sized 4 feet long by 4 feet high; include brick, block, water table, mortar, thru wall flashing, weeps, mortar net, and accessories in mock-up.

B. Locate where directed.

C. Mock-ups may be included as part of finished work.

1.08 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 BRICK UNITS

A. Acceptable Manufacturers:
   1. General Shale Brick: www.generalshale.com.
   2. Acme Brick: www.brick.com
   3. Substitutions allowed but must match existing brick.
      a. Substitutions: 01 25 13 - Product Substitution Procedures and 01 25 33 - Product Substitution Request Form

B. Facing Brick: ASTM C216, Type FBX, Grade SW, minimum average compressive strength: 3000 psi.
   1. General Shale M/S Red Range Semi Smooth - Modular #40 - 6040022685 (Rome, Georgia, Plant 40)
   2. Acme Brick, Rustic White

2.02 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 05 11.

2.03 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:
   1. Dur-O-Wal: www.dur-o-wal.com.
   2. Hohmann & Barnard, Inc: www.h-b.com.
   3. WIRE-BOND: www.wirebond.com
   4. Substitutions: 01 25 13 - Product Substitution Procedures and 01 25 33 - Product Substitution Request Form

B. Hot dip galvanized wire: ASTM A82, hot dip galvanized after fabrication to ASTM A153.

C. Hot dip galvanized metal anchors: ASTM A366, hot dip galvanized after fabrication to ASTM A153.

D. Multiple Wythe Joint Reinforcement: Ladder type; fabricated with moisture drip; ASTM A 82/A 82M steel wire, hot dip galvanized after fabrication to ASTM A153/153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
   1. Coordinate with engineered stone manufacturer to ensure compatibility.

E. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup. Fabricate sheet metal anchor sections and other sheet metal parts from 12 gauge metal, hot dip galvanized to ASTM A153.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
   3. Vertical adjustment: Not less than 3-1/2 inches.
   4. Seismic Feature: Provide lip, hook, or clip on end of wire ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch diameter.
   5. Coordinate with engineered stone manufacturer to ensure compatibility.

F. Steel angles: Structural steel angles for brick support should be ASTM A36 steel hot dipped galvanized angle. Size as shown on drawings. See Section 05 50 00 Metal Fabrications.

2.04 FLASHINGS (CONCEALED)

A. Refer to Specifications Section 07 62 00 Sheet Metal Flashing & Trim.

B. EPDM Flexible Flashing: ASTM D4637, Type I, nonreinforced 0.040 inch thick, 6" overlapping seams with tape joints.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc.; EPRA-MAX EPDM Thru-Wall Flashing; www.h-b.com

b. Heckmann Building Products, Inc.; Product: #81: EPDM Thru-Wall Flashing; www.heckmannbuildingprods.com
c. Wirebond: EPDM Thru-Wall Flashing; www.wirebond.com
d. Firestone: FlashGard thru-wall flashing; www.firestonesp.com
e. Substitutions: 01 25 13 - Product Substitution Procedures and 01 25 33 - Product Substitution Request Form

C. Lap Sealant: Polyurethane, or type as recommended by flashing manufacturer, and as specified in Section 07 90 05.

D. Termination Bars: 0.125 inch stainless steel with caulk tray, pre-drilled at 8 inches o.c.

2.05 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
1. Manufacturers:
a. Dur-O-Wal: www.dur-o-wal.com.
b. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com.
c. WIRE-BOND: www.wirebond.com
d. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; 3 inches (76.2mm) wide x by maximum lengths available.
1. Manufacturers:
a. Dur-O-Wal: www.dur-o-wal.com.
b. Hohmann & Barnard, Inc (including Dur -O-Wal brand): www.h-b.com.
c. WIRE-BOND: www.wirebond.com/#sle.
d. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
a. Manufacturers:
1) Advanced Building Products Inc; Mortar Break: www.advancedflashing.com
2) Mortar Net USA, Ltd; "Wall Defender"; www.mortarnet.com.
3) CavClear: www.cavclear.com
4) Hohmann & Barnard: www.h-b.com
5) Substitutions: 01 25 13 - Product Substitution Procedures and 01 25 33 - Product Substitution Request Form

D. Nailing Strips: Softwood lumber, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.

E. Weeps: full head with cell vents
1. One-piece cellular, flexible extrusion made from UV-resistant polypropylene copolymer, designed to fill head joint with outside face held back 1/8 inch from exterior face of brick. Standard size 3/8" x 2 1/2" x 3 3/8", conforms with ASTM D2240, ASTM D790B, ASTM D638, and ASTM D1238B.
2. Manufacturers:
a. CavClear: www.cavclear.com
b. Mortar Net USA, Ltd: www.mortarnet.com.
c. Hohmann & Barnard: www.h-b.com
d. Substitutions: 01 25 13 - Product Substitution Procedures and 01 25 33 - Product Substitution Request Form

F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

G. Lintels: See structural for size and locations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Brick Units:
   1. Bond: Running.
   2. Coursing: Three units and three mortar joints to equal 8 inches.
   3. Mortar Joints: Concave.

D. Joints:
   1. Horizontal and vertical face joints shall be a nominal thickness of 3/8". Joint widths wider than 3/8" shall be approved by the Architect prior to construction of masonry. All joints shall be uniform.
      a. Shove vertical joints tight.
      b. Tool concave joints (using jointing tool) in exposed surfaces and below grade when thumb-print hard.
      c. Flush cut all joints not tooled.
      d. Fill horizontal joints between top of masonry and underside of overhead elements.
   2. Allowable tolerance:
      a. Bed joints:
         1) Thickness3/8" -/+ 1/16"
         2) Level3/8" -/+ 1/8" in 10', 1/4" max
      b. Head joints:
         1) Thickness-/+ 1/16"
         2) Vertical alignment-/+ 1/8" in 10', 1/4" max
      c. Wall thickness, multiple wythes-/+ 1/4"
      d. Wall alignment:
         1) Vertical-/+ 1/8" in 10', 1/4" max
         2) Horizontal -/+ 1/8" in 10', 1/4" max

3.04 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar and mortar smears as work progresses.

E. Interlock intersections and external corners.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

I. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

3.05 WEEPS/CAVITY VENTS

A. Install full head weeps in veneer and cavity walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

3.06 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.07 REINFORCEMENT AND ANCHORAGE - GENERAL

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

3.08 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

E. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 36 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

F. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

G. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

3.09 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 6 inches into adjacent masonry or turn up at least 8 inches to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Extend EPDM flashings to within 1/4 inch of exterior face of masonry.

C. Lap end joints of flashings at least 4 inches and seal watertight with 6" tape at EPDM or with sealant recommended by manufacturer at other flashing.

3.10 LINTELS

A. Install loose steel lintels over openings.

B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.

3.11 GROUTED COMPONENTS

A. Reinforce bond beams as shown on structural drawings.

B. Lap splices minimum 24 bar diameters.

C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

D. Place and consolidate grout fill without displacing reinforcing.

E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.12 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

C. Install expansion joints in brick and engineered stone as follows:
   1. maximum 25'-0" on center;
   2. maximum 4'-0" from building corners (one corner, not both); and
   3. at all offsets, returns, openings, and intersections with dissimilar materials.
   4. per manufacturer's recommendations.

3.13 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

D. Protect built-in items from damage and mortar droppings.

3.14 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.15 CUTTING AND FITTING

A. Cut and fit for chases, pipes, and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

3.16 CLEANING

A. Cut out any defective joints and holes in exposed masonry and repoint with mortar.

B. Dry brush masonry surface after mortar has set at end of each day's work and after final pointing. Clean exposed, unglazed masonry with stiff brush and clear water.

C. Apply cleaning agent to sample wall area of 20 sq. ft. in location acceptable to the Designer, if cleaning by water does not produce satisfactory results:
   1. Do not proceed with cleaning until sample area is acceptable to the Designer.

2. Follow manufacturer's recommendation for use of cleaning agent. Thoroughly wet surface of masonry on which no efflorescence appears before using cleaning agent. Scrub with acceptable cleaning agent and immediately rise with clear water. Work small sections at a time, working from top to bottom.
3. Protect sash, metal lintels, and other materials which may corrode when masonry is cleaned with recommended solution.
4. Remove efflorescence in accordance with brick manufacturer's recommendations.

D. Leave work area and surrounding surfaces clean and free of mortar spots, droppings and broken masonry.

E. Remove debris.

3.17 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 04 22 00
CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Steel reinforcing bars.

2.01 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

3.01 ACTION SUBMITTALS

A. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

4.01 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product. For masonry units, include data on material properties.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

5.01 FIELD CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

1.01 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.01 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. BASF Corporation.
   b. Euclid Chemical Company (The); an RPM company.

C. CMUs: ASTM C90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
2. Density Classification: Normal weight unless otherwise indicated.

3.01 CONCRETE LINTELS

A. Concrete Lintels: ASTM C1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.

4.01 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C91/C91M.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Cemex S.A.B. de C.V.

b. Essroc.
c. Holcim (US) Inc.
d. Lafarge North America Inc.

E. Aggregate for Mortar: ASTM C144.

1. White-Mortar Aggregates: Natural white sand or crushed white stone.
2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

F. Aggregate for Grout: ASTM C404.

G. Water: Potable.

5.01 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Dur-O-Wal; a Hohmann & Barnard company.
   b. Heckmann Building Products, Inc.
   c. Hohmann & Barnard, Inc.
   d. Wire-Bond.

C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.

1. Interior Walls: Mill- galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized carbon steel.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Spacing of Cross Rods: Not more than 16 inches o.c.
6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

6.01 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
3. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized-steel wire.
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized-steel wire.

7.01 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch thick.
2. Copper: ASTM B370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. weight or 0.0216 inch thick or ASTM B370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. weight or 0.0162 inch thick.
3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
4. Fabricate metal expansion-joint strips from to shapes indicated.

B. Solder and Sealants for Sheet Metal Flashings: As specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

8.01 MISCELLANEOUS MASONRY ACCESSORIES

A. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

9.01 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime or masonry cement mortar.
4. For reinforced masonry, use portland cement-lime or masonry cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type M or Type S.
2. For reinforced masonry, use Type S.

3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.

D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

E. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

PART 3 - EXECUTION

1.01 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

2.01 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.01 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

F. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

4.01 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

5.01 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.

2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

6.01 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

7.01 FLASHING

A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

8.01 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 48 inches.

9.01 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

I. Prism Test: For each type of construction provided, according to ASTM C1314 at seven days and at 28 days.

10.01 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

11.01 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches of finished grade.

B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Structural steel.
2. Shear stud connectors.
3. Shrinkage-resistant grout.

2.01 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

3.01 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication of structural-steel components.

4.01 INFORMATIONAL SUBMITTALS

A. Welding certificates.

5.01 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

PART 2 - PRODUCTS

1.01 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:

1. ANSI/AISC 303.
2. ANSI/AISC 360.
3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

2.01 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A992/A992M.

B. Channels, Angles-Shapes: ASTM A36/A36M.

C. Plate and Bar: ASTM A36/A36M.

D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade B structural tubing.

E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.

F. Welding Electrodes: Comply with AWS requirements.

3.01 BOLTS AND CONNECTORS

A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with plain finish.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, heavy-hex head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish: Plain.

C. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

4.01 PRIMER

A. Steel Primer:

1. Comply with
2. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

5.01 SHRINKAGE-RESISTANT GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

6.01 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

B. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

7.01 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

8.01 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces unless indicated to be painted.
6. Surfaces enclosed in interior construction.

B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:

1. SSPC-SP 2.

C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner or in accordance with SSPC-SP 16.

D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

PART 3 - EXECUTION

1.01 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

2.01 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.

B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.

4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.

C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

3.01 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

4.01 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Bolted Connections: Inspect bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
    a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
        1) Liquid Penetrant Inspection: ASTM E165/E165M.
        2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
        3) Ultrasonic Inspection: ASTM E164.
        4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION

SECTION 05 21 00
STEEL JOIST FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. K-series steel joists.
2. K-series steel joist substitutes.
3. Joist accessories.

2.01 ACTION SUBMITTALS

A. Shop Drawings:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.

3.01 INFORMATIONAL SUBMITTALS

4.01 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

PART 2 - PRODUCTS

1.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. New Millennium Building Systems, LLC.
2. Valley Joist.
3. Vulcraft; Nucor Vulcraft Group.

2.01 PERFORMANCE REQUIREMENTS

3.01 K-SERIES STEEL JOISTS

A. Manufacture steel joists of type indicated according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

4.01 PRIMERS

A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

B. Primer: Provide shop primer that complies with

5.01 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Bridging: Fabricate as indicated and according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

C. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

PART 3 - EXECUTION

1.01 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using carbon-steel bolts.

E. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

END OF SECTION

SECTION 05 31 00
STEEL DECKING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Roof deck.

2.01 ACTION SUBMITTALS

A. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

PART 2 - PRODUCTS

1.01 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.01 ROOF DECK

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. New Millennium Building Systems, LLC.
2. Nucor Corp.
3. Valley Joist.

B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
   a. Color: Manufacturer's standard.
2. Deck Profile: Type WR, wide rib.
3. Profile Depth: 1-1/2 inches.
4. Design Uncoated-Steel Thickness: As indicated.

3.01 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

E. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

1.01 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

C. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

D. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

E. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

F. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

G. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

2.01 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on top surface of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 05 31 00

SECTION 05 40 00
COLD FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Includes all materials, labor and equipment necessary for the fabrication and erection of the cold formed metal framing for exterior wall framing, joists, and rafters, as indicated, all anchorages, bracings, furrings, etc., as may be required for a complete and permanent installation.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast in Place Concrete

B. Section 04 20 00 - Unit Masonry

C. Section 05 12 00 - Structural Steel

D. Section 06 10 00 - Rough Carpentry

E. Section 07 21 00 - Thermal Insulation

F. Section 08 43 13 - Aluminum Framed Storefront

G. Section 09 21 16 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

A. ASTM A 446, Standard Specification for Steel Sheet Zinc-Coated (Galvanized) by Hot-Dip Process, Structural (Physical) Quality.

B. American Iron and Steel Institute (AISI) Cold-Formed Steel Design Manual - Specification for the Design of Cold-Formed Steel Structural Members, latest edition.

C. AISC: Steel Construction Manual, American Institute of Steel Construction.

D. Applicable Building Code(s).

1.04 QUALITY ASSURANCE

A. Component Design - All Framing: Compute structural properties of framing members in accordance with the AISI Design Specification for Cold-Formed Steel Structural Members.
   1. The physical and structural properties published by approved supplier will be accepted; otherwise, these properties must be substantiated by calculations for loading stresses and deflections of the designed framing sealed by a professional engineer licensed in the State that the project is constructed.
   2. Framing: Loading for design purposes shall be as required by the governing building code and amendments thereto.

B. Fire-Rated Assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating, including those required for compliance with governing regulations, provide units that have been approved by governing authorities having jurisdiction.

C. Acceptable Manufacturers: The following manufacturers are acceptable for use on this project subject to compliance with project requirements:
   1. Inryco/Milcor
   2. Dietrich
   3. Substitute manufacturers in accordance with Sections 01 25 13 and 01 25 33.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures. Drawings shall show the following:
   1. Component details, framing openings, bearing, anchorage, loading, temporary bracing, types and locations of mechanical fasteners, finish and accessories and items required of other work for complete installations shall be indicated.
   2. Framing layouts shall be detailed.
   3. Manufacturer's instructions for securing studs to track and for other framing members.

4. Structural calculations as required by these specifications.

B. Sample Sections, 6 inches long, of studs and tracks shall be submitted.

1.06 FIELD MEASUREMENTS

A. Take all necessary field measurements to verify and/or supplement the dimensions shown on the Drawings. Furnish all necessary templates, roughing-in data and shall be responsible for verifying the proper execution and installation of the metal studs and adjacent work as the work progresses.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protect metal framing units from rust and damage. Deliver to the job site in manufacturer's unopened containers or bundles, fully identified with name, brand, type, and grade. Store off ground in a dry, well-ventilated space or protect with suitable waterproof coverings.

PART 2 PRODUCTS

2.01 MATERIALS

A. All components of the metal stud system shall be from a single national manufacturer.

B. Steel Framing - Wall Framing:
   1. Framing shall be formed of galvanized sheet steel (ASTM A 446), normally channel-shaped sections. Webs shall be solid or punched for wall framing only. Sides or faces shall be knurled, as required by project conditions. Depths, shapes, and widths shall be as shown on the drawings.
   2. 3-5/8" studs shall be 20 gauge for up to 15'-4" height.
   3. 6" and 8" studs shall be 18 gauge unless otherwise required.
   4. For 16 gauge and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 50,000 psi, ASTM A 446, Grade D.
   5. "C"-Shaped studs: Manufacturer's standard load-bearing unpunched steel studs of size, shape, and gauge indicated, with a minimum 1.625" flange and 0.5625" flange return lip.
   6. "C"-Shaped joists: Manufacturer's standard JW series standard load-bearing, unpunched steel joists of size, shape and gauge indicated, with a minimum 1.625" flange and 0.5625" flange return lip.
   7. "C-H"-Shaped studs: as required by U.L. listing to achieve fire rating.
   8. Tracks shall be formed galvanized steel, channel-shaped, same width as studs, for tight fit, and shall have solid webs. The gauge of track used shall be equal to or heavier than the gauge of stud used.

C. Accessories:
   1. Bracing, furring, and bridging shall be formed galvanized sheet steel, channel, strip, or bar shaped (ASTM A 446), as required by project conditions.
   2. Plates, gussets, and clip angles shall be galvanized formed or sheet steel, thickness determined for conditions encountered. Manufacturer's standard shapes shall be used if suitable to project conditions.

D. Fastenings: Provide fasteners with a minimum diameter and length required by the design for the particular attachment detail.
   1. Self-drilling, self-tapping screws, bolts, nuts, and washers shall have a minimum protective coating equivalent to standard plating (ASTM A 164 type NS). Penetration through joined materials shall be a minimum of three (3) exposed threads.
   2. Anchorage devices shall be power driven or powder actuated, drilled expansion bolts, or screws with sleeves.

E. Finishes - All members to be unpainted.
   1. Galvanizing shall meet ASTM A 90, 1.25 oz/sf.
   2. Primer used to touch up galvanized surfaces shall be manufacturer's standard or ZRC Cold Galvanizing Compound as manufactured by ZRC Chemical Products Company of Quincy, Massachusetts.

PART 3 EXECUTION

3.01 FABRICATION

A. Where shop fabricated assemblies are required, manufacturers/fabricators shall fabricate assemblies of sizes and profiles required, with joints fitted and secured, reinforced and braced to meet project requirements. Assemblies shall be fitted and assembled in largest practical sections for delivery to the project for installation.

B. Fastenings: Attach similar components by screw fasteners.
   1. Attach dissimilar components by bolting or screw fasteners as standard with manufacturer.
   2. Truss anchors shall be anchored to steel supports or cast in place for reinforced masonry walls and concrete substrates. The design and supply of the embeds for masonry and concrete substrates shall be by the truss manufacturer. Placement shall be in accordance with the truss manufacturer's shop drawings.

C. All abrasions to members from cutting shall be touched up with the specified primer.

3.02 ERECTION

A. Head and sill tracks shall be aligned as shown on drawings and secured into place with the specified fasteners at a maximum of 16" on center and no nearer than 4" from either end of the track.

B. Studs shall be placed on centers shown on plans, and not more than 2" from abutting walls and at each side of all openings. Studs must be connected to tracks using screws, in accordance with the approved shop drawings.

C. Corners shall be constructed using a minimum of three (3) studs. Provide for double studs at exhaust fan opening and other framed openings. Intermediate studs shall be installed above and below openings to match wall stud spacing.

D. Framing between studs for attachment of electrical boxes and other mechanical and electrical items must be installed.

E. Load bearing studs shall be erected in one piece, full length. Splicing and wire tying of framing components will not be permitted. Splices in the top of bottom chord of the truss members will not be permitted.

F. Erect the wall studs and brace and reinforce to meet design requirements. Studs shall be seated squarely in track with stud flanges abutting track flanges. Studs shall be plumbed, aligned, and squarely attached to flanges of top and bottom on both sides of tracks and securely attached to clip angles at intermediate slab edges where stud bypasses slab construction.

G. Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of the stud system.

H. Joists and rafters shall be located directly over bearing studs or a load distribution member shall be provided at the top track.

I. Provide web stiffeners at reaction points as shown on drawings.

J. Joist and rafter bridging shall be as shown on drawings.

K. End blocking shall be provided where joist/rafter ends are not otherwise restrained from rotation.

L. Provisions shall be made for erection stresses. Provide temporary alignment and bracing.

M. Provide deflection allowance below supported horizontal building framing in ceiling and head track for non-load-bearing framing in a method recommended by the manufacturer.

N. Framing must provide true and flat surfaces, ready to receive finishes.

3.03 CLEAN AND TOUCH-UP

A. Clean bolted connections and abraded areas and apply cold galvanizing compound to comply with ASTM A 780, except that the paint shall be brushed on or spray applied in multiple coats until a dry film thickness of 8 mils minimum has been achieved. A finish coat of aluminum paint shall be applied to provide color blend with the surrounding galvanizing where galvanized items are not painted.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.

1.2 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.

D. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.

E. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.

F. Zinc-Coated Steel Wire Rope: ASTM A741.

1. Wire Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

G. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A492, Type 316.

1. Wire Rope Fittings: Stainless steel connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

H. Steel Prestressing Strand: ASTM A416/A416M, Grade 270, low-relaxation, seven-wire, with 0.9-lb/sq. ft.zinc coating.

1. Steel Prestressing Strand Fittings: Hot-dip galvanized-steel anchors and connectors with capability to sustain, without failure, a load equal to minimum breaking strength of steel prestressing strand with which they are used.

I. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: As indicated.

J. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

K. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

L. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.

M. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

N. Bronze Extrusions: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze).

O. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (leaded red brass) or UNS No. C84400 (leaded semired brass).

P. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.2 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless steel fasteners for fastening aluminum stainless steel or nickel silver.
2. Provide bronze fasteners for fastening bronze.

B. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.

C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

D. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

2.3 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 8 inches from ends and corners of units and 24 inches o.c.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

B. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.

1. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches o.c.

C. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

2.6 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Galvanize loose steel lintels located in exterior walls.

C. Prime loose steel lintels located in exterior walls with

2.7 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

2.8 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with unless indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 09 96 00 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for ceiling hung toilet partitions operable partitions overhead doors and overhead grilles securely to, and rigidly brace from, building structure.

C. Anchor shelf angles securely to existing construction with expansion anchors.

D. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

3.3 INSTALLATION OF BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 REPAIRS

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

SECTION 05 51 10

FIXED ALUMINUM ACCESS LADDERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Fixed, wall mounted, vertical, aluminum, heavy duty with platform and return to rear of parapet ladders.

1.02 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry: Blocking in metal stud walls and partitions for anchorage of access ladders.

1.03 REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI A14.3 - Ladders, Fixed, Safety Requirements.

B. American Society for Testing and Materials (ASTM) Publications:
   1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
   2. ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.

1.04 SUBMITTALS

A. Provide in accordance with Section 01330 - Submittal Procedures:
   1. Product data for access ladders and accessories.
   2. Shop drawings showing elevations, dimensions, connections, and fabrication details.
   3. Installation and maintenance instructions.

1.05 QUALITY ASSURANCE

A. Access ladders shall be designed and installed to comply with ANSI A14.3. and OSHA 1910.27

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. UPNOVR, Inc., 3Crane Way, New Hampshire 03106; 603-625-8639.

B. Manufacturers of equivalent products submitted and approved in accordance with Section 012513 Product Substitution Procedures.

2.02 MATERIALS

A. Extruded aluminum: ASTM B221, Alloy 6063 Temper T-6, non-spark.

B. Sheet aluminum: ASTM B209 6063 Temper T-6.

C. Finish: Mill finished aluminum.

2.03 GENERAL FABRICATION

A. Field verify ladder dimensions prior to fabrication.

B. Fabricate to designs indicated on Drawings and to meet performance requirements specified in Paragraph 1.4.

C. Components shall be welded. Ladder shall not require field assembly.

2.04 VERTICAL FIXED ACCESS LADDER

A. Type: Fixed, wall mounted, vertical, aluminum, heavy duty with platform and return to rear of parapet ladder; Model No. U-203 as manufactured by UPNOVR, Inc.

B.

C. Nominal height: As indicated on Drawings.

D. Cross over span: As indicated on Drawings.

E. Side rails: 1-3/4 inches by 3 inches tubes with 1/8 inch wall thickness. Extend rails 42 inches above parapet. Provide rails on opposite side mounted to rear of parapet and extending 42 inches above parapet and below parapet to roof line.

F. Grab bars: Connect front and rear side rails with 4 pairs of 1-1/4 inches square tube grab bars with corrugated surfaces.

G. Platform: Provide cross over platform fabricated from 6 inches wide by 1-3/4 inches deep aluminum treads with corrugated surface.

H. Rungs: 1-1/4 inches square tube by 24 inches long with corrugated surfaces and capable of 1,000 pounds load. Space 12 inches on center. Attach rungs in centerline of side rails by welding.

2.05 ACCESSORIES

A. Support brackets:
   1. Wall brackets: Support ladder at top and bottom and at 48 inches maximum intermediate points with 2 by 1/4 inch minimum flat bar aluminum wall brackets. Allow 7 inches minimum clearance from wall to center line of rungs.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prior to fabrication, field verify required dimensions.

B. Coordinate provision of access ladder with provision of roof hatch specified in Section 07725 - Roof Hatch to ensure height and position of ladder is compatible with roof hatch curb.

C. Coordinate ladder installation with construction of CMU walls specified in Section 042200 - Concrete Unit Masonry to ensure block walls are adequately reinforced and cells grouted for attachment of brackets and support of ladder.

D. Insulate dissimilar metals to prevent electrolysis with bituminous paint or non-absorptive isolation pad to prevent contact.

3.02 INSTALLATION

A. Install ladder in accordance with reviewed shop drawings.

B. Position ladder such that side rails end 3 inches above floor and center of rungs are 7 inches from wall.

C. Securely anchor support brackets with fasteners of type and size recommended by manufacturer. Place wall brackets at top and bottom of ladder. Place intermediate wall brackets at 48 inches maximum.

D. Ensure ladder is vertical, plumb, and rigid.

E. After installation inspect ladder to verify proper, secure, and safe installation.

F. Clean ladder using clean water and mild detergent. Do not use abrasive agent, steel wool, or harsh chemicals. Rinse with clean water.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rough opening framing for doors, windows, and roof openings.
B. Sheathing.
C. Roofing nailers.
D. Preservative treated wood materials.
E. Fire retardant treated wood materials.
F. Communications and electrical room mounting boards.
G. Concealed wood blocking, nailers, and supports.
H. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications & Castings
B. Section 07 54 23 - TPO Membrane Roofing
C. Section 07 62 00 - Sheet Metal Flashing and Trim
D. Section 09 21 16 - Gypsum Board Assemblies
E. Section 10 28 00 - Toilet & Utility Accessories

1.03 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2009.
B. AFPA (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; American Forest and Paper Association; 2012.
C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
E. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board; 2012.
F. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
G. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010.
H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
I. AWPA C9 - Plywood -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association; 2003.
J. AWPA C20 - Structural Lumber -- Fire Retardant Treatment by Pressure Processes; American Wood-Preservers' Association; 2002.
K. AWPA C27 - Plywood -- Fire-Retardant Treatment by Pressure Processes; American Wood-Preservers' Association; 2002.
L. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
M. PS 1 - Structural Plywood; 2009.
N. PS 20 - American Softwood Lumber Standard; 2010.
O. SPIB (GR) - Grading Rules; 2014.
P. WWPA G-5 - Western Lumber Grading Rules; 2011.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials.

C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Species: Southern Pine, unless otherwise indicated.
   2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: Kiln-dry or MC15.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

A. Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I.

B. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, 5/8 inch Type X fire resistant.

C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

D. Other Applications:
   1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
   2. Other Locations: PS 1, C-D Plugged or better.

2.04 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   2. Drywall Screws: Bugle head, hardened steel, power driven type, length to achieve full penetration of sheathing substrate.
   3. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.

B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.

1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.

C. Sill Flashing: As specified in Section 07 62 00.

D. Water-Resistive Barrier: As specified in Section 07 27 26.

E. Roof Wood Blocking:
   1. Meet ES-1 and FM 1-49 requirements.
   2. Blocking to withstand 200 PLF applied in any direction.

2.05 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
   2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment:
   1. Manufacturers:
      a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
      b. Hoover Treated Wood Products, Inc: www.frtw.com.
      c. Osmose, Inc: www.osmose.com.
      d. Refer to Section 01 25 13 - Product Substitution Procedures and 01 25 33 - Product Substitution Request Form
   2. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Treat all exterior rough carpentry items.
      c. Do not use treated wood in direct contact with the ground.
   3. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. All interior rough carpentry items are to be fire retardant treated.
      c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:
   1. Manufacturers:
      a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
      b. Viance, LLC: www.treatedwood.com.
      c. Refer to Section 01 25 13 - Product Substitution Procedures and 01 25 33 - Product Substitution Request Form
   2. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
      a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
      b. Treat lumber exposed to weather.
      c. Treat lumber in contact with roofing, flashing, or waterproofing.

d. Treat lumber in contact with masonry or concrete.
e. Treat lumber less than 18 inches above grade.

3. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
   a. Treat plywood in contact with roofing, flashing, or waterproofing.
   b. Treat plywood in contact with masonry or concrete.
   c. Treat plywood less than 18 inches above grade.
4. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
   a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
   b. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Wood blocking attachment to comply with Factory Mutual Bulletin 1-49 and ANSI/SPRI ES-1.

B. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

F. Provide the following specific non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Tackboards and marker boards.
   8. Wall paneling and trim.
   9. Joints of rigid wall coverings that occur between studs.
   10. TV's, smart boards and flat screens.

3.04 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

C. NRCA (National Roofing Contractors Association) suggests the following guidelines when encountering treated wood:
   1. Carbon steel, aluminum and electroplated galvanized steel fasteners and connectors should not be used in contact with treated wood. Type 304 or Type 316 stainless-steel fasteners and connectors are recommended for maximum corrosion resistance.
   2. Fasteners with proprietary anti-corrosion coatings may be acceptable for use with treated wood. When considering the use of such proprietary coated fasteners and connectors, consult fastener manufacturers for specific information regarding the performances of their products in treated wood and any precautions or special instructions that may be applicable.
   3. Aluminum fasteners, flashings and accessory products should not be used in direct contact with any treated wood. ACQ-treated wood is not compatible with aluminum.
   4. Uncoated metal and painted metal flashings and accessories, except for 300-series stainless steel, should not be used in direct contact with treated wood. Metal products, except stainless steel, may be used if separated from treated wood by a spacer or barrier, such as single-ply membrane or self-adhered polymer-modified bitumen membrane material.

3.05 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
   1. Use sheathing clips between roof framing members.
   2. Provide solid edge blocking between sheets.
   3. Nail panels to framing; staples are not permitted.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
   1. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.

C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.
   4. Size: 48 by 96 inches, installed horizontally at ceiling height.

3.06 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.07 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.08 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 74 19 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

1.02 REFERENCE STANDARDS

A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.

D. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.

E. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.

F. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2009.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide data on fire retardant treatment materials and application instructions.
   2. Provide instructions for attachment hardware and finish hardware.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, to a minimum scale of 1-1/2 inch to 1 ft.

D. Samples: Submit two samples of finish plywood, 6x6 inches in size illustrating wood grain and specified finish.

E. Samples: Submit two samples of wood trim 6 inches long with finish.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom grade.

B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

C. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum three years of documented experience.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire retardant requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

1.07 PROJECT CONDITIONS

A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

B. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

2.02 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.03 LUMBER MATERIALS

A. Softwood Lumber: Fir species, plain sawn, maximum moisture content of 6 percentwith vertical grain,of quality suitable for transparent finish.
   1. Grading: In accordance with rules certified by ALSC; www.alsc.org.

B. Hardwood Lumber: hard white maple species second grade or better, plain sawn, maximum moisture content of 6 percent , of quality suitable for transparent finish.

2.04 SHEET MATERIALS

A. Hardwood Plywood: HPVA HP-1, Grade AA, Type VC; Veneer core, type of glue recommended for application; hard white maple face species, plain cut, book match.

B. Hardboard: ANSI A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth one side (S1S).

2.05 ADHESIVE

A. Adhesive: Type recommended by manufacturer to suit application .Must meet Tennessee Sustainable Guidelines for low emitting materials.

2.06 FASTENINGS

A. Fasteners: Of size and type to suit application.

B. Concealed Joint Fasteners: Threaded steel.

2.07 ACCESSORIES

A. Lumber for Shimming, Blocking; Softwood lumber of SYP species.

B. Primer: Alkyd primer sealer.

C. Wood Filler: Solvent base, tinted to match surface finish color.

2.08 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Shop prepare and identify components for book match grain matching during site erection.

C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.09 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Transparent: Nitrocellulose lacquer (formerly TR-1).
   2. Opaque: Nitrocellulose lacquer (formerly OP-1).

E. Back prime woodwork items to be field finished, prior to installation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

C. See Section 06 10 00 Rough Carpentry for installation of recessed wood blocking.

3.02 INSTALLATION

A. Set and secure materials and components in place, plumb and level.

B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

C. Install hardware in accordance with manufacturer's written instructions.

3.03 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment in accordance with manufacturer's instructions.

B. Brush apply one coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

3.04 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.05 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 06 41 00

ARCHITECTURAL CASEWORK - PLASTIC LAMINATE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Plastic laminate casework

B. Specially fabricated cabinet units.

C. Cabinet hardware.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 12 36 00 - Countertops.

1.03 REFERENCE STANDARDS

A. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.

B. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.

C. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.

D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

E. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2006, 8th Ed., Version 2.0.

F. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.

C. Product Data: Provide data for hardware accessories.

D. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, locksets, and grommet colors, demonstrating hardware design, quality, and finish.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated.

B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 PRE-INSTALLATION MEETING

A. Convene not less than one week before starting work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

1.08 FIELD CONDITIONS

A. During and after installation of cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI (AWS) for Custom Grade.

2.02 PANEL MATERIALS

A. Shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

B. Medium Density Fiberboard (MDF): ANSI A208.2; type as specified in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated; composed of wood fibers pressure bonded with moisture resistant adhesive to suit application; sanded faces; thickness as required.

C. Hardboard: AHA A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth two sides (S2S); use for drawer bottoms, dust panels, and other components indicated on drawings.

2.03 LAMINATE MATERIALS

A. Laminate Manufacturers: Refer to Section 09 06 00 Finish Schedule.

B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications and as follows:
   1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, colors as scheduled, finish as scheduled.
   2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, colors as scheduled, finish as scheduled.

C. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form
   1. Substitutions shall meet the original specification material characteristics including but not limited to durability, recycled content, color, texture, pattern and sheen.

2.04 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

B. Laminating adhesives used to fabricate on-site shall contain no added urea-formaldehyde resins.

C. Edge Banding: Same plastic laminate as cladding on horizontal and vertical surfaces unless indicated otherwise in the drawings.

D. Concealed Edge Banding: PVC edge banding on all sides

E. Door and Drawer Edge: Same plastic laminate as cladding on horizontal and vertical surfaces

F. Cabinet Body Edge: Same plastic laminate as cladding on horizontal and vertical surfaces

G. Fasteners: Size and type to suit application.

H. Concealed Joint Fasteners: Threaded steel.

I. Grommets:Grommets for cut-outs
   1. Material to be plastic unless indicated otherwise on the drawings
   2. 3" round grommet with removable cap
   3. Grommet colors as selected by Architect from at least 6 colors.

2.05 HARDWARE

A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.

B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, satin chrome finish, for nominal 1 inch spacing adjustments.

C. Drawer and Door Pulls: 4" Chrome Wire Pull

D. Cabinet and Drawer Locks: Keyed cylinder, two keys per lock, master keyed, Stainless Steel with satin finish.
   1. All cabinets and drawers to have locks.
   2. Must meet or exceed ANSI/BIFMA Grade 1.

E. Catches: Magnetic.

F. Drawer Slides:
   1. Static Load Capacity: Commercial grade. (100 Lb static load rating)
   2. Mounting: Side mounted.
   3. Stops: Integral type.
   4. Features: Provide self closing/stay closed type.
   5. Manufacturers:
      a. Knape & Vogt Manufacturing Company: www.knapeandvogt.com.
      b. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

G. Hinges: European style concealed self-closing type, steel with polished finish.
   1. Manufacturers:
      a. Julius Blum, Inc: www.blum.com.
      b. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

H. Sliding Door Track Assemblies: Upper and lower track of satin anodized aluminum, with matching shoe equipped with nylon rollers.

2.06 FABRICATION

A. Cabinet Style: Full overlay.

B. Cabinet Doors and Drawer Fronts: Flush style.

C. AWI/AWMAC Architectural Woodwork Quality Standards Illustrated Custom Quality

D. Open Shelving: All exposed surfaces including all edges to be High Pressure Decorative Laminate (HPDL)

E. Concealed shelving: All exposed surfaces to be white melamine and all edges to receive PVC edge banding.

F. Drawer Fronts to be 3/4" minimum with 1/2" minimum sub front

G. Drawer Sides and Backs Edgebanded HPDL or thermoset decorative overlay on particleboard core with minimum 1/2" thickness

H. Cabinet ends, divisions, bottoms and tops to be a minimum of 3/4" thick

I. Provide an attached toe-kick with applied base that clears the finished floor by 1/2" where indicated on the drawings.

J. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

K. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

L. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

M. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Locate counter butt joints minimum 2 feet from sink cut-outs.

N. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

O. Sink bases must be fully enclosed unless indicated otherwise in the drawings.

P. Stop silencers to be installed at all hinged doors.

2.07 FACTORY FINISHING

A. Sand work smooth and set exposed nails and screws.

B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.

C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.

D. Finish work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Section 1500, Nitrocellulose Lacquer, Transparent.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

B. Use fixture attachments in concealed locations for wall mounted components.

C. Use concealed joint fasteners to align and secure adjoining cabinet units.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

3.03 ADJUSTING

A. Adjust installed work.

B. Adjust moving or operating parts to function smoothly and correctly.

C. Remove adhesive residue from all exposed, semi exposed bottom edge of base and upper cabinets surfaces.

D. Bottom edges of base cabinets shall be smoothly sanded.

E. Drawer slides to operate smoothly, fully open and fully close.

F. The maximum uniform gap variance within cabinet elevation shall be per the following:
   1. 1/8" between door and drawer.
   2. 1/8" between edge of door and another door.

3.04 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 13 00

WATERPROOFING MEMBRANE SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rolled, self-adhering waterproofing membrane system at structural retaining walls and foundation walls.

B. Geocomposite drainage board at structural retaining walls.

1.02 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 07 21 00 - Thermal Insulation

C. Section 07 90 05 - Joint Sealer

D. Section 31 20 00 - Earth Moving

E. Section 33 41 00 - Storm Utility Drainage Piping

1.03 REFERENCES

A. ASTM D1621 (modified) - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.

B. ASTM D1777 - Standard Test Method for Thickness of Textile Materials.

C. ASTM D3776 - Standard Test Methods for Mass Per Unit Area (Weight) of Fabric.

D. ASTM D3786 - Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method.

E. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

F. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

G. ASTM D4716 - Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

H. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.

1.04 SUBMITTALS

A. Comply with Section 01 30 00 - Administrative Requirements.

B. Submit manufacturer's product data and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a clean dry area in accordance with manufacturer's instructions.

C. Store adhesives and primers at temperatures of 40oF (5oC) and above to facilitate handling.

D. Store membrane cartons on pallets.

E. Do not store at temperatures above 90oF (32oC) for extended periods.

F. Keep away from sparks and flames.

G. Completely cover when stored outside. Protect from rain.

H. Protect materials during handling and application to prevent damage or contamination.

I. Avoid use of products which contain tars, solvents, pitches, polysulfide polymers, or PVC materials that may come into contact with waterproofing membrane system.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Product not intended for uses subject to abuse or permanent exposure to the elements.

B. Protect rolls from direct sunlight until ready for use

C. Do not apply membrane when air or surface temperatures are below 40oF (4oC).

D. Do not apply to frozen concrete.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. W.R. Meadows: www.wrmeadows.com

B. Tremco: www.tremcosealants.com

C. Cetco: www.cetco.com

D. Architect Approved Equal

2.02 MATERIALS

A. Rolled, Self-Adhering Waterproofing Membrane: Based on W.R. Meadows Mel-Rol.
   1. Waterproofing membrane shall have the following characteristics:
      a. Compliance: AREMA Specification Chapter 29 - Waterproofing.
      b. Thickness:
         1) Carrier Film: 4 mils.
         2) Polymeric Membrane: 56 mils.
      c. Tensile Strength, ASTM D 412, Die C:
         1) Carrier Film: 5,900 psi (40.71 MPa) minimum.
         2) Polymeric Membrane: 590 psi (4.07 MPa) minimum.
      d. Elongation, ASTM D 412, Die C: Polymeric Membrane: 455 percent minimum.
      e. Peel Adhesion:
         1) Dry: 7 to 11 pounds/inch (125 to 196 g/mm) width, minimum.
         2) Wet: 7 to 12 pounds/inch (125 to 214 g/mm) width, minimum.
      f. Pliability, ASTM D 146:
         1) 180 Degree Bend: Unaffected.
         2) 1 Inch (25.4 mm) Mandrel at -25oF (-32oC): Unaffected.
      g. Water Vapor Permeability, ASTM E 96, Method B: 0.019 perms.
      h. Water Absorption, ASTM D 570: 0.1 percent, 72 hours maximum.
      i. Resistance to Hydrostatic Head: Equivalent to 240 feet (73.1m) of water.
      j. Puncture Resistance, ASTM E 154: 67 pounds.
      k. Exposure to Fungi, Soil Test: Pass, 16 weeks.
      l. Color:
         1) Carrier Film: White.
         2) Polymeric Membrane: Black.

B. Geocomposite Drainage Board based on W.R. Meadows Mel-Drain 5012.

2.03 ACCESSORIES

A. All accessories to be by same manufacturer as waterproofing membrane.

B. Primer:
   1. Temperatures Above 40oF (4oC): Mel-Prime Water Base Primer
   2. Temperatures Above 20oF (-7oC): Mel-Prime VOC Compliant Solvent Base Primer or Standard Solvent Base Primer.

C. Flashing and Fillets: Mel-Rol Liquid Membrane.

D. Pointing Mastic.

E. Termination Bar: Sealtight Termination Bar.

F. Corner Tape: Detail Strip.

G. Waterproofing Protection Course: Protection Course.

H. Rolled Matrix Drainage System: Mel-Drain™ Rolled Matrix Drainage System.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive membrane. Notify Designer if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.02 SURFACE PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.

C. Do not apply waterproofing to surfaces unacceptable to manufacturer.

D. Concrete surfaces must be clean, smooth and free of standing water.

E. Patch all holes and voids and smooth out any surface misalignments.

F. Apply surface conditioner to surfaces that will be covered within one working day according to manufacturer's recommended coverage rates.

G. Install corner tape on all inside and outside corners, including the footing.

H. Apply a 9" (229 mm) strip of self-adhering membrane over construction, control, and expansion joints and over cracks greater than 1/16" (1.59 mm) wide.

I. Seal all terminations with pointing mastic.

3.03 APPLICATION

A. Apply waterproofing membrane system in accordance with manufacturer's instructions.

B. Ensure accessory materials are compatible with membrane and approved by membrane manufacturer.

C. Prime surfaces to be covered in one working day with applicable primer. Reprime uncovered surfaces next day.

D. Inspect membrane before covering and repair as necessary. Cover tears and inadequate overlaps with membrane. Seal edges of patches with pointing mastic.

E. Perform flood testing of horizontal applications, as required. Mark leaks and repair when membrane dries.

F. Avoid use of products which contain tars, solvents, pitches, polysulfide polymers, or PVC materials that may come into contact with waterproofing membrane system.

G. Overlap all seams and stagger end laps at least 2 ½".

H. Seal all terminations with pointing mastic.

I. Inspect membrane before covering and repair as necessary. Cover tears and inadequate overlaps with membrane. Seal edges of patches with pointing mastic.

J. Vertical Application of Composite Drainage Board
   1. Unroll drainage board with flat, core side against the wall or waterproofing membrane. Drainage board can be fastened at the top side with a suitable mechanical fastening system that is compatible with the substrate.
   2. Adhere remainder of drainage board with mastic, compatible with this installation.
   3. Overlap the flat side core lip with second sheet of drainage board to provide a continuous drainage layer (shingle fashion). Ensure excess filter fabric is overlapped with this next sheet.

3.04 PROTECTION

A. Protect membrane on vertical and horizontal applications with immediate application of waterproofing protection course, if no drainage system is used, or rolled matrix drainage system. Use pointing mastic as an adhesive.

B. Backfill immediately using care to avoid damaging waterproofing membrane system.

END OF SECTION

SECTION 07 13 50
FLUID-APPLIED DAMPPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fluid applied membrane dampproofing at CMU walls.

1.02 RELATED REQUIREMENTS

A. Section 31 23 23 - Fill.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension; 2006a.

C. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers; 2009.

D. ASTM E 96/E 96M - Standard Test Methods For Water Vapor Transmission of Materials; 2005.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for membrane.

C. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.

D. Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacture of fluid-applied waterproofing membranes with three years experience.

B. Installer Qualifications: Company specializing in installation of fluid-applied waterproofing with minimum three years experience.

1.06 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until cured.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Contractor shall correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no cost to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cold-Applied, Water-Based Asphalt Emulsion Waterproofing Manufacturers:
   1. W.R. Meadows, Inc; MEL-ROL LM: www.wrmeadows.com.
   2. Substitutions: See Section 01 25 13 - Product Substitution Procedures.

2.02 MEMBRANE AND FLASHING MATERIALS

A. Cold-Applied, Water-Based Asphalt Emulsion Waterproofing:
   1. Cured Thickness: 60 mils (0.060 inches), minimum.
   2. Suitable for installation over concrete substrates.

3. Elongation: 1000 percent, measured in accordance with ASTM D412.
4. VOC Content: Less than 20 g/L when tested in accordance with 40 CFR 59 Subpart D (EPA Method 24).
5. Water Vapor Permeability: 0.02 perm inch, measured in accordance with ASTM E96/E96M.
6. Peel Adhesion: According to ASTM D412, for the following substrates.
   a. High Density Polyethylene Film: 12.2 pound-inches.
   b. Concrete and Concrete Masonry: 14.1 pound-inches.
   c. Glass Fiber Mat Faced Gypsum Board: 13.1 pound-inches.
7. Adhesion: Greater than 150 psi, measured in accordance with ASTM D4541.
8. Products:
   a. W.R. Meadows, Inc; MEL-ROL LM: www.wrmeadows.com.
   b. Substitutions: See Section 01 25 13 - Product Substitution Procedures.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.

C. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.

D. Verify that items that penetrate surfaces to receive waterproofing are securely installed.

3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions. Vacuum substrate clean.

C. Do not apply waterproofing to surfaces unacceptable to manufacturer.

D. Seal cracks and joints with sealant using methods recommended by sealant manufacturer.

E. Install cant strips at inside corners.

3.03 INSTALLATION

A. Apply waterproofing in accordance with manufacturer's instructions to specified minimum thickness.

B. Apply primer or surface conditioner at a rate recommended by manufacturer. Protect conditioner from rain or frost until dry.

C. At joints and cracks less than 1/2 inch in width including joints between horizontal and vertical surfaces, apply 12 inch wide strip of joint cover sheet.

D. At joints from 1/2 to 1 inch in width, loop joint cover sheet down into joint between 1-1/4 and 1/-3/4 inch. Extend sheet 6 inches on either side of expansion joint.

E. Center joint cover sheet over joints. Roll sheet into 1/8 inch coating of waterproofing material. Apply second coat over sheet extending minimum of 6 inches beyond sheet edges.

F. Extend membrane over cants and up intersecting surfaces at membrane perimeter minimum 6 inches above horizontal surface for first ply and 6 inches at subsequent plies laid in shingle fashion.

G. Apply extra thickness of waterproofing material at corners, intersections, and angles.

H. Install flexible flashings and seal into waterproofing material. Seal items penetrating through membrane with flexible flashings.

I. Extend waterproofing material and flexible flashing into drain clamp flange, apply adequate coating of liquid membrane to assure clamp ring seal. Coordinate with drain installation in Section 22 10 06.

J. Seal membrane and flashings to adjoining surfaces. Install termination bar at all edges. Install counterflashing over all exposed edges.

3.04 FIELD QUALITY CONTROL

A. Contractor will provide testing services in accordance with Section 01 40 00 - Quality Requirements. Contractor shall provide temporary construction and materials for testing.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Batt insulation in metal stud walls.

B. Rigid insulation board inside cavity walls.

C. Mineral Fiber Sound Attenuation Batt Insulation in interior wall, and ceiling construction for sound control.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 07 54 23 - TPO Membrane Roofing

C. Section 07 84 00 - Firestopping

D. Section 09 2116 - Gypsum Board Assemblies

E. Section 09 81 10 - Acoustical Treatment - Partitions/Ceilings

1.03 DEFINITIONS

A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, vapor retarders, or water-resistive barriers.

B. Air Barrier: Air-tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.

1.04 REFERENCE STANDARDS

A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

C. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.06 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 BATT INSULATION

A. Batt Insulation: ASTM C 665; preformed batt; friction fit, conforming to the following:
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 50 or less, when tested in accordance with ASTM E84.
   3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
   4. Formaldehyde Content: Zero.
   5. Thermal Resistance: see drawings for R-values
   6. Thickness: see drawings for thickness.

7. Facing: Unfaced.
8. Manufacturers:
   a. CertainTeed Corporation; _____: www.certainteed.com/#sle.
   b. Johns Manville; _____: www.jm.com/#sle.
9. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

2.02 RIGID INSULATION BOARD IN CAVITY WALLS

A. Extruded Polystyrene Foam Insulation:
   1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E 84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E 84.
   3. Board Size: 48 x 96 inch (1220 x 2440 mm)
   4. Board Thickness: see drawings for thickess
   5. Board Edges: Square
   6. Thermal Resistance (R-value) at 25 degrees F (-3.9 degrees C): see drawings for R-values
   7. Compressive Strength: 25 psi (173 kPa).
   8. Water Absorption, maximum: 0.3 percent, volume.
   9. Manufacturers:
      a. Dow Chemical Co: www.dow.com
      b. Owens Corning Corp: www.owenscorning.com
      c. Pactiv Building Products: www.pactiv.com/green-guard.com
      d. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

2.03 MINERAL FIBER SOUND ATTENUATION BATT INSULATION

A. Mineral Fiber Sound Attenuation Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit; unfaced; flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
   2. Thermal Resistance: see drawings for R-values
   3. Thickness: as shown on drawings.
   4. Manufacturers:
      a. Thermafiber, Inc.; SAFB: www.thermafiber.com/#sle.
      b. CertainTeed: www.certainteed.com
      c. Owens Corning: www.owenscorning.com.
      d. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

2.04 ACCESSORIES

A. Seam Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide or as recommended by weather barrier manufacturer.

B. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

C. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

D. Wire Mesh: Galvanized steel, hexagonal wire mesh.

E. Adhesive: Type recommended by insulation manufacturer for application.

F. Sealants: As recommended by weather barrier manufacturer.

G. Primers: Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 RIGID INSULATION BOARD INSTALLATION

A. Apply emulsified asphalt as adhesive to face of inner wythe of cavity wall:
   1. Full bed 1/8 inch (3 mm) thick.

B. Install boards to fit snugly between wall ties.
   1. Place membrane surface against adhesive.

C. Install boards horizontally on walls.
   1. Place boards to maximize adhesive contact.
   2. Install in running bond pattern.
   3. Butt edges and ends tightly to adjacent boards and to protrusions.

D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

E. Place 6 inch (150 mm) wide rubberized asphalt sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames. Tape seal in place to ensure continuity of vapor retarder and air seal.

3.03 BATT AND MINERAL FIBER INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Staple or nail facing flanges in place at maximum 6 inches on center.

F. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

G. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.

H. Tape seal tears or cuts in vapor retarder.

I. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

3.04 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 25 00

WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Weather barrier membrane

B. Seam Tape

C. Flashing

D. Fasteners

1.02 REFERENCES

A. ASTM International
   1. ASTM C920; Standard Specification for Elastomeric Joint Sealants
   2. ASTM C1193; Standard Guide for Use of Joint Sealants
   3. ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting
   4. ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics
   5. ASTM E84; Test Method for Surface Burning Characteristics of Building Materials
   6. ASTM E96; Test Method for Water Vapor Transmission of Materials
   7. ASTM E1677; Specification for Air Retarder Material or System for Framed Building Walls
   8. ASTM E2178; Test Method for Air Permeance of Building Materials
   9. ASTM E2357; Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

B. AATCC - American Association of Textile Chemists and Colorists
   1. Test Method 127 Water Resistance: Hydrostatic Pressure Test

C. TAPPI
   1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
   2. Test Method T-460; Air Resistance (Gurley Hill Method)

1.03 SUBMITTALS

A. Refer to Section 01 30 00 Administrative Requirements

B. Product Data: Submit manufacturer current technical literature for each component.

C. Quality Assurance Submittals
   1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
   2. Manufacturer Instructions: Provide manufacturer's written installation instructions.
   3. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.

D. Closeout Submittals
   1. Refer to Section 01 78 00 Closeout Submittals.
   2. Weather Barrier Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion.

1.04 QUALITY ASSURANCE

A. Qualifications
   1. Installer shall have experience with installation of weather barrier assemblies under similar conditions.
   2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
   3. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.

B. Pre-installation Meeting

1. Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor, Architect, Engineer, Consultant, Installer, Owner's Representative, and Weather Barrier Manufacturer's Designated Representative.
2. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of weather barrier assembly materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store weather barrier materials as recommended by weather barrier manufacturer.

1.06 SCHEDULING

A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.

B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

1.07 WARRANTY

A. Warranty
1. Weather-barrier manufacturer's warranty for weather barrier for a period of ten (10) years from date of final weather barrier installation.
2. Pre-installation meetings and jobsite observations by weather barrier manufacturer for warranty is required prior to assembly installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. DuPont: www.construction.tyvek.com

B. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

2.02 MATERIALS

A. Basis of Design: spunbonded polyolefin, non-woven, non-perforated, weather barrier is based upon DuPont Tyvek CommercialWrap and related assembly components.

B. Performance Characteristics:
1. Air Penetration: 0.001 cfm/ft2 at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677. =0.04 cfm/ft2 at 75 Pa, when tested in accordance with ASTM E2357.
2. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.
3. Water Penetration Resistance: Minimum 280 cm when tested in accordance with AATCC Test Method 127.
4. Basis Weight: Minimum 2.7 oz/yd2, when tested in accordance with TAPPI Test Method T-410.
5. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.
6. Tensile Strength: Minimum 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.
7. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.
8. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 10, Smoke Developed: 10.

2.03 ACCESSORIES

A. Seam Tape: As recommended by the weather barrier manufacturer.

B. Fasteners:
   1. 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap or manufacturer approved 1-1/4” or 2” metal gasketed washer
   2. Masonry tap-con fasteners with Caps: 2-inch diameter plastic cap fasteners.

C. Adhesives:
   1. Provide adhesive recommended by weather barrier manufacturer.
   2. Products: Adhesives recommend by the weather barrier manufacturer.

D. Primers:
   1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.
   2. Products: Primers recommended by the flashing manufacturer.

E. Flashing
   1. Flexible membrane flashing materials for window openings and penetrations recommended by manufacturer.
   2. Thru-Wall flashing membrane materials for flashing at changes in direction or elevation (shelf angles, foundations, etc.) and at transitions between different assembly materials.
   3. Preformed Inside and Outside Corners and End Dams: Preformed three-dimensional shapes to complete the flashing system used in conjunction with Thru-Wall Flashing.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.02 INSTALLATION - WEATHER BARRIER

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.

B. Install weather barrier prior to installation of windows and doors.

C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.

D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.

E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.

F. Window and Door Openings: Extend weather barrier completely over openings.

G. Overlap weather barrier
   1. Exterior corners: minimum 12 inches.
   2. Seams: minimum 6 inches.

H. Weather Barrier Attachment:
   1. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 12-18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

I. Apply flashing to weather barrier membrane prior to installing cladding anchors.

3.03 SEAMING

A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.

B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.04 OPENING PREPARATION (FOR USE WITH NON-FLANGED WINDOWS - ALL CLADDING TYPES)

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.05 FLASHING (FOR USE WITH NON-FLANGED WINDOWS - ALL CLADDING TYPES)

A. Cut flexible flashing a minimum of 12 inches longer than width of sill rough opening.

B. Cover horizontal sill by aligning flexible flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

C. Fan flexible flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.

D. Apply 9-inch wide strips of flashing at jambs. Align flashing with interior edge of jamb framing. Start flashing at head of opening and lap sill flashing down to the sill.

E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.

F. Install flexible flashing at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

G. Coordinate flashing with window installation.

H. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C1193.

I. Position weather barrier head flap across head flashing. Adhere using flashing over the 45-degree seams.

J. Tape top of window in accordance with manufacturer recommendations.

K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C1193.

3.06 OPENING PREPARATION (FOR USE WITH FLANGED WINDOWS)

A. Cut weather barrier in an "I-cut" pattern. A modified I-cut is also acceptable.
   1. Cut weather barrier horizontally along the bottom and top of the window opening.
   2. From the top center of the window opening, cut weather barrier vertically down to the sill.
   3. Fold side and bottom weather barrier flaps into window opening and fasten.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.07 FLASHING (FOR USE WITH FLANGED WINDOWS)

A. Cut flexible flashing a minimum of 12 inches longer than width of sill rough opening.

B. Cover horizontal sill by aligning flexible flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

C. Fan flexible flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges if necessary.

D. On exterior, apply continuous bead of sealant to wall or backside of window mounting flange across jambs and head. Do not apply sealant across sill.

E. Install window according to manufacturer's instructions.

F. Apply strips of flashing at jambs overlapping entire mounting flange. Extend jamb flashing 1-inch above top of rough opening and below bottom edge of sill flashing.

G. Apply strip of flashing as head flashing overlapping the mounting flange. Head flashing should extend beyond outside edges of both jamb flashings.

H. Position weather barrier head flap across head flashing. Adhere flashing over the 45-degree seams.

I. Tape head flap in accordance with manufacturer recommendations.

J. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.08 THRU-WALL FLASHING INSTALLATION

A. Apply primer per manufacturer's written instructions.

B. Install preformed corners and end dams bedded in sealant in appropriate locations along wall.

C. Starting at a corner, remove release sheet and apply membrane to primed surfaces in lengths of 8 to 10 feet.

D. Extend membrane through wall and leave ¼ inch minimum exposed to form drip edge.

E. Roll flashing into place. Ensure continuous and direct contact with substrate.

F. Lap ends and overlap preformed corners 4 inches minimum. Seal all laps with sealant.

G. Trim exterior edge of membrane 1-inch and secure metal drip edge per manufacturer's written instructions.

H. Terminate membrane on vertical wall. [Terminate into reglet, counterflashing or with termination bar.]

I. Apply sealant bead at each termination.

3.09 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT BASE OF WALL

A. Overlap thru-wall flashing with weather barrier by 6-inches.

B. Mechanically fasten bottom of weather barrier through top of thru-wall flashing.

C. Seal vertical and horizontal seams with tape or sealing membrane.

3.10 THRU-WALL FLASHING / WEATHER BARRIER INTERFACE AT WINDOW HEAD

A. Cut flap in weather barrier at window head.

B. Prime exposed sheathing.

C. Install lintel as required. Verify end dams extend 4 inches minimum beyond opening.

D. Install end dams bedded in sealant.

E. Adhere 2 inches minimum thru-wall flashing to wall sheathing. Overlap lintel with thru-wall flashing and extend ¼ inch minimum beyond outside edge of lintel to form drip edge.

F. Apply sealant along thru-wall flashing edges.

G. Fold weather barrier flap back into place and tape bottom edge to thru-wall flashing.

H. Tape diagonal cuts of weather barrier.

I. Secure weather barrier flap with fasteners.

3.11 FIELD QUALITY CONTROL

A. Notify manufacturer's designated representative to obtain periodic observations of weather barrier assembly installation.

3.12 PROTECTION

A. Protect installed weather barrier from damage.

END OF SECTION

SECTION 07 26 00

UNDER-SLAB VAPOR BARRIER

PART 1 - GENERAL

1.01 SUMMARY

A. Products supplied under this section:
   1. Vapor barrier, seam tape, and mastic for installation under concrete slabs.

B. Related sections:
   1. Section 03 30 00 Cast-in-Place Concrete
   2. Section 09 64 20 Wood Gymnasium Flooring
   3. Section 09 65 00 Resilient Flooring

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM E 1745-09 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
   2. ASTM E 154-99 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
   3. ASTM E 96-05 Standard Test Methods for Water Vapor Transmission of Materials.
   4. ASTM F 1249-06 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
   5. ASTM E 1643-09 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. American Concrete Institute (ACI):
   1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.03 SUBMITTALS

A. Quality control/assurance:
   1. Summary of test results as per paragraph 8.3 of ASTM E 1745.
   2. Manufacturer's samples, literature.
   3. Manufacturer's installation instructions for placement, seaming and penetration repair instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Vapor barrier must have all of the following qualities:
   1. Permeance of less than 0.01 Perms [grains/(ft2 ? hr ? inHg)] as tested in accordance with ASTM E 1745 Section 7.
   2. Other performance criteria:
      a. Strength: ASTM E 1745 Class A.
      b. Thickness: 15 mils minimum

B. Vapor barrier products:
   1. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
   2. Acceptable Manufacturers:
      a. Stego Wrap (15 mil) vapor barrier as manufactured by Stego Industries, LLC
      b. Zero-Perm by Alumiseal
      c. W.R. Meadowns - Perminator
   3. Vapor barrier under gym and auditorium floor shall be Premoulded Membrane Vapor Seal with Plasmatic Core (PMPC) by W.R. Meadows, including all accessories required (mastic, tape, etc.).

2.02 ACCESSORIES

A. Seam tape:
   1. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com

B. Vapor-proofing mastic:
   1. Stego Mastic by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com

PART 3 - EXECUTION

3.01 PREPARATION

A. Ensure that base material is approved by Architect or Geotechnical Engineer.
   1. Level and compact base material.

3.02 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E 1643.
   1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement.
   2. Lap vapor barrier over footings and/or seal to foundation walls.
   3. Overlap joints 6 inches and seal with manufacturer's tape.
   4. Seal all penetrations (including pipes) per manufacturer's instructions.
   5. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
   6. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all sides with tape.

END OF SECTION

SECTION 07 46 43
COMPOSITE CLADDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Composite cladding.

B. Composite hybrid cladding.

1.02 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry.

1.03 REFERENCES

A. Architectural Testing, Inc:
   1. AA-676: Third party testing.
   2. Manufacturer's Code Compliance Research Reports:
      a. CCRR-0151.
      b. CCRR-0135.
      c. CCRR-0160.

B. ASTM International (ASTM):
   1. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
   2. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics.
   3. ASTM D2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
   4. ASTM D7032 - Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards, and Handrails.
   5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   6. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure.

C. American Architectural Manufacturers Association (AAMA):
   1. AAMA 509 - Voluntary Test and Classification Method of Drained and Back Ventilated Rain Screen Wall Cladding Systems.

D. Florida Building Code and Miami Dade County Approval.

E. International Code Council Evaluation Services (ICC-ES):
   1. AC 10 - Acceptance Criteria for Quality Documentation.
   2. AC 174 -Acceptance Criteria for Deck Board Span Ratings and Guardrail.

F. JIS International (Japanese Industrial Standards):
   1. JIS A 5721 - Plastic Floor Parts.
   2. JIS A 5909 - Dressed Particleboards.
   3. JIS K 7112 - Plastics - Methods of Determining the Density and Relative Density of Non-Cellular Plastics.
   4. JIS K 7191 - Plastics - Determination of Temperature of Deflection Under Load.
   5. JIS K 7197 - Testing Method for Linear Thermal Expansion Coefficient of Plastics by Thermomechanical Analysis.

1.04 SUBMITTALS

A. Submit under provisions of Section 013000.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Manufacturer's printed installation instructions, showing required preparation and installation procedures.
   2. Storage and handling requirements and recommendations.

3. Installation methods including anchorage details.
4. Cleaning and maintenance instructions.

C. Shop Drawings: Provide shop drawings indicating details of construction, anchorage and installation. Include statement that anchorage methods comply with applicable building codes and loadings for the type of framing and condition of the supporting construction and details.

D. Verification Samples: For each product specified, two samples 6 inches in length, representing materials, colors, patterns, textures, and finishes to be installed.
1. Closeout Submittals: Documentation of manufacturer's warranty.

1.05 QUALITY ASSURANCE

A. Installer: Minimum 2 years experience with similar drainage mat/rainscreen materials.

B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship and appearance are approved by Architect.
3. Subject to approval by Architect, mock-up may be retained as part of finish work.

C. Pre-Installation Meetings: Conduct pre-installation meetings to verify project requirements, substrate conditions, construction documents, details and manufacturer's warranty requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged rolls/pallets with identification labels intact.

B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.07 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.08 WARRANTY

A. Manufacturer's Warranty: Manufacturer's standard limited 10 year warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Geolam, which is located at: 9 Shorncliffe Ave.; Toronto, ON, Canada M4V 1S9; Toll Free Tel: 877-627-3530; Tel: 416-548-7450; Fax: 416-548-7894; Email:request info (info@geolaminc.com)

B. Requests for substitutions will be considered in accordance with provisions of Section 01 25 13 and 01 25 33.

2.02 COMPOSITE HYBRID CLADDING

A. Basis of Design: Vertigo 5010 Wood Hybrid Cladding as manufactured by Geolam.
1. Hot co-extrusion of aluminum and wood composite.
2. Physical Properties:
a. Specific Density Value: 0.046 lbs per cu in (1.27 gr per cu cm) per JIS K 7112.
b. Deformation Temperature: 241 degrees F (116 degrees C) per JIS K 7191.
c. Thermal Expansion Coefficient Value: 0.00002 in per F degrees (0.000036 mm per C degrees) per JIS K7197.
d. Moisture Absorption Value 24 hours at 65 degrees F (20 degrees C): 0.2 per JIS A5909.
e. Linear Expansion Value: Zero per JIS A5909.
f. Aging Test Value: 5 percent per JIS 5721.

g. Core in Anodized Aluminum Alloy: A60635S-T5.

3. Width: 7-1/4 in (184 mm). Exposure: 6-1/2 (165 mm).
4. Depth: 1/2 in (13 mm).
5. Length: 12 ft (3658 mm).
6. Weight: 0.080 lbs per ft.
7. Color: Ebony.
8. per C degrees per JIS K7197.
9. Moisture Absorption Value 24 hours at 65 degrees F (20 degrees C): 0.2 per JIS A5909.
10. Linear Expansion Value: Zero per JIS A5909.
11. Aging Test Value: 5 percent per JIS 5721.

B. Protect installed work from damage due to subsequent construction activity on the site.

C. Clean using materials recommended by the manufacturer to remove stains, dirt and debris prior to final acceptance.

END OF SECTION

SECTION 07 54 23
TPO MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Thermoplastic Polyolefin Membrane (TPO) Roofing. Work under this Section includes all labor, materials, equipment, and services to install the Thermo Plastic (TPO) roofing system shown on the Drawings and/or hereinafter specified.

B. Membrane Flashings.

C. Metal Flashings.

D. Roof Insulation.

1.02 RELATED SECTIONS

A. Section 05 31 00 - Steel Decking.

B. Section 06 10 00 - Rough Carpentry.

C. Section 07 62 00 - Sheet Metal Flashing and Trim.

D. Section 07 72 00 - Roof Accessories.

1.03 REFERENCES

A. American Society of Civil Engineers (ASCE) - ASCE 7 - Minimum Design Loads for Buildings and Other Structures, Current Revision.

B. ASTM International (ASTM):
   1. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
   2. ASTM D 1079 - Standard Terminology Relating to Roofing, Waterproofing, and Bituminous Materials.
   3. ASTM D 6878 - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
   4. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.

C. International Code Council (ICC)
   1. International Building Code (IBC).

D. National Roofing Contractors Association (NRCA) - Low Slope Roofing and Waterproofing Manual, Current Edition.

E. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

F. Underwriters Laboratories (UL):
   1. TGFU R1306 - "Roofing Systems and Materials Guide".
   2. UL-790 - Standard Test Method for Fire Tests of Roof Coverings.

1.04 DESIGN CRITERIA

A. Wind Uplift Performance:
   1. Roof system is designed to withstand wind uplift forces as calculated using the current revision of ASCE-7.

B. Fire Resistance Performance:
   1. Roof system will achieve a UL Class A rating when tested in accordance with UL-790.

C. Thermal Performance: Roof system will achieve a minimum R value not less than 20, or as required by local and state energy codes.

D. Drainage: Provide a roof system with positive drainage where all standing water dissipates within 48 hours after precipitation ends.

E. Building Codes:
   1. Roof system will meet the requirements of all federal, state and local code bodies having jurisdiction.

1.05 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. No material shall be ordered or delivered until the submittals have been approved in writing by the Designer.

C. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

D. Detail Drawings:
   1. Shop drawings to be reviewed by the roofing manufacturer prior to submittal to the architect.
   2. Provide roofing system plans, elevations, sections, details, and details of attachment to other Work including:
      a. Base flashings and membrane terminations
      b. Tapered insulation, including slopes
      c. Crickets, saddles, and tapered edge strips, including slopes
      d. Insulation fastening patterns

E. Verification Samples: For each finish product specified, two samples, minimum size 4 inches (100 mm) square representing actual product, color, and patterns.

F. Certificates: Certify that products of this section meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of fifteen (15) years experience.

B. Installer Qualifications:
   1. All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.
   2. Installer shall be capable of extending the Manufacturer's Labor and Materials guarantee.
   3. Installer shall be capable of extending the Manufacturer's No Dollar Limit guarantee.
   4. Inspection shall be conducted by a Field Representative of the membrane manufacturer to ascertain that the membrane roofing system has been installed according to manufacturer specifications and details.

1.07 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

B. Review conditions of installation, installation procedures, and coordination required with related work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

C. Materials shall be stored in a neat and safe manner so as not to exceed the allowable live load of the storage area.

D. Materials shall be stored out of the weather in a clean, dry area.

E. Liquid materials, such as adhesive, thinners and cleaners, shall be stored in areas away from sparks, open flames and excessive heat.

F. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Comply with insulation manufacturer’s written instructions for handling, storing, and protecting during installation.

1.09 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not install TPO sheet roofing during inclement weather. Seams may not be laid when temperatures are below 40 degrees F.

B. Do not apply sheet roofing to damp, frozen, dirty, or deck surfaces unacceptable to manufacturer.

1.11 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's Total System warranty, outlining its terms, conditions, and exclusions from coverage. This warranty is to cover all labor and materials necessary to keep the roofing membrane watertight for the period of the warranty and it to have an unlimited penal sum.
   1. Duration: Twenty (20) Years.

B. Installer's Warranty Signs
   1. Furnish and install a roof warranty sign, 10" x 12" (minimum) size.
   2. Sign shall read: DO NOT MAKE REPAIRS, PENETRATION OR ALTERATIONS TO THIS ROOF WITHOUT THE WRITTEN APPROVAL FROM THE OWNER OR AUTHORIZED REPRESENTATIVE. The roof is warranted by (insert Manufacturer's name, address, and telephone number) until (insert the date of the month and 20 years after the date of Substantial Completion)

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Roof Membrane
   1. Basis of Design: Carlisle Syntec: www.carlislesyntec.com
   2. Other Acceptable Manufacturers
      a. Firestone Building Products: www.firestonebpco.com
      b. Versico Roofing Systems: www.versico.com
   3. Substitutions: Other manufacturers not mentioned above must confirm in all respects with the requirements of this Section of the Specifications and must have prior written approval prior to bid. Substitution must be submitted in accordance with the conditions of the contract and expressly identified as proposed substitution. Substitutions must be submitted 10 days prior to bid date.
      a. Substitutions: Refer to Section 01 25 13 Product Substitution Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

B. Polyisocyanurate Insulation
   1. Basis of Design: Versico Roofing Systems: www.versico.com
   2. Other Acceptable Manufacturers
      a. Carlisle Syntec: www.carlislesyntec.com
      b. Firestone Building Products: www.firestonebpco.com
   3. Substitutions: Other manufacturers not mentioned above must confirm in all respects with the requirements of this Section of the Specifications and must have prior written approval prior to bid. Substitution must be submitted in accordance with the conditions of the contract and expressly identified as proposed substitution. Substitutions must be submitted 10 days prior to bid date.
      a. Substitutions: Refer to Section 01 25 13 Product Substitution Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

C. Roof Cover Boards
   1. Basis of Design: USG Securock: www.usg.com
   2. Other Acceptable Manufacturers

a. Carlisle Syntec: www.carlislesyntec.com
b. Firestone Building Products: www.firestonebpco.com
c. Georgia Pacific: www.gp.com

2.02 SCOPE / APPLICATION

A. Roof System: Provide a waterproof roof system, capable of withstanding uplift forces as specified in this section.
   1. Membrane Attachment: Mechanically Attached.

B. Base Flashing: Provide a waterproof, fully adhered base flashing system at all penetrations, plane transitions and terminations.

C. Insulation: Provide a roof insulation system beneath the finish membrane.

2.03 INSULATION

A. Polyisocyanurate: Rigid board with fiber reinforced facers on both sides, meeting or exceeding the requirements of ASTM C 1289. Versicore MPH
   1. Compressive Strength: 20 psi (138 kPa).
   2. Density: 2 lb per cubic foot (24 kg/cu m) minimum.
   3. R-Value (LTTR): 25 minimum

B. Moisture-, mold- and impact-resistant, nonstructural fiber-reinforced gypsum panel made from 95% recycled materials. Basis of design Securock, distributed by Versico.
   1. Board Thickness: 5/8 inch (15mm).

2.04 THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE

A. VersiWeld Membrane:
   1. Color: White.
   2. Membrane Thickness: 60 mil nominal.
      a. Thickness over Scrim: 0.0120 inches (0.508mm).
      b. Breaking Strength (ASTM D 751): 250 lbf/in (1.1 kN/m) minimum.
      c. Tear Resistance (ASTM D 751): 55 lbf/in (245 N/m) minimum.
      d. Elongation (ASTM D 751): 25 percent.
   3. Field Sheet Dimensions:
      a. Width: 10 feet (3.05 m) maximum.
      b. Length: 100 feet (30.5 m) maximum.

2.05 ROOF COVER BOARD

A. Fiberglass Mat Faced Cover Board
   1. Thickness: 1/2"
   2. Surfacing: fiberglass mat with nonasphaltic coating.
   3. R-value per ASTM: 0.53 (for 1/2" thick)
   4. Water Absorption: 10% max, per ASTM C473
   5. Compressive Strength: 700-1000 PSI, nominal

2.06 FLASHING ACCESSORIES

A. Inside Corners: Pre-molded corner flashing for inside corners. 60 mil thickness. Color to match membrane.

B. Outside Corners: Pre-molded corner flashing for outside corners. 60 mil thickness. Color to match membrane.

C. TPO Curb Wrap Corners: Pre-fabricated corner flashings made from 45 mil thick reinforced VersiWeld membrane. 6 inch (152mm) wide base flange and a 12 inch (305mm) overall height. Sizes available to fit curbs up to 6 foot by 6 foot (1828 x 1828 mm) in size. Color to match membrane.

D. TPO T-Joint Covers: 60 mil thick non-reinforced TPO flashing cut into a 4.5 inch (114mm) diameter circle used to seal step-offs at splice intersections. Color to match membrane.

E. Pipe Flashings: A pre-molded flashing and clamping ring used for pipe penetrations. Available for 1 inch to 6 inch (25 - 152mm) diameter pipes.

F. Split Pipe Seals: Pre-fabricated flashing consisting of 45 mil thick reinforced VersiWeld Membrane for pipes 1 inch to 6 inch (25 - 152mm) in diameter. Split (cut) and overlapped tabs are incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration.

G. TPO Square Tubing Wraps: Fabricated flashings made of 45 mil thick reinforced VersiWeld membrane for square tubing. A split (cut) and overlap tab are incorporated into these parts to allow the seals to be opened and wrapped around a square penetration. Available for 3 inch, 4 inch, 5 inch and 6 inch (76, 102, 127, 152 mm) diameter square tubing.

H. Molded TPO Sealant Pockets:
   1. Pre-fabricated, interlocking, 2-piece, injection molded, flexible pocket with a rigid polypropylene vertical wall and pre-formed deck flanges. Color - White
   2. Used with Thermoplastic One-Part Pourable Sealer as specified in this section for waterproofing pipe clusters or other odd shaped penetrations. Forms a 7 1/2 inch by 6 inch (191 x 152mm) oval when completed. Color - White.

I. Pre-Fabricated Sealant Pockets: A two-piece, pre-fabricated sealant pocket that utilizes reinforced TPO membrane and coated metal to form a rigid, oversized sealant pocket with a weldable horizontal deck flange. Color - White.
   1. 12 inch (305mm) - Total volume of 1.87 gallons.
   2. 16 inch (406mm) - Total volume of 2.77 gallons.
   3. 20 inch (508mm) - Total volume of 3.81 gallons.

J. Sealant Pocket Extension Legs: Designed for use with the TPO Molded Sealant Pocket and the Pre-Fabricated Sealant Pocket to extend the length in increments of 10 inches (254mm). Fabricated from 45 mil thick reinforced TPO membrane and TPO coated metal. Can be used full length, cut to size for customized lengths or welded to each other for extra long applications. Color - White.

K. Pressure-Sensitive (PS) Cover Strip: A nominal 6 inch (152mm) by 40 mil thick non-reinforced TPO membrane laminated to nominal 35 mil thick cured synthetic rubber pressure-sensitive adhesive used in conjunction with TPO Primer to strip in flat metal flanges (i.e., drip edges or rows of fasteners and plates). Color to match membrane.

L. TPO Pressure-Sensitive (PS) RUSS: A nominal 6 inch (152mm) and 10 inch (254mm) wide, 45 mil thick reinforced TPO membrane with nominal 3 inch (76mm) wide 35mil thick cured synthetic rubber pressure-sensitive adhesive laminated along one end on 6 inch (152mm) width and both ends on 10 inch (254mm) width.

M. TPO Non-Reinforced Flashing: Non-reinforced thermoplastic polyolefin based membrane used for field fabricated pipe flashings, sealant pockets and scuppers when the use of a pre-molded accessory is not feasible.

N. Heat Weldable Walkway Rolls: Recycled VersiWeld Membrane offering superior tear, puncture and weather resistance and designed to protect VersiWeld membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to VersiWeld membrane using an automated heat welder or hand held heat welder. Walkway Rolls are 34 inches (762mm) wide by 50 feet (15.2 M) long and are nominal 120 mils thick. Color - White.

2.07 CLEANERS, PRIMERS, ADHESIVES AND SEALANTS

A. VersiWeld Bonding Adhesive: Solvent-based contact adhesive that allows bonding of VersiWeld membrane to various porous and non-porous substrates.
   1. Base: Synthetic Rubber.
   2. Color: Yellow.
   3. Solids: 20.0 percent.
   4. VOC: 670 grams/liter.

B. Cut Edge Sealant: A medium solids contact, free flowing polymeric material designed for sealing cut edges (exposed fabric) of VersiWeld reinforced membrane.

C. Water Cut-Off Mastic: A one-component, low viscosity, self wetting, Butyl blend mastic used as a compression sealing agent between membrane and applicable substrates.

D. TPO Primer: Solvent-based product designed for priming TPO surfaces prior to the application of pressure-sensitive products.

E. Universal Single-Ply Sealant: A 100 percent solids, solvent free, one-part polyether sealant that is used as a termination bar sealant. Available in white only.

F. White One-Part Sealant: Single component, moisture curing, elastomeric polyether sealant that is compatible with Versico's Thermoplastic membranes. Provides a flexible, durable and long lasting seal around hard-to-flash penetrations in Thermoplastic Roofing Systems.

G. Versico Weathered Membrane Cleaner: Clear, solvent-based cleaner used to loosen and remove contaminants from the surface of exposed membrane.

2.08 FASTENERS

A. HPVX Fasteners: Heavy-duty #15 threaded fastener with a Phillips head used with HPVX seam plates (Mechanically Attached System) and where increased pullout resistance is necessary for steel and wood decks (Fully Adhered System)

B. HPV Fastener: Threaded, coated (E-Coat) fastener for use with steel, wood plank, minimum 15/32" thick plywood, or minimum 7/16" thick oriented strand board (OSB).

C. Term Bar Nail-In: A 1 1/4 inch (32mm) long expansion anchor with threaded drive pin used for fastening VersaGard Termination Bar or Seam Fastening Plates to concrete, brick or block walls.

D. HPVX Plates: A 2-3/8 inch (60mm) diameter metal barbed fastening plate used with Versico Fasteners for membrane securement. This plate can be used for insulation securement.

E. Insulation Fastening Plates: a nominal 3 inch (76mm) diameter plastic or metal plate used for insulation attachment.

2.09 EDGINGS AND TERMINATIONS

A. For metal copings, gravel, guards and drip edges, see Section 07 62 00 Sheet Metal Flashing and Trim.

B. Termination Bar: 1 inch (13 mm) wide, 98-mil thick extruded aluminum bar pre-punched 6 inches (152 mm) on center with sealant ledge.

C. TPO Coated Metal: 24 gauge, galvanized steel sheet coated with a layer of non-reinforced TPO laminate. Used to fabricate metal drip edges or other roof perimeter edging profiles. TPO Membrane may be heat welded directly to the coated metal. Sheet sizes 4 feet by 10 feet (1219 x 3048mm). Color to match membrane.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Clean surfaces thoroughly prior to installation.

D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

E. Do not commence Work until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment.

F. A vapor retarder / temporary roof may be applied to protect the inside of the structure prior to the roof system installation.

3.02 SUBSTRATE PREPARATION

A. Steel Deck:
   1. Metal decks shall be a minimum uncoated thickness of 22 gauge and have a G-90 galvanized finish on all panels.
   2. Decks shall comply with the gauge and span requirements in the current Factory Mutual Approval Guide and be installed in accordance with Loss Prevention Data Sheet 1-28 or specific FM approval.
   3. Remove any surface corrosion and repair severely corroded areas. Properly fasten loose or inadequately secured decking.

3.03 INSULATION - SYSTEM DESIGN

A. Base Layer:
   1. Type: Polyisocyanurate.
   2. Thickness: 3 1/2 inches (min. R25).
   3. Attachment Method: Mechanical.

B. Tapered System:
   1. Type: Polyisocyanurate.
   2. Field Slope: 1/4 inch per foot.
   3. Sump Slope: 1/2 inch per foot.
   4. Cricket Slope: 1/2 inch per foot.
   5. Attachment Method: Mechanical.

C. Top Layer:
   1. Type: Fiberglass mat faced Roof Board
   2. Thickness: 1/2 inches.
   3. Attachment Method: Cold Adhesive.

3.04 INSULATION PLACEMENT

A. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch (6 mm). Stagger joints both horizontally and vertically if multiple layers are provided.

B. Secure insulation to the substrate with the required mechanical fasteners or insulation adhesive in accordance with the manufacturer's current application guidelines.

C. Do not install wet, damaged or warped insulation boards.

D. Stagger joints in one direction unless joints are to be taped. Install insulation boards snug. Gaps between board joints shall not exceed 1/4 inch (6 mm). Fill all gaps in excess of 1/4 inch (6 mm) with same insulation material.

E. Wood nailers shall be at least 3 1/2 inches (89 mm) wide or 1 inch (25 mm) wider than adjacent metal flange. Thickness shall equal that of insulation but not less than 1 inch (25 mm) thickness.

F. Miter and fill the edges of the insulation boards at ridges, valleys and other changes in plane to prevent open joints or irregular surfaces. Avoid breaking or crushing of the insulation at the corners.

G. Do not install any more insulation than will be completely waterproofed each day.

3.05 INSULATION ATTACHMENT

A. Securely attach insulation to the roof deck. Attachment shall have been successfully tested to meet or exceed the calculated uplift pressure required by the International Building Codes (ASCE-7) or ANSI/SPRI WD-1

B. Enhance the perimeter and corner areas in accordance with the International Building Code (ASCE-7) or ANSI/SPRI WD-1.

3.06 MEMBRANE PLACEMENT AND ATTACHMENT

A. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour prior to attachment. Provide and secure both perimeter and field

membrane sheets in accordance with the manufacturer's most current specifications and details.

B. Secure the membrane with the required Fasteners and Plates centered over the pre-printed marks approximately 1 1/2 inches (39mm) from the edge of the membrane sheet.

C. Install adjoining membrane sheets in the same manner in accordance with the manufacturer's current application requirements.

3.07 SEAM WELDING

A. Hot-air weld membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's current guidelines. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.

B. Overlay all splice intersections with T-Joint Covers.

C. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).

D. Repair all seam deficiencies the same day they are discovered.

E. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete. Cut Edge Sealant is not required on vertical splices.

3.08 FLASHING

A. Flashing of parapets, curbs, expansion joints and other parts of the roof shall be performed using VersiWeld reinforced membrane or prefabricated accessories. VersiWeld non-reinforced membrane may be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded or prefabricated accessories is not feasible.

B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.09 WALKWAYS

A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the Contract Drawings.

B. Hot-air weld walkway pads to the membrane in accordance with the manufacturer's current application guidelines.

C. Loose lay concrete pavers over an approved protection sheet in accordance with the manufacturer's current application guidelines.

3.10 DAILY SEALS

A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal shall be performed to temporarily close the membrane to prevent water infiltration.

B. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.

3.11 CLEAN UP

A. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris shall be disposed of in a legally acceptable manner.

B. Prior to the manufacturer's inspection for warranty, the applicator shall perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

3.12 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, copings, scuppers, and other items indicated in Schedule.

B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

A. Section 07 27 26 - Fluid Applied Membrane Weather Barriers

B. Section 07 42 13 - Metal Wall Panels

C. Section 07 62 00 - Sheet Metal Flashing & Trim

D. Section 07 54 23 - TPO Membrane Roofing

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.

C. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

F. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.

G. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2013a.

H. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007 (Reapproved 2012).

I. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).

J. CDA A4050 - Copper in Architecture - Handbook; current edition.

K. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

L. ANSI/SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; 2003 (ANSI/SPRI ES-1).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with ____ years of documented experience.

C. All low slope perimeter edge metal flashings (copings, fascia, gravel stops) except gutters shall be designed and installed in accordance with ANSI/SPRI ES-1, "American National Standard for Edge Systems used with Low Slope Roof Systems."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration, staining or galvanic action.

1.07 WARRANTY

A. Warranty Certification: Installing contractor shall certify that sheet metal work has been installed per National Sheet Metal System's printed details and specifications.

B. Manufacturer warrants sheet metal fabrications are warranted to be free of defects in material and workmanship for a period of five (5) years from date of shipment.
   1. Product modification may be required to adapt to a project's geographic location, building height, or geometry. Product liability is limited to the repair or replacement of furnished materials, provided printed installation instructions have been followed.

C. Provide manufacturer's twenty (20) year finish warranty for standard coil-coated Kynar 500 colors against peeling, chalking, fading, checking and crazing, commencing upon the date of substantial completion.

D. No other warranties either expressed or implied are acceptable unless so stated in writing.

PART 2 PRODUCTS

2.01 GENERAL

A. All metals that come in contact with stone must be corrosive resistant.

B. Membrane flashing shall be EPDM as detailed on the drawings. Refer to Section 07 53 00 Elastomeric Membrane Roofing.

C. All concealed flashings shall be inspected by the Designer while flashings are visible before work may continue. Alternatively, contractor may provide photographic evidence showing proper installation.

2.02 SHEET MATERIALS FOR FLASHINGS - GENERAL

A. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 0.024 inch thick; plain finish shop pre-coated with fluoropolymer coating of color as selected.
   1. Standard length of product: 10'-0" with concealed splice plates at joints.
   2. Coping profile: Formed coping (tapered) with continuous hold down cleats front and back.

B. Pre-Finished Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; minimum 0.022 inch thick base metal, shop pre-coated with superior performance PVDF coating.
   1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
   2. Color: As selected by Designer from manufacturer's full range of color options.

2.03 COUNTERFLASHINGS, MISC. FLASHINGS

A. Acceptable Manufacturers:
   1. Fry Reglet; www.fryreglet.com
   2. Cheney Flashing Co.; www.cheneyflashing.com
   3. W.P. Hickman Co.; www.wph.com
   4. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

B. Materials
   1. Counterflashings and misc. flashings
      a. Pre-Finished Aluminum: ASTM B 209 (ASTM B 209M); 0.024 inch thickness.
      b. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color to be selected from manufacturer's standard colors.

2.04 PREFINISHED GUTTERS, CONDUCTORS, AND DOWNSPOUTS

A. Manufacturers:
   1. W.P. Hickman; www.wph.com
   2. Berger Building Products Corp.; www.bergerbp.com
   3. Englert, Inc.; www.englertinc.com
   4. Cheney Flashing Co.; www.cheneyflashing.com
   5. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

B. Materials:
   1. Prefinished steelized gauge hot-dipped galvanized steel, ASTM A446-85 Grade C, Kynar 500, fluorocarbon finish.
   2. Style: see drawings.
   3. Finish: shop finish fluoropolymer coating
   4. Color: selected from manufacturers standard colors

C. Components:
   1. Gutters: SMACNA Style rectangular, sized as shown.
   2. Downspouts: SMACNA rectangular profile with smooth surfaces; factory fabricated.
   3. Conductor Head: SMACNA style rectangular profile.
   4. Anchors and Supports: Profiled to suit gutters and downspouts.
      a. Anchoring Devices: Type recommended by fabricator. Min. 0.060 inches for heavy duty hangers and straps.
      b. Gutter Supports: Hanger style straps at 24" o.c. per SMACNA Figure 1-18B for steep slope and Figure 1-14A for low slope application.
      c. Downspout Supports: Brackets; three downspout anchor straps per 10'-0" section; .32 inch.
   5. Fasteners: Same material and finish as gutters and downspouts, with soft neoprene washers.
   6. Expansion Joints: Built in, as shown on drawings; max. 30'-0" o.c.
   7. Gutter guards: by gutter manufacturer .027 inch aluminum, perforated face.

2.05 PRE-FINISHED ALUMINUM COPINGS

A. Basis of Design: Pac Clad, PAC-Continuous Cleat Coping

B. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

C. Characteristics:
   1. Material: 0.032" thickness, formed aluminum alloy, smooth surface.
   2. Finish: Fluropolymer coating as specified herein as selected by Designer.
   3. Face height: per drawings. Back face height min. 2 1/2"
   4. Lengths: 12'-0" max, 60" min.
   5. Joints: Splice plates, concealed, in accordance with manufacturer's product data.
   6. Wind Uplift: In accordance with ANSI/SPRI, Wind Design Standards ES-1

D. Accessories:
   1. Splice plates: 24 ga. min. thickness aluminum sheet, 6" min. width, for concealed installation. Finish to match all copings.
   2. Anchor plate: Galvanized steel of manufacturer's standard design.
   3. Prefabricated sections: Factory-assembled mitered corners and transitions, extenders and end caps.
   4. Factory-supplied fasteners.

2.06 TWO COMPONENT MEMBRANE FLASHING AT EXTERIOR OPENINGS - DOORS, WINDOWS, LOUVERS

A. Basis of Design: Prosoco R-Guard Joint and Seam Filler with R-Guard Fast Flash liquid applied flashing membrane; www.prosoco.com

B. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures.

C. Adhesives & Sealants: by membrane manufacturer.

2.07 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers. At exposed fasteners, provide EPDM washers. Seal all fasteners.

B. Primer: Zinc chromate type.

C. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.

D. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.

E. Plastic Cement: ASTM D4586, Type I. Not to come in contact with EPDM.

F. Solder: ASTM B32; Sn50 (50/50) type.

2.08 FABRICATION

A. General Metal Fabrication: Shop-fabricate work to the greatest extent possible. Comply with details indicated on Drawings, and with applicable requirements of SMACNA. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded outward 1/4 inch and hemmed to form drip.

B. Seams: Fabricate non-moving seams in sheet metal with flat-lock seams. Form seams and solder tin edges to be seamed. Provide the following seam types unless noted or detailed otherwise. Provide continuous application of silicone sealant within seams to maintain seams watertight. Provide sufficient means within seams to accommodate movement of items joined together. Minimum movement capability: 1/8 inch per 10 feet.
   1. Flat Seam: Drive cleat.
   2. Corner Seam: Double Corner.

C. Expansion and Contraction:
   1. Provide for thermal expansion and contraction, and building movement in completed work, without over-stressing the material, breaking connections, or producing wrinkles and distortion in finished surfaces. Make watertight and weather-resistive.
   2. Where subject to thermal expansion and contraction, attach members with clips to permit movement without damage, or provide slotted or oversize holes with washers only, as acceptable to Designer.
   3. Make lock seam work flat and true to line, and sweat full of solder, except where installed to permit expansion and contraction.
      a. Lap flat lock seams and soldered lap seams according to pitch, but in no case less than 3 inches (76 mm). Make seams in direction of flow.

D. Cleats: Fabricate cleats and starter strips interlockable with coping and counterflashing in accordance with SMACNA or NRCA recommendations.
   1. At cleats used as termination bars at membrane flashing (and at metal base flashing) for roofing and waterproofing systems, fold top flange over to create hem not less than 1 inch wide. Extend bottom flange minimum 1/2 inch, at angle of 30 to 45 degrees from vertical to establish positive, snap-on attachment of coping and of counterflashing.

E. Sealant Joints: Where movable, non-expansion type joints are indicated, or required for proper performance of work, form metal to provide for proper installation of sealant per SMACNA standards.

F. Metal Separation: Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with bituminous coating or other permanent separation as recommended by manufacturer.

G. Soldering:
   1. Clean material and tin prior to soldering. Solder with heavy coppers of blunt design, properly tinned before use.
   2. Solder slowly with well-heated coppers. Heat seams thoroughly and completely fill with solder.
   3. Make exposed joints on finish surfaces full flowing and smooth.
   4. Wash acid flux with soda solution after soldering, and remove soldering flux on exposed and painted surfaces.

H. Accessories:
   1. Miters, scuppers, and accessory items shall be furnished by manufacturer; color to match specified profile unless noted otherwise.
   2. Factory assemblies shall be furnished to maintain watertight integrity.
   3. Provide matching accessories such as extenders, brick/wall caps, conductor heads and downspouts, or other special fabrications from the manufacturer; color to match specified profile unless noted otherwise.

I. Fascia and flashing sections furnished with strippable protective vinyl masking shall have film removed immediately before installation to prevent damage to the coating if left exposed to the ultra-violet rays of sunlight.

PART 3 EXECUTION

3.01 INSTALLATION

A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

B. Apply plastic cement compound between metal flashings and felt flashings. Not to come in contact with TPO.

C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Solder metal joints for full metal surface contact, and after soldering wash metal clean with neutralizing solution and rinse with water.

END OF SECTION

SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2015.

B. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.

C. ITS (DIR) - Directory of Listed Products; current edition.

D. FM 4991 - Approval Standard for Firestop Contractors; 2013.

E. FM (AG) - FM Approval Guide; current edition.

F. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

G. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

H. UL (FRD) - Fire Resistance Directory; current edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Product Data: Provide data on product characteristics, performance ratings, and limitations.

D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Certificate from authority having jurisdiction indicating approval of materials used.

G. Installer Qualification: Submit qualification statements for installing mechanics.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
   2. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:
   1. With minimum 3 years documented experience installing work of this type.
   2. Licensed by local authorities having jurisdiction (AHJ).
   3. Approved by firestopping manufacturer.

D. Installing Mechanic's Qualifications: Trained by firestopping manufacturer and able to provide evidence thereof.

1.06 MOCK-UP

A. Install one firestopping assembly representative of each fire rating design required on project.

1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
2. Where firestopping is intended to fill a linear opening, install minimum of 1 linear ft.

B. Obtain approval of authorities having jurisdiction (AHJ) before proceeding.

C. If accepted, mock-up will represent minimum standard for the Work.

D. If accepted, mock-up may remain as part of the Work. Remove and replace mock-ups not accepted.

1.07 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in original unopened containers bearing the name of the manufacturer, product name, type, and testing agency's identification mark.

B. Store products in accordance with manufacturer's instructions.

1.09 SEQUENCING AND SCHEDULING

A. Perform firestopping work after completion of work which penetrates fire barriers, but prior to covering up or eliminating access to the penetration. Coordinate with installers of such other work.

PART 2 PRODUCTS

2.01 FIRESTOPPING SYSTEMS

A. Firestopping:
1. Fire Ratings: See drawings for required systems and ratings.

2.02 MATERIALS

A. Elastomeric Silicone Firestopping: Single component silicone elastomeric compound and compatible silicone sealant; conforming to the following:
1. Manufacturers:
a. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures

B. Foam Firestoppping: Single component silicone foam compound; conforming to the following:
1. Manufacturers:
a. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures

C. Fibered Compound Firestopping: Formulated compound mixed with incombustible non-asbestos fibers; conforming to the following:
1. Manufacturers:
a. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures

D. Fiber Firestopping: Mineral fiber insulation used in conjunction with elastomeric surface sealer forming airtight bond to opening; conforming to the following:
1. Manufacturers:
a. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures

E. Firestop Devices - Wrap Type: Mechanical device with incombustible filler and sheet stainless steel jacket, intended to be installed after penetrating item has been installed; conforming to the following:
1. Manufacturers:
a. Grace Construction Products: www.na.graceconstruction.com.
b. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures

F. Firestop Devices - Cast-In Type: Sleeve and sealing material, intended to be cast in concrete floor forms or in concrete on metal deck, not requiring any additional materials to achieve penetration seal.
   1. Manufacturers:
      a. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures

G. Intumescent Putty: Compound that expands on exposure to surface heat gain; conforming to the following:
   1. Manufacturers:
      a. Grace Construction Products: www.na.graceconstruction.com.
      b. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures

H. Reusable Firestopping: Removable intumescent compressible shapes, pillows, or blocks specifically tested in removable configuration; conforming to the following:
   1. Manufacturers:
      a. Grace Construction Products: www.na.graceconstruction.com.
      b. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures

2.03 TESTING REQUIREMENTS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS:

A. Testing shall have been conducted or witnessed by an independent testing agency acceptable to governing authorities.
   1. Test methods: ASTM E 814 or UL 1479.
   2. Conduct tests with a higher pressure inside the chamber than outside, but not less than 0.01 inches of water.
   3. Walls: Use any system listed by UL or tested in accordance with ASTM E 814 that has an F Rating not less than the fire rating of the penetrated assembly and that meets all other specified requirements.
   4. Horizontal Assemblies: Use any system listed by UL or tested in accordance with ASTM E 814 that has both a minimum F Rating and a minimum T Rating of 1 hour but not less than the required rating of the assembly penetrated, and that meets all other specified requirements.
   5. The listing of the assembly to be used in the current edition of one of the following classification guides will be considered evidence or acceptable testing:
      a. UL (FRD); Underwriters Laboratories Inc., "Fire Resistance Directory."
      b. Warnock Hersey, "Certification Listings."

B. Penetration Assembly Labels: Permanent, red marking with black lettering.
   1. For marking firestopping assemblies, use self-adhesive tape or wired on labels.
   2. Legend:
      a. Fire-Rated Assembly - Do not disturb - See maintenance instructions.
      b. Product manufacturer's name.
      c. U.L. Des. No. _____
      d. F rating: _____
      e. T rating: _____
      f. Installer's name

C. Partition Labels:
   1. Permanent, red lettering with legend "Fire and Smoke Barrier - Protect All Openings."
   2. Use letters at least 3 inches (77 mm) high.

D. Testing Requirements for Joints: Testing shall have been conducted or witnessed by an independent testing agency acceptable to governing authorities.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

C. Install labeling required by code.

3.04 PERMANENT IDENTIFICATION

A. Affix penetration assembly labels to each fire-stop penetration assembly.

B. Install partition labels on fire rated partitions above lay-in ceilings at intervals not exceeding 12 feet.

3.05 PROTECTION

A. Clean adjacent surfaces of firestopping materials.

B. Protect adjacent surfaces from damage by material installation.

3.06 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Firestop Systems with No Penetrating Items:
   1. Available UL-Classified Systems: C-BJ-XXXX and W-L-XXXX

C. Firestop Systems for Metallic Pipes, Conduit, or Tubing:
   1. Available UL-Classified Systems: W-L-1166

D. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing:
   1. Available UL-Classified Systems: C-BJ-XXXX and W-L-XXXX

E. Firestop Systems for Electrical Cables (in conduit):
   1. Available UL-Classified Systems: W-L-3031

F. Firestop Systems for Insulated Pipes:
   1. Available UL-Classified Systems: C-BJ-XXXX and W-L-XXXX

G. Firestop Systems for Miscellaneous Electrical Penetrants:
   1. Available UL-Classified Systems: C-BJ-XXXX and W-L-XXXX

H. Firestop Systems for Miscellaneous Mechanical Penetrants:
   1. Available UL-Classified Systems: C-BJ-XXXX and W-L-XXXX

I. Firestop Systems for Groupings of Penetrants:
   1. Available UL-Classified Systems: C-BJ-XXXX and W-L-XXXX.

END OF SECTION

SECTION 07 90 05
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

B. Precompressed foam sealers.

1.02 RELATED REQUIREMENTS

A. Section 04 20 00 - Unit Masonry

B. Section 06 20 00 - Finish Carpentry

C. Section 07 84 00 - Firestopping

D. Section 08 80 00 - Glazing

E. Section 09 21 16 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2014.

B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

D. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.

E. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2014.

F. ASTM D1667 - Standard Specification for Flexible Cellular Materials--Poly(Vinyl Chloride) Foam (Closed-Cell); 2005 (Reapproved 2011).

G. ASTM D2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements; 1991 (Reapproved 2011).

H. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.04 DEFINITIONS

A. M Type Substrates: Concrete, concrete masonry units, brick, mortar, natural stone. The term masonry means brick, stone, and concrete masonry work.

B. G Type Substrates: Glass and transparent plastic glazing sheets.

C. A Type Substrates: Metals, porcelain, glazed tile, and smooth plastics.

D. O Type Substrates: Wood, unglazed tile; substrates not included under other categories.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating sealant chemical characteristics.

C. Samples: Submit two samples illustrating sealant colors for selection.

1.06 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

C. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

1.07 MOCK-UP

A. Provide mock-up of sealant joints in conjunction with window under provisions of Section 01 40 00.

B. Construct mock-up with specified sealant types and with other components noted.

C. Locate where directed.

D. Mock-up may remain as part of the Work.

1.08 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.09 COORDINATION

A. Coordinate the work with all sections referencing this section.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Silicone Sealants:
   1. Tremco, Inc.: www.tremcosealants.com
   2. Dow Corning: www.dowcorning.com. Basis of design: Dow 795.
   3. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

B. Polyurethane Sealants:
   1. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

C. Polysulfide Sealants:
   1. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

D. Acrylic Sealants (ASTM C920):
   1. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

E. Butyl Sealants:
   1. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

F. Acrylic Emulsion Latex Sealants:
   1. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

G. Acoustical Sealants
   1. Pecora Corporation: www.pecora.com
   2. Tremco Sealants: www.tremcosealants.com
   3. Quiet Solution: www.quietsolution.com
   4. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

H. Preformed Compressible Foam Sealers:
   1. EMSEAL Joint Systems, Ltd: www.emseal.com/#sle.
   2. Sandell Manufacturing Company, Inc: www.sandellmfg.com/#sle.
   3. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
   4. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

2.02 SEALANTS

A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

B. Silicone Sealant: ASTM C920, Grade NS, Class 25 minimum; Uses NT, A, G, M, O; single component, neutral curing, non-sagging, non-staining, fungus resistant, non-bleeding.
   1. Applications:
      a. Weather sealing
      b. Glazing
      c. Attachment
   2. Color: Standard colors matching finished surfaces.
   3. Movement Capability: Plus and minus 25 percent.
   4. Service Temperature Range: -65 to 180 degrees F.
   5. Shore A Hardness Range: 15 to 35.

C. General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25 minimum; Uses M, G, and A; single component.
   1. Color: Standard colors matching finished surfaces.

D. Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent;
   1. Face color: standard colors matching finished surfaces.
   2. Size as required to provide weathertight seal when installed.
   3. Provide product recommended by manufacturer for traffic-bearing use.
   4. Applications:
      a. Exterior wall expansion joints.

E. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
   1. Applications:
      a. Concealed sealant bead in sheet metal work.

F. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
   1. Color: Standard colors matching finished surfaces.
   2. Applications:
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces.
      c. Other interior joints for which no other type of sealant is indicated.

G. Acoustical Sealant for Concealed Locations:
   1. Applications:
      a. Sealant bead between top stud runner and structure and between bottom stud track and floor.

H. Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single component.
   1. Approved by manufacturer for wide joints up to 1-1/2 inches.
   2. Color: Standard colors matching finished surfaces.
   3. Applications:
      a. Expansion joints in floors.

I. Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single component.
   1. Color: Gray.
   2. Applications:
      a. Joints in sidewalks and vehicular paving.

J. Acrylic Emulsion Latex: ASTM C834, single component, non-staining, non-bleeding, non-sagging.
   1. Color: Standard colors matching finished surfaces, Type OP (opaque).
   2. Movement Capability: 2 to 5 percent.

3. Grade: ASTM C834 Grade minus 18 degrees C
4. Shore A Hardness Range: 15 to 40.

K. Acrylic Sealant: ASTM C920, Grade NS, Class 12-1/2, Uses NT, M, A, O; single component, solvent curing, non-staining, non-bleeding, non-sagging.
1. Color: Standard colors matching finished surfaces.

L. Butyl Sealant: ASTM C1311; single component, solvent release, non-skinning, non-sagging.
1. Color: Standard colors matching finished surfaces.
2. Movement Capability: Plus and minus 12-1/2 percent.
3. Service Temperature Range: -13 to 180 degrees F.
4. Shore A Hardness Range: 10 to 30.

M. Nonsag Polysulfide Sealant: ASTM C920, Grade NS, Class 25, Uses NT, I, M, A, G, O; two component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging type.
1. Color: Standard colors matching finished surfaces.
2. Movement Capability: Plus and minus 25 percent.
3. Service Temperature Range: -40 to 180 degrees F.
4. Shore A Hardness Range: 20 to 35.

N. Self-Leveling Polysulfide Sealant: ASTM C920, Grade P, Class 25, Uses T, I, M, A, O; two component, chemical curing, non-staining, non-bleeding, capable of continuous water immersion, self-leveling type.
1. Color: Standard colors matching finished surfaces.
2. Movement Capability: Plus and minus 25 percent.
3. Service Temperature Range: -40 to 180 degrees F.
4. Shore A Hardness Range: 20 to 35.

O. Nonsag Polyurethane Sealant: ASTM C920, Grade NS, Class 25, Uses NT, I, M, A, G, O; single component, chemical curing, non-staining, non bleeding, capable of continuous water immersion, non-sagging type.
1. Color: Standard colors matching finished surfaces.
2. Movement Capability: Plus and minus 25 percent.
3. Service Temperature Range: -40 to 180 degrees F.
4. Shore A Hardness Range: 20 to 35.

P. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Class 25 minimum; Uses T, I, M, A, O; single component, chemical curing, non staining, non bleeding, capable of continuous water immersion, self-leveling type.
1. Color: Standard colors matching finished surfaces.
2. Movement Capability: Plus and minus 25 percent.
3. Service Temperature Range: -40 to 180 degrees F.
4. Shore A Hardness Range: 20 to 35.

2.03 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

E. Install bond breaker where joint backing is not used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Tool joints concave.

H. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect sealants until cured.

END OF SECTION

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Hollow metal frames for wood doors.

C. Fire-rated hollow metal doors and frames.

D. Thermally insulated hollow metal doors with frames.

E. Hollow metal borrowed lites glazing frames.

F. Accessories, including glazing, louvers, and matching panels.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

B. Section 08 80 00 - Glazing

C. Section 09 21 16 - Gypsum Board Assemblies

D. Section 09 90 00 - Painting and Coating

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2007 (R2011).

C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.

I. ASTM C236 - Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box; 1989 (Reapproved 1993).

J. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.

K. ASTM E413 - Classification for Rating Sound Insulation; 2010.

L. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.

M. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

N. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000 (ANSI/DHI A115 Series).

O. ITS (DIR) - Directory of Listed Products; current edition.

P. NAAMM HMMA 805 - Recommended Selection and Usage Guide for Hollow Metal Doors and Frames; 2012.

Q. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

R. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

S. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.

T. NAAMM HMMA 850 - Fire-Protection and Smoke Control Rated Hollow Metal Door and Frame Products; 2014.

U. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames; 2013.

V. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2006.

W. NAAMM HMMA 865 - Guide Specifications for Sound Control Hollow Metal Doors and Frames; 2013.

X. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

Y. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.

Z. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.

AA. UBC Std 7-2, Part II - Test Standard for Smoke- and Draft-control Assemblies; International Conference of Building Officials; 1997.

AB. UL (BMD) - Building Materials Directory; current edition.

AC. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

AD. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

AE. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:

1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.

2. Republic Doors: www.republicdoor.com.
3. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

2.02 DESIGN CRITERIA

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
   4. Door Edge Profile: Manufacturers standard for application indicated.
   5. Typical Door Face Sheets: Flush.
   6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
   7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
   8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.

B. Hollow Metal Panels: Same construction, performance, and finish as doors.

C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Exterior Doors :18 ga. min.
   1. Grade: ANSI A250.8 Level 2, 18 gauge minimum. Full Flush.
   2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
   3. Top Closures for Outswinging Doors: Flush with top of faces and edges.
   4. Thickness: 1 3/4" thick
   5. Door Face Sheets: Flush.
   6. Insulating Value: U-value of 0.20, when tested in accordance with ASTM C1363 and ASTM C591.
   7. Weatherstripping: Refer to Section 08 71 00.
   8. Door Finish: Factory finished.
   9. Insulated doors shall have 20 ga. vertical steel stiffeners spanning the full thickness of the interior space between door faces.
   10. Drip cap: Galvanized steel field painted per Section 09 90 00. Secure to frame per manufacturer's recommendations.

B. Interior Doors, Non-Fire Rated:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
   2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
   3. Door Thickness: 1-3/4 inch, nominal.

4. Door Finish: Factory finished.

C. Interior Doors, Fire-Rated: (20 min, 45 min, 60 min, 90 min)
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 1 - Standard-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
      d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
   2. Based on NAAMM HMMA Custom Guidelines: Comply with NAAMM HMMA 850 requirements for fire-rated doors.
      a. Comply with guidelines of NAAMM HMMA 860 for Hollow Metal Doors and Frames.
      b. Performance Level 1 - Light Duty, in accordance with NAAMM HMMA 805.
      c. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
   3. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
      a. Temperature-Rise Rating (TRR) Across Door Thickness: In accordance with local building code and authorities having jurisdiction.
      b. Provide units listed and labeled by UL (DIR) or ITS (DIR).
      c. Attach fire rating label to each fire rated unit.
   4. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
   5. Door Finish: Factory finished.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. General:
   1. Comply with the requirements of grade specified for corresponding door.
      a. ANSI A250.8 Level 2 Doors: 16 gage frames.
      b. Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 for Level 2, 16 gage.
      c. Frames for Sound-Rated Wood Doors: Comply with frame requirements specified in ANSI A250.8 for Level 2, 16 gage.

C. Exterior Door Frames: Knock-down type.
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
   2. Frame Finish: Factory primed and field finished.
   3. Weatherstripping: Separate, see Section 08 71 00.

D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
   1. Frame Finish: Factory finished.

E. Door Frames, Fire-Rated: Knock-down type.
   1. Fire Rating: Same as door, labeled.
   2. Frame Finish: Factory finished.

F. Sound-Rated Door Frames: Knock-down type.
   1. Frame Finish: Factory finished.

G. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

H. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

I. Sidelites: Fixed, of profile same as jamb and head.

2.05 ACCESSORIES

A. Louvers: Roll formed steel with overlapping frame; finish same as door components; factory-installed.

B. Glazing: As specified in Section 08 80 00, factory installed.

C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

D. Astragals for Double Doors: Specified in Section 08 71 00.
   1. Exterior Doors: Steel, Z-shaped.
   2. Fire-Rated Doors: Steel, shape as required for fire rating.

E. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.

F. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

G. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

2.06 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

B. Factory Finish: Complying with ANSI/SDI A250.3, manufacturer's standard coating.

C. Factory Finish: Complying with ANSI A 250.3, manufacturer's standard coating of color as selected.

D. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Install door hardware as specified in Section 08 71 00.

F. Comply with glazing installation requirements of Section 08 80 00.

G. Coordinate installation of electrical connections to electrical hardware items.

H. Touch up damaged factory finishes.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Adjust sound control doors so that seals are fully engaged when door is closed.

C. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.

3.06 SCHEDULE

A. Refer to Door and Frame Schedule: See Drawings.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush configuration; fire rated, non-rated, acoustical, and special function.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames.

B. Section 08 71 00 - Door Hardware.

C. Section 08 80 00 - Glazing.

D. Section 09 90 00 - Painting and Coating

1.03 REFERENCE STANDARDS

A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.

B. ASTM E413 - Classification for Rating Sound Insulation; 2010.

C. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.

D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

E. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.

F. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

G. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

H. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

I. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2013.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Specimen warranty.

D. Test Reports: Show compliance with specified requirements for the following:
   1. Sound-retardant doors and frames; sealed panel tests are not acceptable.
   2. Electrostatic shielded doors and frames.

E. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing.

F. Samples: Submit two samples of door construction cut from top corner of door.

G. Samples: Submit two samples of door veneer, 12" x 12" in size illustrating wood grain, stain color, and sheen.

H. Submit wood or metal frames for light openings, minimum 3 inches long, for each material, type, and finish required.

I. Manufacturer's Installation Instructions: Indicate special installation instructions.

J. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.

C. Installed Fire Rated Door and Transom Panel Assembly: Conform to NFPA 80 for fire rated class as indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 PROJECT CONDITIONS

A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Graham Wood Doors: www.grahamdoors.com
   2. Algoma Hardwoods: www.algomahardwoods.com
   3. Marshfield DoorSystems, Inc: www.marshfielddoors.com.
   4. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

2.02 DOORS

A. All Doors: See drawings for locations and additional requirements.
   1. Quality Level: Custom Grade, Extra Heavy Duty performance, in accordance with WDMA I.S.1-A and Face Veneer WDMA "A" grade.
   2. Wood Veneer Faced Doors: Select white birch species, plain sliced, with book matched grain for transparent finish. 5-ply with factory finish.
      a. All sides to be finished.
      b. Refer to Finish Schedule for stain color.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction. Wood veneer facing.
   1. Provide solid core doors at all locations.
   2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with International Building Code ("positive pressure"); UL or WH (ITS) labeled without any visible seals when door is open.

2.03 DOOR CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

C. Sound Resistant Doors (as indicated on door schedule): Equivalent to type, with particleboard core (PC) construction with core as required to achieve STC rating of 45; piles and faces as indicated above.

2.04 DOOR FACINGS

A. Wood Veneer Facing with Factory Finish
   1. Vertical Edges: Any option allowed by custom standard for grade.
   2. Pairs: Pair match each pair; set match pairs within 10 feet of each other when doors are closed.

B. Facing Adhesive: Type I - waterproof.
   1. No formaldehyde.

2.05 METAL FRAMES

A. Frames for Lite Openings:
   1. Manufacturer's standard wood frame to match door species and finish.
   2. Approved for use in doors of fire-protection rating indicated.

2.06 ACCESSORIES

A. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

2.07 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. All doors:
   1. Provide solid blocks at lock edge for hardware reinforcement. Thru-bolting is not allowed.
   2. Provide closer blocks at top edge of door to eliminate thru-bolting. Thru-bolting of closers is not allowed.

C. Fit door edge trim to edge of stiles after applying veneer facing.

D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

F. Provide edge clearances in accordance with the quality standard specified.

2.08 FACTORY FINISHING - WOOD VENEER DOORS

A. Finish work in accordance with WDMA 1.S 1A for grade specified.

B. Factory finished doors in accordance with specified quality standard Heavy Duty Performance.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Field-Finished Doors: Trimming to fit is acceptable.
   1. Adjust width of non-rated doors by cutting equally on both jamb edges.
   2. Trim maximum of 3/4 inch off bottom edges.
   3. Trim fire-rated doors in strict compliance with fire rating limitations.

D. Use machine tools to cut or drill for hardware.

E. Coordinate installation of doors with installation of frames and hardware.

F. Coordinate installation of glazing.

3.03 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, and squareness.

C. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 by 84 inches surface area.

D. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 by 84 inches surface area.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 SCHEDULE

A. Refer to Door and Frame Schedule appended to this section.

END OF SECTION

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall and ceiling access door and frame units.

B. Access door and frame units, fire-rated and non-fire-rated, in wall and ceiling locations.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies

B. Section 09 90 00 - Painting and Coating

C. Division 22 - Plumbing components requiring access.

D. Division 23 - HVAC components requiring access.

E. Division 26 - Electrical components requiring access.

1.03 REFERENCE STANDARDS

A. ITS (DIR) - Directory of Listed Products; current edition.

B. UL (FRD) - Fire Resistance Directory; current edition.

1.04 DESIGN REQUIREMENTS

A. Fabricate floor access assemblies to support live load of 100 lb/sq ft with deflection not to exceed 1/180 of span.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of each access door and/or panel unit.

D. Manufacturer's Installation Instructions: Indicate installation requirements.

E. Project Record Documents: Record actual locations of each access unit.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated access doors.
   1. Provide access doors of fire rating equivalent to the fire rated assembly in which they are to be installed.

B. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.

1.07 PROJECT CONDITIONS

A. Coordinate the work with other work requiring access doors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Access Doors:
   1. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.
   2. Barco Access Doors by Metal Service C., Inc.
   3. J.L. Industries
   4. Nystrom: www.nystrom.com
   5. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

2.02 ACCESS DOORS AND PANELS

A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.

B. Units in Fire Rated Assemblies: Fire rating equivalent to the fire rated assembly in which they are to be installed.
   1. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.
   2. Provide certificate of compliance from authority having jurisdiction indicating approval of fire rated doors.

2.03 WALL AND CEILING MOUNTED UNITS

A. Door and Frame Units: Formed steel.
   1. Frames and flanges: 0.058 inch steel.
   2. Door panels: 0.070 inch single thickness steel sheet.
   3. Door/Panel Size: As indicated on the drawings.
   4. Hardware:
      a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
      b. Hinge: Concealed constant force closure spring type and an interior release handle.
      c. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.
   5. Galvanized, hot dipped finish.
   6. Finish: One coat baked enamel, to match adjacent surface color.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Wide Stile Aluminum doors and frames.

C. Weatherstripping.

D. Door hardware.

E. Perimeter sealant.

1.02 RELATED REQUIREMENTS

A. Section 04 20 00 - Unit Masonry

B. Section 05 5000 - Metal Fabrications

C. Section 07 8400 - Firestopping

D. Section 07 9005 - Joint Sealers

E. Section 08 7100 - Door Hardware

F. Section 08 8000 - Glazing

G. Section 09 21 16 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

B. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; 2009.

C. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2014.

D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.

E. AAMA 612 - Voluntary Specification, Performance Requirements, and Test Procedures for Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum; 2015.

F. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

G. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.

H. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.

I. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

J. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.

K. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

L. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

M. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

N. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

O. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

P. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

Q. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

R. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

S. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

T. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential; 2000 (Reapproved 2009).

U. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

V. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 PERFORMANCE REQUIREMENTS

A. Design and size components to withstand the following load requirements without damage or permanent set, when tested in accordance with ASTM E 330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   1. Design Wind Loads: Comply with requirements of ASCE 7.
   2. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
      a. Deflection Normal to Glazing Plane: The deflection shall not exceed 1/175 of clear span for spans up to 13 feet 6 inches or 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
      b. Deflection Parallel to Glazing Plane: The deflection shall not exceed that which reduces the glazing bite to less than 75 percent of the design dimension or that which reduces the edge clearance between framing members and glazing or other fixed components directly below them to less than 1/8 inch.
   3. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.

B. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E 283.

C. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with the inside pane of glass and inner sheet of infill panel and heel bead of glazing compound.

D. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 12 lbf/sq ft.

E. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

F. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

G. Condensation Resistance & Thermal Transmittance per UA Standard. Measure in accordance with AAMA 1503 with 1 inch (25 mm) insulating glass installed.

H. Thermal Transmittance: When tested according to criteria listed in AAMA 1503, the thermal transmittance shall not exceed .45 BTU/(sf*hr*deg F degrees). Thermal breaks are required. Thermally improved or thermally skipped bridged systems are not allowed.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details . Test data less than 5 years old.

C. Shop Drawings: Indicate system dimensions,anchorage, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required. Submit details for specific adjacent construction for this project.

1. Shop drawings shall be configured in such a manner that the submitted window details may be easily compared with details provided on the architectural drawings. Shop drawings shall use numbering systems consistent with those provided on the architectural drawings. Shop drawings shall be specific to the project. Generalized drawings are not acceptable. All details should be thoroughly dimensioned. The following items shall be clearly detailed on the shop drawings:
   a. Plan & elevation views.
   b. Details addressing anchorage.
   c. Jamb, sill, sill pans and head details.
   d. Hardware.
   e. Flashing details.
   f. Drainage.
   g. Weather stripping
   h. Thermal breaks.
   i. Wind deflection charts.

D. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

E. Samples: Submit two samples 12 x 12 inches in size illustrating finished aluminum surface, glass, glazing materials.

F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

G. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

H. Warranty: Submit manufacturer warranty sample for approval and ensure forms have been completed in Owner's name and registered with manufacturer.

I. Installation Manual. Include written installation instructions for each type of window assembly, QC task checklist showing each step of window installation and a signoff column for each task. This checklist is to be used for all windows installed and the QC manual shall be kept on record by the Contractor to be viewed at any time by Owner or Designer.

1.07 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.09 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide Ten year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting, condensation and other performance criteria. Include labor and material for replacement of failed units at no added cost to the owner.

D. Provide Ten year manufacturer warranty against excessive degradation of exterior finish. Warranty shall provide labor & material for replacement of units with excessive fading, chalking, or flaking at no added cost to the owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: See below under description of products.
   1. Kawneer Trifab 601T Framing System, 2" sightline, center set
      a. Exterior Storefront: Trifab 601T. 2" x 6" deep.
      b. Interior Storefront: Trifab 451, non-thermal, 2" wide x 4 1/2" deep
      c. Aluminum Entrances: Factory Fabricated, Kawneer 500 heavy wall storefront entrance with 10" bottom rail.

B. Aluminum-Framed Storefront and Doors:
   1. Oldcastle Building Envelope (VistaWall; Product Series 3000 Thermal, MultiPlane, Center Set: www.oldcastlebe.com.
   2. United States Aluminum Corp: www.usalum.com.
   3. Tubelite, Inc.; www.tubeliteinc.com.

C. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

2.02 STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Position: Centered (front to back).
   2. Vertical Mullion Dimensions: 2 inches wide by 6 inches deep.
   3. Water Leakage Test Pressure Differential: None, when measured in accordance with ASTM E331 with a test pressure difference of 12 lbf/sq ft.
   4. Air Infiltration Test Pressure Differential: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft (0.3 L/s/sq m) of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E 283.
   5. Finish: Clear anodized or as selected by Architect from manufacturer's full line of standard colors.
      a. Conforming to AA-N1ZC22A31 and AAMA 611.
      b. Architectural Class II, etched, medium matt, clear anodic coating 0.4 mils minimum thickness.

2.03 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.

1. Framing members for interior applications need not be thermally broken.
2. Glazing Stops: Flush.
3. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member. Isolate steel from aluminum with separation sheet or paint. Use Stainless steel connections between all dissimilar materials.

B. Swing Doors: Glazed aluminum.
1. Frame: 2 inches wide x 4-1/2" deep.
2. Type: 500 heavy wall (2" deep, 5" vertical stiles and top rail, 10" bottom rail)
3. Glazing: exterior: 1" insulated, tinted / interior: 1/4" tempered, clear.
4. Glazing Stops: Square.
5. Finish: Clear anodized or as selected by Architect
6. Mid rail shall be 6" wide.

C. Three Section Window Units
1. Window units with 3 sections shall have (2) horizontal mullions between each section with a brake metal cover between, .090 thick, clear anodized finish to match other storefront.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Sheet Aluminum: ASTM B209 (ASTM B209M).

C. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.

D. Fasteners: Stainless steel.

E. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch minimum thickness; finish to match framing members.

F. Concealed Flashings:.032 inch thick aluminum.

G. Perimeter Sealant: Type Silicone specified in Section 07 90 05.

H. Glass: As specified in Section 08 80 00.
1. Glass in Exterior Framing: Type 1" Insulating Tinted, fully tempered where required.
2. Glass in Interior Framing: Type 1/4" Fully tempered clear, fully tempered where required.
3. Glass in Doors: Type 1" Fully tempered, insulating, clear, fully tempered where required.

I. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

J. Glazing Accessories: As specified in Section 08 80 00.

K. Shop and Touch-Up Primer for Steel Components: SSPC-Paint 25, zinc oxide, alkyd, linseed oil primer.

L. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.05 FINISHES

A. Clear anodized or as selected by Architect.

B. Touch-Up Materials: As recommended by coating manufacturer suitable for mechanical field application using portable powered equipment. Manual touch up, or refinishing is not permitted.

2.06 HARDWARE

A. General: Provide heavy-duty units in sizes and types recommended by entrance system and hardware manufacturers for entrances and uses indicated.

B. Opening-Force Requirements:
1. Egress Doors: Not more than 30 lbf (133 N) required to set door in motion and not more than 15 lbf (67 N) required to open door to minimum required width.

C. Continuous Hinges: See hardware section 08 71 00

D. Panic Exit Devices: See Section 08 71 00 - Door Hardware

E. Cylinders: See Section 08 71 00 - Door Hardware

F. Mullions: See Section 08 71 00 - Door Hardware.
   1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.
   2. Acceptable Product: Von Duprin #4854 Elec. Disconnect Mullions prepared for electric strike as specified in F. above.

G. Closers: LCN only. No substitutions. See Section 08 71 00 - Door Hardware

H. Door Stops: See Section 08 71 00 - Door Hardware

I. Weather Stripping: Manufacturer's standard replaceable components.
   1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287 molded PVC.
   2. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

J. Silencers: BHMA A156.16, Grade 1.

K. Thresholds: See Section 08 71 00 - Door Hardware

L. Door Hardware: Coordinate with hardware schedule Section 08 71 00.
   1. Finish on Hand-Contacted Items: Satin Stainless Steel.
   2. Include for each exterior door weatherstripping, sill sweep strip, threshold, pivots, push handle, pull handle, closer, and full length hinges. Coordinate with hardware schedule Section 08 71 00.
   3. Include for each interior door : Heavy duty continuous hinges. Coordinate with hardware schedule Section 08 71 00.

2.07 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

E. Arrange fasteners and attachments to conceal from view.

F. Reinforce components internally for door hardware .

G. Reinforce framing members for imposed loads.

H. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
   1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Coordinate attachment and seal of perimeter air and vapor barrier and flashing materials.

I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

J. Install operating sash.

K. Set thresholds in bed of sealant and secure.

L. Install hardware using templates provided.
   1. See Section 08 71 00 for hardware installation requirements.

M. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.

N. Install perimeter sealant in accordance with Section 07 90 05.

O. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

P. Do not block weeps.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.

B. Test installed storefront for water leakage in accordance with AAMA 501.2. Test a minimum of 6 lites unless directed otherwise by the owner.

C. Provide field testing of installed storefront system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as indicated on drawings.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
   3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf.
      a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.

D. Repair or replace storefront components that have failed designated field testing, and retest to verify performance conforms to specified requirements.

E. Test per ASTM E1105 as required by the Owner. Test at 2/3 lab pressure.

F. Failed Test: Additional testing will be required & paid by the contractor. Contractor to submit written plan to owner for approval. Plan shall contain: 1) Statement of problem. 2) Plan of repair. 3) Additional tests required.

G. Test mock ups per procedures on AAMA 501.2 without veneer installed. Test a minimum of two mock up lites.

H. Contractor shall provide access and make repairs required for testing.

3.05 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

3.06 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

C. Remove excess sealant by method acceptable to sealant manufacturer.

3.07 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass.

B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames

B. Section 08 14 16 - Flush Wood Doors

C. Section 08 43 13 - Aluminum Framed Storefronts

D. Section 10 28 00 - Toilet & Utility Accessories

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

D. ASTM C1036 - Standard Specification for Flat Glass; 2011.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

F. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.

G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

I. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.

J. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

K. GANA (GM) - GANA Glazing Manual; 2009.

L. GANA (SM) - GANA Sealant Manual; 2008.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Samples: Submit two samples 12" x 12" in size of glass units, showing coloration and design.

E. Samples: Submit 6 inch long bead of glazing sealant, color to be selected by Designer.

F. Certificates: Certify that products meet or exceed specified requirements.

G. Manufacturer's Certificate: Certify that glass meets or exceeds specified requirements.

H. Tennessee Sustainable Guidelines required submittals.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.06 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for additional mock-up requirements.

B. Provide mockup of the following:
   1. Curtain wall systems
   2. Storefront systems

C. Locate where directed by Architect.

D. Mock-up may remain as part of the Work.

1.07 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.08 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

C. Laminated Glass: Provide a five (5) year warranty to include coverage for delamination, including replacement of failed units.

1.10 MAINTENANCE PRODUCTS

A. Provide two of each glass size and each glass type,.

PART 2 PRODUCTS

2.01 EXTERIOR GLAZING ASSEMBLIES

A. Structural Design Criteria: Select type and thickness to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with International Building code (IBC) 2015 Edition.
   1. Glass thicknesses listed are minimum.

B. Air and Vapor Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier:
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.
   2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

2.02 FLOAT GLASS MATERIALS

A. Float Glass Manufacturers:
   1. Vitro Industries, Inc: www.vitroglazings.com.
   2. ACH Glass/Versalux: www.versaluxglass.com.
   3. Pilkington North America Inc: www.pilkington.com/na.
   4. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

B. Float Glass:
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
   3. Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.
   4. Thicknesses: 1/4".

C. Sealed Insulating Glass Units:
   1. Application: Exterior glazing where indicated on drawings.

2. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
3. Tint: PPG Solargray.
4. Coating: Same as on vision units, on #2 surface.
5. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
6. Tint: Clear.
7. Opacifier: Elastomeric coating, on #4 surface.
8. Opacifier Color: white.
9. Total Thickness: 1 inch.

D. Low E Glass: Float type, heat strengthened, tinted gray
1. Coating on surface indicated.
2. Visible light transmittance of 30 percent, solar light transmittance of 17 percent, shading coefficient of.28.
3. Comply with ASTM C 1036, Type I, transparent flat, Quality Q3 (glazing select).
4. Comply with ASTM C 1048.
5. 1/4" (6 mm).

2.03 INSULATING GLASS - STOREFRONT WINDOWS AND DOORS

A. General
1. Triple Insulated glass units consist of glass lites separated by a dehydrated airspace that is hermetically dual sealed with a primary seal of polyisobutylene (PIB), or thermo plastic spacer (TPS) and a secondary seal of silicone or an organic sealant depending on the application.
2. Insulating glass units are certified through the Insulating Glass Certification Council (IGCC) to ASTM E2190.

B. Performance Characteristics - Basis of Design Vitro Solarban 60
1. Exterior Lite - 1/4" Vitro Solar Gray
2. Interior Lite - 1/4" Vitro Solarban 60 on Clear Low-E #3
3. Second Interior Lite - 1/4" clear tempered glass
4. 1/2" Cavity - Air Standard
5. Performance Characteristics
   a. Winter U-factor/U-value: 0.29
   b. Visible Light Transmittance: 27%
   c. Summer U-factor/U-value: 0.27
   d. Visible Light Reflectance: 15%
   e. Solar Heat Gain Coefficient: 0.20
   f. Shading Coefficient: 0.23
   g. Total Solar Transmittance: 13%
   h. Light to Solar Gain: 1.35
   i. Total Solar Reflectance (outside): 8%

2.04 GLAZING COMPOUNDS

A. Manufacturers:
1. Tremco, Inc.: www.tremcosealants.com
2. Bostik Inc: www.bostik-us.com/#sle.
3. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com/#sle.
4. Substitutions: Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form..

B. Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; grey color.

C. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

D. Silicone Sealant : Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C 920, Type S, Grade NS, Class 25, Uses M, A, and G; cured Shore A hardness of 15 to 25; color as selected by Designer.

2.05 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.
   1. Manufacturers:
      a. Pecora Corporation: www.pecora.com/#sle.
      b. Tremco Global Sealants: www.tremcosealants.com/#sle.
      c. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; color as selected by Designer.

E. Glazing Clips: Manufacturer's standard type.

2.06 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing for all glass.

B. Test samples in accordance with ANSI Z97.1.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

E. Install sealants in accordance with manufacturer's instructions.

3.03 INSTALLATION - EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

A. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

B. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

E. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
   1. Place glazing tape on glazing pane of unit with tape flush with sight line.

F. Fill gap between glazing and stop with glazing manufacturer's recommended type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

G. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.04 INSTALLATION - INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

A. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

D. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.

E. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.

F. Trim protruding tape edge.

3.05 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.06 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.07 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 09 06 00
FINISH SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Finish Schedule

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. The manufacturers listed in the finish schedule are the Basis of Design.
B. Refer to the individual specification section for equal manufacturers.
C. Substitutions shall meet the original specification material characteristics including but not limited to durability, recycled content, color, texture, pattern and sheen.
D. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

2.02 FINISH SCHEDULE

Flooring

Floor Tile 1 – Crossville, Java Joint 12” x 24”, JAV05 French Press
Installed Straight Joint
Laticrete Spectralock Pro Grout, 45 Raven

Sealed Concrete – Kemiko Clear -A- Thanc with slip resistant additive

VCT – to match existing VCT in existing Band Room

Rubber Floor Base

4” Rubber Cove – to match existing rubber base in existing Band Room

Tile Base

Schluter Dilex-AHK 1S 80 AE Cove Base

Walls

Interior Paint Schedule:
Paint Color 1 – to match existing wall color in existing Band Room
Paint Color 2 (Concessions) – TBD
Paint Color 3 (Ceilings) - TBD

Wall Tile 1 – Porcelain wall tile Crossville, Java Joint 12” x 24”, JAV05 French Press
Installed longest side vertical and joints aligned.
Align joints with floor joints.
Laticrete SpectraLock Pro Grout, 45 Raven

Solid Surface

Solid Surface 1 (Concessions) – TBD
Solid Surface 2 (Restrooms) - TBD

Plastic Laminate

PLAM 1 – TBD
PLAM 2 – TBD

Misc.

Hollow Metal Door Finish – Color to match Paint Color 3

Door Frame – existing Hollow Metal Door Frames in existing Band Room

Toilet Partitions – Scranton, Hiny Hiders, Molded Plastic (HDPE) – Color and Texture TBD

Outlet, Data, Switch, etc, - to match existing

Cover Plates for Outlet, Data, Switch, etc, - to match existing

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal stud wall framing.
B. Metal channel ceiling framing.
C. Acoustic insulation.
D. Gypsum sheathing.
E. Cementitious backing board.
F. Gypsum wallboard.
G. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry
B. Section 06 20 00 - Finish Carpentry
C. Section 06 41 00 - Architectural Casework
D. Section 09 06 00 - Finish Schedule
E. Section 09 90 00 - Painting and Coating
F. Section 10 28 00 - Toilet & Utility Accessories

1.03 REFERENCE STANDARDS

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Reaffirmed 2016).
C. ANSI A108.11-SystemDeleted - American National Standard for Interior Installation of Cementitious Backer Units; 2010 (Revised).
D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
E. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
F. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
H. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
J. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
K. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing Board; 2013.
L. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
M. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
N. GA-216 - Application and Finishing of Gypsum Board; 2013.
O. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 2008.
P. GA-600 - Fire Resistance Design Manual; 2015.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

E. Sustainability Submittals:
   1. Statement from manufacturer stating recycled content percentage (by weight), whether the recycled content is post-consumer or post-industrial and location of manufacture.
   2. Statement from manufacturer of VOC (volatile organic compounds).

1.05 QUALITY ASSURANCE

A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.

B. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum __ years of experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assemblies as indicated on drawings.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC as indicated on drawings and as calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
   2. Dietrich Metal Framing: www.dietrichindustries.com.
   3. Phillips Manufacturing Company; : www.phillipsmfg.com.

B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
   1. Studs: "C" shaped with flat or formed webs with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C-shaped.
   4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

C. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05 40 00.

D. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
   1. Manufacturers - Shaft Wall Studs and Accessories:
      a. Same manufacturer as other framing materials.
      b. Substitutions: Refer to Section 01 25 13 - Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

E. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

F. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
   1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
   2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
   3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
   4. Deflection and Firestop Track:
      a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. Georgia-Pacific Gypsum: www.gpgypsum.com.
   2. National Gypsum Company: www.nationalgypsum.com.
   3. USG Corporation: www.usg.com.
   4. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

B. Impact Resistant Wallboard:
   1. Application: High-traffic areas indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
   4. Unfaced Type: Interior fiber-reinforced gypsum panels as defined in ASTM C1278/C1278M.
   5. Type: Non-rated or fire-resistance rated Type X, UL or WH listed. As called for on drawings.
   6. Thickness: 5/8 inch.
   7. Edges: Tapered.

C. Gypsum Wallboard: ASTM C 1396/C 1396M. Sizes to minimize joints in place; ends square cut.
   1. Regular Type:
      a. Application: Use for vertical surfaces, unless otherwise indicated.
      b. Thickness: 5/8 inch.
      c. Edges: Tapered.
   2. Fire Resistant Type: Complying with Type X requirements; UL or WH rated.
      a. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X.
      b. Application: Where required for fire-rated assemblies, unless otherwise indicated.
      c. Thickness: 5/8 inch.
      d. Edges: Tapered.
   3. Ceiling Board: Special sag-resistant type.
      a. Application: Ceilings, unless otherwise indicated.
      b. Thickness: 1/2 inch.
      c. Edges: Tapered.

D. Mold Resistant Gypsum Wallboard:
   1. Basis of Design: Georgia Pacific DensArmor Plus
   2. Application: Wet areas without wall tile.
   3. Core Type: Regular.
   4. Thickness: 5/8 inch.
   5. Edges: Tapered.

E. Cement Board:

1. Basis of Design: USG Durock
2. Application: Wet areas with wall tile
3. Cementitious Fiber-Mat Reinforced Sheathing: ASTM C 1325, ANSI A118.9, cementitious backer.
4. Fire Class A, Humidity Resistant, Mold Resistant, Abuse Resistant, Sag Resistant, 14% Recycled
5. Thickness: 5/8 inch

F. Fiberglass-Mat Faced Gypsum Exterior Sheathing Board:
1. Basis of Design: Georgia Pacific DensGlass Gold Sheathing.
2. Application: horizontal and vertical exterior sheathing.
3. Types: Regular and Type X, in locations indicated.
4. Type X Thickness: 1/2 inch.
5. Regular Type Thickness: 1/2 inch.
6. Edges: Tapered.

G. Shaftwall and Coreboard: Type X; thickness as shown on drawings, beveled long edges, ends square cut.
1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
2. Products:
a. American Gypsum; Shaft Liner.
b. CertainTeed Corporation; ProRoc Brand Shaftliner Type X.
c. National Gypsum Company; Gold Bond Brand 1" Fire-Shield Shaftliner.
d. National Gypsum Company; Gold Bond Brand 1" Fire-Shield Shaftliner XP (mold-resistant).
e. Temple-Inland Inc; SilentGuard Gypsum Shaftliner.
f. USG Corporation; Sheetrock Gypsum Liner Panels.
g. USG Corporation; Sheetrock Gypsum Liner Panels--Enhanced (mold-resistant).
h. Substitutions: Refer to Section 01 25 13 - Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form..

2.04 ACCESSORIES

A. Acoustic Insulation: As specified in Section 07 21 00.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

C. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
1. Types: As detailed or required for finished appearance.
2. Corner Beads: Galvanized Steel, 26 gauge minimum.
3. Control Joints:
a. Roll-formed zinc with perforated flanges.
b. Size: 1-3/4 inch wide with 1/4 inch wide center.
c. Equivalent to No. 093 by USG.

D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
3. Ready-mixed vinyl-based joint compound.
4. Chemical hardening type compound.

E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

F. Screws: ASTM C 1002; self-piercing tapping type; cadmium-plated for exterior locations.

G. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 SHAFT WALL INSTALLATION

A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
   1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
   2. Install studs at spacing required to meet performance requirements.

B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.
   1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.
   2. Seal perimeter of shaft wall and penetrations with acoustical sealant.

3.03 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as permitted by standard.
   1. Level ceiling system to a tolerance of 1/600.
   2. Laterally brace entire suspension system.
   3. Install bracing as required at exterior locations to resist wind uplift.

C. Studs: Space studs at 16 inches on center.
   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
   3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Standard Wall Furring: Install at CMU walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
   1. Orientation: Horizontal.

F. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, toilet accessories, and hardware.

3.04 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. Place continuous bead at perimeter of each layer of gypsum board.

3.05 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.

D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

E. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.

F. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

G. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

H. Moisture Protection: Treat cut edges, holes and screw heads in moisture/mold resistant gypsum board, and exterior gypsum soffit board with sealant approved by gypsum board manufacturer.

I. Do not install gypsum board when ambient temperature is below 40 degrees F.

3.06 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 20 feet apart on walls and ceilings over 50 feet long.
   2. At both corners of all interior doors.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.07 JOINT TREATMENT AND FINISH

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.

B. All joints and screw heads to be sealed with sealant approved by gypsum board manufacturer.

C. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

D. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

E. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

F. Fill and finish joints and corners and screw heads of cementitious backing board as recommended by manufacturer.

3.08 IDENTIFICATION OF SMOKE AND FIRE RATED WALLS

A. In accordance with building codes, provide proper identification of smoke and fire rated walls above all ceilings. Wall identification for both smoke and fire ratings shall be on both sides of walls.

3.09 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 22 26

METAL SUSPENSION SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Exposed metal suspension systems for acoustical panel ceilings.

1.02 RELATED SECTIONS:

A. Section 09 51 13 - Acoustical Panel Ceilings.

B. Section 09 51 13.01 - Acoustical Panel Ceilings

C. Division 23 - HVAC Related Sections

D. Division 26 - Electrical Related Sections

1.03 REFERENCES

A. Abbreviations and Acronyms:
   1. ASCE: The American Society of Civil Engineers; www.asce.org.
   2. CISCA: Ceilings & Interior Systems Construction Association; www.cisca.org.
   3. LEED: Leadership in Energy and Environmental Design; www.usgbc.org.

B. Reference Standards:
   1. ASCE 7-10 - Minimum design loads for buildings and other structures
   2. ASTM A653/A653M -Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
   3. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
   4. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
   5. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
   6. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring
   7. ICC ES AC 156 - Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components

1.04 SUBMITTALS

A. Product Data: Submit sheets listing dimensions, load carrying capacity and standard compliance.

B. Samples: Submit samples of main tee and cross tee with couplings.

1.05 EXTRA MATERIALS

A. Provide 10% of each type of acoustical unit for Owner's use in maintenance of project. Each carton/box shall be labeled identifying the type of ceiling tile.

B. Provide quantity of each exposed suspension component equal to 2.0 percent of amount installed.

1.06 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect system components from excessive moisture in shipment, storage, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver material to building until wet conditions such as concrete, plaster, paint, and adhesives have been completed and cured to a condition of equilibrium.

1.08 WARRANTY

A. Manufacturer Warranty: Submit a written warranty executed by manufacturer for a period of 40 years from date of Substantial Completion, agreeing to repair or replace suspension system components that fail or are compromised within the specified warranty period. Failed or compromised parts can include, but are not limited to:
   1. Rusting or defects directly made by the manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Chicago Metallic [Intermediate] [Heavy] Duty Non-Fire Rated Double Web Suspension System manufacturerd by Rockfon, 4849 South Austin Avenue, Chicago, IL 60638, 1-800-323-7164; www.rockfon.com

B. Substitutions: Refer to Section 01 25 13 & 01 25 33.
   1. Substitutions shall meet all requirements of this section including but not limited to UL acoustical performance, panel edge, durability, recycled content, color, texture, size and sheen.

2.02 MATERIALS

A. Siesmic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE 7 and ICC ES AC 156.

B. Basic Steel Material and Finish: Commercial quality, CS Type A to ASTM A653/A653M, hot-dip galvanized to not less than G30 zinc coating designation.

C. Main Tees and Cross Tees: All suspension main tee and cross tee components are manufactured from commercial quality steel with factory punched cross tee slots, hanger holes and integral bayonet-style end couplings. The main tees are capped with steel capping affixed to a flange and is coated with factory applied baked-on enamel paint.
   1. Structural Classification Standard: ASTM C635/C635M [Intermediate] [Heavy] Duty.
   2.
   3. Specified Product: “Chicago Metallic 1200 (15/16) Exposed” by ROCKFON.

D. Perimeter Treatment Components:
   1.
   2. Channel Moldings: Manufactured from 0.018” thick steel with factory applied standard white baked-on enamel paint finish.
   3. Shadow Line Moldings: Manufactured from 0.020” thick steel with 3/4” and 3/8” hemmed edge and finished with factory applied standard baked-on enamel paint.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas and conditions, including structural framing to which metal acoustical ceiling suspension assemblies attach or abut, with installer present, for compliance with requirements specified in this and other Sections affecting ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of metal acoustical ceiling suspension assemblies.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install metal acoustical ceiling suspension assemblies to comply with ASTM C636/C636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Main Tees: Installed 24” on center, by direct suspension from existing structure in accordance with ASTM C754 and ASTM C841 with not less than 12 ga steel hanger wires, wrapped tightly 3 full turns, spaced [36”] [48”] [60”] on center along component length.

C. Cross Tees:

1. Installed perpendicular to main tees 24” on center.
2. Installed perpendicular to module forming cross tees.
3. Installed adjacent to each unsupported side of recessed fixtures.

D. [Angle] [Channel] [Shadow Line] Moldings: Installed on vertical surfaces, intersecting suspension components by appropriate method in accordance with industry accepted practice.

E. Additional Hanger Wires: Wrapped tightly 3 full turns to structure and components at locations where imposed loads could cause deflection exceeding 1/360 span.

3.03 REPAIR

A. Remove damaged or compromised components; replace with undamaged components.

3.04 CLEANING

A. Clean exposed grid with non-solvent based non-abrasive commercial cleaning solution. Comply with manufacturer’s instructions for cleaning grid components. Remove any components that cannot be effectively cleaned or repaired.

END OF SECTION

SECTION 09 30 00

TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Cementitious backer board as tile substrate.

D. Tile accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 90 05 - Joint Sealers

B. Section 09 06 00 - Finish Schedule

C. Section 09 30 10 - Transition and Joint Profiles

1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2013.1.

1. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2014.
2. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
3. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement; 1999 (Reaffirmed 2010).
4. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
5. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
6. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).
7. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).
8. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2010).
9. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).
10. ANSI A108.11-SystemDeleted - American National Standard for Interior Installation of Cementitious Backer Units; 2010 (Revised).
11. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior glue plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
12. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2010).
13. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).
14. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).

15. ANSI A118.9-SystemDeleted - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2010).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, sealants, and accessories. Include instructions for using grouts and adhesives.

C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
   1. Contractor is responsible for coordinating tile installation with building construction expansion joints, saw cut joints, control joints, and cold joints whether or not cleavage membrane is specified herein. All tile work to be in accordance with referenced standards including tile control joints as required by field conditions.

D. Samples: Submit a sample of each tile illustrating color and sheen for each tile.

E. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

F. Closeout Submittals: Submit the following:
   1. Operation and Maintenance Data: Operation and maintenance data for installed products. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

G. See Section 01 78 00 Closeout Submittals.
   1. Provide warranty for uncoupling membrane, waterproofing membrane, grout and mortar.

1.05 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. Construct tile mock-up where indicated by Architect, incorporating all components specified for the location.
   1. Approved mock-up may remain as part of the Work.

1.06 PRE-INSTALLATION MEETING

A. Convene one month before starting work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F for installation and three days following.

1.09 EXTRA MATERIALS

A. Provide 10 sq. ft of each size, color, and surface finish of tile specified, at least 1 box of each type in marked cartons.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers:
   1. Refer to Section 09 06 00 - Finish Schedule
   2. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form
      a. Substitutions shall meet the original specification material characteristics including but not limited to durability, recycled content, color, texture, pattern and sheen.

2.02 TRIM AND ACCESSORIES

A. Tile and Corner Trim: Provide trim matching the field tile unless indicated otherwise.
   1. Related sections: Finish Schedule, Transition & Joint Profiles.

B. Thresholds: Must meet ADA.
   1. Related sections: Finish Schedule, Transition & Joint Profiles.

2.03 ADHESIVE & MORTAR MATERIALS

A. Manufacturers: Must be approved by tile manufacturer.
   1. Laticrete: www.laticrete.com
   2. Custom Building Products: www.custombuildingproducts.com
   3. Bostik: www.bostik-us.com
   4. Bonsal American, Inc: www.sakrete.com
   5. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

B. Adhesives
   1. Must be per the TCNA Installation Method and manufacturer's recommendations.

C. Tile floors must slope to floor drains.

2.04 GROUTS

A. Manufacturers:
   1. Laticrete, Inc.: www.laticrete.com - SpectraLock Pro Grout
   2. Custom Building Products: www.customgroutsolutions.com - CEG- Lite 100% Solids Commercial Epoxy Grout
   3. Bostik: www.bostik-us.com - Tru Color Pre-mixed grout
   4. Mapei: www.mapei.com - Kerapoxy
   5. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form
      a. Substitutions shall meet the original specification material characteristics including but not limited to durability, recycled content, color, texture, pattern and sheen.

B. All grout must meet or exceed ANSI A118.3 grout performance standards.

C. Colors: Refer to Section 09 06 00 - Finish Schedule.

2.05 ACCESSORY MATERIALS

A. Uncoupling Membrane: Provide continuous membrane at all floor tile locations - uncoupling membrane neutralizes differential movement stresses between substrate and tile for protection against in-plane cracking, waterproofing and vapor management.
   1. Uncoupling Membrane: 1/8 inch thick polyurethane matting with three-dimensional grid structure with dovetail shaped cavities and fleece webbing laminated to the underside to provide a mechanical bond to the substrate adhesive. Install membrane per manufacturers recommendation.
      a. Product: Schluter Systems "DITRA."
         1) Must use mortar approved by membrane manufacturer.
      b. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

B. Shower Waterproofing Membrane: Provide continuous waterproofing membrane at all floor and wall tile shower locations. Provide membrane, strips and all accessories from a single manufacturer.
   1. Product: Schulter Kerdi
      a. Must use mortar and accessories approved by the membrane manufacturer.
   2. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

C. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

D. Sealant
   1. Fungicidal one-part silicone rubber sealant comparable to Dow Corning 782 or 784.
   2. Color as selected by Architect from the manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that required floor-mounted utilities are in correct location.

E. If not cured properly, excessive moisture and high pH in concrete floor slabs may cause failure in adhesion of floor finish materials and environmental concerns. Due to incompatibility of concrete sealers with finish adhesives and moisture sensitivity of flooring adhesives and materials, Contractor shall follow the finish material manufacturer's written installation recommendations regarding concrete moisture, concrete pH, building humidity, and building temperature levels at the time of installation including but not limited to use of compatible concrete curing compounds and sealers and shall provide and install upgraded adhesives and sealers as recommended by the manufacturer at no additional cost to the Owner. Contractor shall follow applicable ACI (American Concrete Institute) procedures without exception for type, strength, and moisture content of concrete specified.

F. Using the manufacturer's approved test method the Contractor shall verify moisture content, emission rate, and alkalinity of concrete slab is within approved adhesive and flooring finish manufacturer's recommended range prior to finish installation and shall make such adjustments in adhesives and procedures as recommended by the finish manufacturer at no additional cost to the Owner.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Treat substrate surface cracks per manufacturer's recommendations. Level existing substrate surfaces to acceptable flatness tolerances.

D. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

E. Substrates must meet or exceed TCNA Handbooks substrate requirements.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
   1. Subsurface tolerances must facilitate a tile installation that will meet ANSI finish flatness requirements.
   2. Tile install is responsible for inspecting and verifying all surfaces are smooth and flat within the tolerances per TCNA.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
   1. Notify Architect if pattern conflicts with manufacturer's recommendations.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout. Grout joints must be smooth.
   1. Grout joints between mesh or sheet mounted tiles must be uniform in width to the grout joints between the tiles on mesh or sheets.

E. Form internal angles square and external angles bullnosed.

F. Install thresholds.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep control and expansion joints free of mortar, grout, and adhesive.

I. Prior to grouting, allow installation to completely cure; minimum of number of hours recommended by manufacturer.

J. Grout tile joints unless otherwise indicated.
   1. Grout color to be uniform without any color shading over the surface. Grout color to be consistent between areas.

K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

L. All tile trim sizes to be coordinated with tile and installation thickness. Tile trim must align with adjacent tile.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA Handbook Method.
   1. On-Ground Concrete, Ceramic Tile TCNA Method F115-16
      a. Provide membrane per F-125-Full-16 (full coverage).
         1) Refer to uncoupling membrane.
      b. Epoxy grout ANSI A118.3.
      c. Mortar must be approved by membrane manufacturer.
   2. Above-Ground Concrete, Ceramic Tile TCNA Method F115A-16
      a. Provide membrane per F-125-Full-16 (full coverage)
         1) Refer to uncoupling membrane.
      b. Epoxy grout ANSI A118.3.
      c. Mortar must be approved by membrane manufacturer.

3.05 INSTALLATION - WALL TILE

A. All tile base and tile at corners must be back butter 100% adhesive.

B. Exterior Walls Masonry or Concrete, Ceramic Tile TCNA Method W202E-16
   1. Epoxy grout ANSI A118.3
   2. Mortar must be approved by tile manufacturer.

C. Exterior Walls Wood or Metal Studs, Cement Backer Board, Ceramic Tile TCNA Method W244E-16
   1. Epoxy grout ANSI A118.3
   2. Mortar must be approved by tile manufacturer.

D. Interior Walls Masonry or Concrete, Ceramic Tile TCNA Method W2021-16
   1. Epoxy grout ANSI A118.3
   2. Mortar must be approved by tile manufacturer.

E. Interior Walls Wood or Metal Studs, Cement Backer Board, Ceramic Tile TCNA Method W244E-16.
   1. Epoxy grout ANSI A118.3
   2. Mortar must be approved by tile manufacturer.

3.06 CLEANING

A. Clean tile and grout surfaces.

B. Tile must be cleaned so that no haze or grout remains on tile surface.

3.07 PROTECTION

A. Do not permit traffic over finished floor surface for at least 4 days after installation or per manufacturer's recommendation.

B. Protect finished floor surface from other trades.

END OF SECTION

SECTION 09 30 10
TRANSITION AND JOINT PROFILES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Edge-protection and transition profiles for floors

B. Finishing and edge-protection profiles for stair nosings

1.02 RELATED SECTIONS

A. Division 03 Concrete

B. Section 09 30 00 Tiling

C. Section 09 65 00 Resilient Flooring

D. Section 09 68 00 Carpeting

1.03 REFERENCES

A. Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation

B. American National Standard Specifications for the installation of ceramic tile A108 / A118 / A136.1

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data and Samples

1.05 QUALITY ASSURANCES

A. Must not be clampdown or hammer down type transition.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Schluter Systems, L.P., 194 Pleasant Ridge Road, Plattsburgh, NY 12901-5841. Tel.: (800) 472-4588. Fax: (800) 477-9783. E-mail: specassist@schluter.com. Internet: www.schluter.com.

B. Ceramic Tool Company www.ceramictool.com

C. Mannington www.mannington.com

D. Julius Blum & Co., Inc.: www.juliusblum.com

E. Substitutions: Refer to Section 01 25 13 - Product Substitution Procedures

2.02 PRODUCTS

A. Edge Protection, Joints and Transition Profiles For Floors

1. Schluter-RENO-T
    a. Description: T-shaped profile with 1/16 inch (1 mm) thick beveled exposed surface and 11/32 inch (9 mm) tall integrated vertical anchoring leg.
    b. Material and Finish:
        1) EB - Brushed Stainless Steel Type 304 = V2A
    c. Width: 1 inch (25 mm)
2. Schluter-RENO-U
    a. Description: profile with sloped exposed surface, 5/32 inch (4 mm) tall leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
    b. Material and Finish:
        1) EB - Brushed Stainless Steel Type 304 = V2A
    c. Height: Height as required
3. Schluter-RENO-V
    a. Description: ball-and-socket hinged profile with sloped exposed surface, tapered leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

b. Material and Finish:
1) AE - Satin Anodized Aluminum
c. Height: Height as required
d. Ramp Length: as required

B. Finish and Edge Protection Profiles for Tile Floor Edges that meet Wall tile below
1. Schluter-RONDEC-STEP
a. Description: anodized aluminum profile with symmetrically-rounded top surface with 1/4 inch (6 mm) radius and vertical leg that together form the exposed surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
b. Material and Finish:
1) AE - Satin Anodized Aluminum
2) Vertical Leg Length:
(a) 1-1/2 inch (39 mm)
3) Height: Height as required

C. Cove Edge Profiles for Tile Base: Finishing and Hygienic Edge
1. Schluter - Dilex-AHK
a. Trapezoid-perforated anchoring legs, Anodized aluminum, which are secured in the mortar bond coat
b. Anodized aluminum

D. Finish and Outside Corner Edge Protection Profiles for Wall Tile Outside Corners
1. Schluter - Jolly
2. Color - Brushed Chrome Anodized Aluminum

E. Control Joints in Tile
1. Schluter Dilex-KSN
2. Stainless Steel and Black Thermoplastic Rubber Movement Zone

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify location ready to receive finishes.

B. Verify location and sizes of finishes associated with work of this section.

3.02 INSTALLATION

A. Install per manufacturers current technical literature for proper design and installation instructions.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acoustical ceiling panels.

B. Wire hangers, fasteners, main runners, cross tees, wall angle moldings, perimeter trim and accessories.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies

B. Division 23 - HVAC

C. Division 26 - Electrical

1.03 REFERENCE STANDARDS

A. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

B. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

C. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability

D. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

E. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.

F. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.

G. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.

H. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

I. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

J. ASTM E 119 Standard Test Method for Fire Tests of Building Construction and Material.

K. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

L. International Code Council-Evaluation Services - Evaluation Report, ESR-1308, Fire- and Nonfire-Resistance-Rated Suspended Ceiling Framing Systems

M. ASCE 7 Standard - American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

N. CISCA Seismic Zones 3 & 4 - Ceilings and Interior Systems Construction Association Guidelines for Seismic Restraint for Direct Hung Suspended Ceiling Assemblies

O. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint

P. International Building Code

Q. ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

R. NFPA 70 National Electrical Code

S. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

T. International Code Council-Evaluation Services Report - Seismic Engineer Report
   1. ESR 1308 - Armstrong Suspension Systems

U. International Association of Plumbing and Mechanical Officials - Seismic Engineer Report
   1. 0244 - Armstrong Single Span Suspension System

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning. Show locations of items which are to be coordinated with, or supported by the ceilings.

C. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

D. Samples: Submit two samples 6" x 6" in size illustrating material and finish of acoustical units.

E. Samples: Submit two samples each of suspension system main runner and trim

F. Certifications: Manufacturer's certifications that system complies with specified requirements:
   1. For seismic performance: International Code Council Evaluation Report, ESR-1308.
   2. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

G. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.05 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten yearsdocumented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

D. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
   1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
   2. Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory

E. Acoustical panels, as with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

F. Seismic Performance: Provide acoustical ceiling system that is compliant with the International Building Code, Seismic Category D.

G. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.06 PROJECT CONDITIONS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, weatherproof, sufficient heating or cooling is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved. Ambient conditions of

temperature and humidity are continuously maintained at values near those intended for final occupancy.

B. Install acoustical units after interior wet work is completed and dry.

C. Space Enclosure:
   1. Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel, aluminum or stainless steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.
   2. Building areas to receive ceilings shall be free of construction dust and debris. Ceilings with HumiGuard Max performance can be installed in conditions up to 120°F (49°C) and maximum humidity exposure including outdoor applications, and other standing water applications, so long as they are installed with either SS Prelude Plus, AL Prelude Plus, or Prelude Plus Fire Guard XL suspension systems. Products with Humiguard Max performance can be installed in exterior applications, where standing water is present, or where moisture will come in direct contact with the ceiling. Only Ceramaguard with AL Prelude Plus suspension system can be installed over swimming pools.

1.07 EXTRA MATERIALS

A. Provide 10% of each type of acoustical unit for Owner's use in maintenance of project. Each carton/box shall be labeled identifying the type of ceiling tile.

B. Provide quantity of each exposed suspension component equal to 2.0 percent of amount installed.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.09 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
   1. Acoustical Panels: Sagging and warping
   2. Grid System: Rusting and manufacturer's defects

B. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

A. Manufacturers:
   1. Armstrong World Industries, Inc: www.armstrong.com. Contact: Michelle Ashberry.
   2. RockFon: www.rockfon.com
   3. Substitutions: Refer to Section 01 25 13 & 01 25 33.
      a. Substitutions shall meet all requirements of this section including but not limited to UL acoustical performance, panel edge, durability, recycled content, color, texture, size and sheen.

B. Acoustical Units - General: ASTM E1264, Class A.

C. Acoustical Panels

1. Refer to Drawings.

2.02 SUSPENSION SYSTEM(S)

A. Manufacturers:
   1. Acoustical grid system manufacturer same as for acoustical units.
   2. Refer to drawings for products
      a. Armstrong World Industries, Inc: www.armstrong.com.
      b. RockFon: www.rockfon.com
      c. Substitutions: Refer to Section 01 25 13 & 01 25 33.
         1) Substitutions shall meet all requirements of this section including but not limited to UL acoustical performance, panel edge, durability, recycled content, color, texture, size and sheen.

B. Components: Main beams and cross tees In accordance with the International Building Code, and ASCE 7 for Category D as described in ESR-1308.
   1. Structural Classification: ASTM C 635, Heavy Duty.

C. Attachment Devices: In accordance with the International Building Code and ASCE 7 for Category D.

D. Wire for Hangers and Ties: In accordance with the International Building Code and ASCE 7.

E. Wall Moldings: In accordance with the International Building Code and ASCE 7 Category D.
   1. Nominal 7/8 inch x 7/8 inch hemmed, pre-finished angle molding

F. Accessories:
   1. BERC2 - 2 inch Beam End Retaining Clip, 0.034 inch thick, hot-dipped galvanized cold-rolled steel per ASTM A568 - used to join main beam or cross tee to wall molding.
   2. SJCG - Seismic Joint Clip, 5 inches x 1-1/2 inch, hot-dipped galvanized cold-rolled steel per ASTM A568. The two piece unit is designed to accommodate a seismic separation joint. The clip is compatible with 15/16 inch and 9/16 inch grid systems including Prelude, Suprafine, and Silhouette. The SJCG is not suitable for use with Vector panel installations.
   3. Touch up Paint: Type and color to match acoustical and grid units.

2.03 ACOUSTICAL CLOUDS, WOOD AND SPECIALTY CEILINGS

A. Manufacturers:
   1. Refer to drawings for products.
      a. Armstrong World Industries, Inc.; www.armstrong.com. Contact: Michelle Ashberry.
      b. Substitutions: Refer to Section 01 25 13 & 01 25 33.
         1) Substitutions shall meet all requirements of this section including but not limited to UL acoustical performance, panel edge, durability, recycled content, color, texture, size and sheen.

B. Accessories:
   1. Accessories manufacturer same as for acoustical cloud.
   2. Refer to drawings for products.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than 4" width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. All ceiling tiles must be 4" or larger in both dimensions including perimeter ceiling tiles.

3.03 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system and panels in accordance with the International Building Code and ASCE 7 except as noted in the International Code Council independent engineering evaluation ESR-1308, and with the authorities having jurisdiction.

B. ESR-1308, Alternate Seismic Design Category D,E and F Installation:
   Under this installation, the runners must be rated heavy-duty and have a minimum simple span uniform load of 16.35 pounds per lineal foot (238 N/m); maximum ceiling weight permitted is 1.80 pounds per square foot (8.78 kg/m2).
   1. The BERC-2 clip is used to secure the main runners and cross runners on two adjacent walls to the structure and the two opposite walls to the perimeter trim, as detailed below. A nominal 7/8-inch (22 mm) wall molding is used in lieu of the 2- inch (51 mm) perimeter supporting closure angle required in ASCE-7 for Seismic Design Categories D, E and F. Except for the use of the BERC-2 clip and the 7/8-inch (22 mm) wall molding and elimination of spreader bars, installation of the ceiling system must be as prescribed by the applicable code.
   2. The BERC-2 clip is attached to the wall molding by sliding the locking lances over the hem of the vertical leg of the wall molding. On the walls where the runners are fixed, the runners are attached by pop-riveting the runner to the wall molding.

C. The SJCG Seismic Separation Joint Clip is to be installed per the manufacturer's instructions CS-3815.

D. The presence of a hanger wire within 3 inches of an expansion relief joint as called for in ASTM C636 shall be required in addition to the requirements of the International Building Code, ASCE and with the authorities having jurisdiction.
   1. Only applies when using
      a. Prelude XL Fire Guard 15/16"
      b. Prelude Plus XL Fire Guard 15/16"
      c. Suprafine XL Fire Guard 9/16" Exposed Tee Systems

E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.04 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.
   2. Double cut and field paint exposed reveal edges.

G. Where round obstructions occur, provide preformed closures to match perimeter molding.

H. Install hold-down clips on panels within 20 ft of an exterior door.

3.05 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.07 SEISMIC REQUIREMENTS

A. Installation must conform to CISCA for Seismic Zone D

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS (ROCKFON KORAL CEILING PANEL)

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Acoustical Ceiling Panel

1.02 RELATED SECTIONS:

A. Section 09 21 16 - Gypsum Board Assemblies

B. Section 09 52 23 - Metal Acoustical Ceiling Suspension Assemblies.

C. Division 23 - HVAC Related Sections

D. Division 26 - Electrical Related Sections

1.03 REFERENCES

A. Abbreviations and Acronyms:
   1. CISCA: Ceilings & Interior Systems Construction Association; www.cisca.org.

B. Reference Standards:
   1. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
   2. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
   3. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
   4. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
   5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
   6. ASTM E1111/E1111M - Standard Test Method for Measuring the Interzone Attenuation of Open Office Components
   7. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meetings: Conduct meeting at Project site. Agenda includes Project conditions, coordination with work of other trades and layout of items which penetrate ceilings.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer’s Product data, including maintenance data.

B. Samples: Submit 6” x 6” samples of specified ceiling panels.

1.06 EXTRA MATERIALS

A. Provide 10% of each type of acoustical unit for Owner's use in maintenance of project. Each carton/box shall be labeled identifying the type of ceiling tile.

B. Provide quantity of each exposed suspension component equal to 2.0 percent of amount installed.

1.07 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect system components from excessive moisture in shipment, storage, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation.

1.09 WARRANTY

A. Manufacturer Warranty: Submit a written warranty executed by manufacturer for a period of 30 years from date of Substantial Completion, agreeing to repair or replace suspension system components that fail or are compromised within the specified warranty period. Failed or compromised parts can include, but are not limited to:
   1. Rusting or defects directly made by the manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Rockfon, 4849 South Austin Avenue, Chicago, IL 60638, 1-800-323-7164; www.rockfon.com

B. Substitutions: Refer to Section 01 25 13 & 01 25 33.
   1. Substitutions shall meet all requirements of this section including but not limited to UL acoustical performance, panel edge, durability, recycled content, color, texture, size and sheen.

2.02 MATERIALS

A. Acoustical Lay-in Panels: Stone wool panels, Rockfon Koral by Rockfon with the following characteristics:
   1. ASTM E1264 Classification: Type XX, Pattern E
   2. Edges: SQ
   3. Size: 24" x 24"
   4. Thickness: 5/8"
   5. NRC: 0.85
   6. AC: 170
   7. Fire Class: Class A
   8. Fire Performance:
      a. UL 723 (ASTM E84) Flame Spread/Smoke Developed: 0/5
   9. Light Reflectance: 0.86
   10. Recycled Content: Up to 34%
   11. R Value (BTU Units) 2.2

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine suspension assemblies, with installer present, for compliance with requirements specified in this and other Sections affecting ceiling panel installation and with requirements for installation tolerances and other conditions affecting performance of acoustic ceiling assemblies.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install ceiling panels to comply with ASTM C636/C636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

3.03 REPAIR

A. Remove damaged or compromised components; replace with undamaged components.

3.04 CLEANING

A. Clean exposed surfaces in accordance with manufacturer’s written instructions.

END OF SECTION

SECTION 09 51 13.01

ACOUSTICAL PANEL CEILINGS (ROCKFON “HYGIENIC PLUSTM” CEILING PANEL)

PART 1 - GENERAL

1.01 SECTIONS INCLUDES

A. Acoustical Ceiling Panel.

1.02 RELATED SECTIONS:

A. Section 09 21 16 - Gypsum Board Assemblies

B. Section 09 52 23 - Metal Acoustical Ceiling Suspension Assemblies

C. Division 23 - HVAC Related Sections

D. Division 26 - Electrical Related Sections

1.03 REFERENCES

A. Abbreviations and Acronyms:
   1. CISCA: Ceilings & Interior Systems Construction Association; www.cisca.org.

B. Reference Standards:
   1. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
   2. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
   3. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
   4. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
   5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
   6. ASTM E1111/E1111M - Standard Test Method for Measuring the Interzone Attenuation of Open Office Components
   7. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meetings: Conduct meeting at Project site. Agenda includes Project conditions, coordination with work of other trades and layout of items which penetrate ceilings.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer’s Product data, including maintenance data.

B. Samples: Submit 6” x 6” samples of specified ceiling panels.

1.06 EXTRA MATERIALS

A. Provide 10% of each type of acoustical unit for Owner's use in maintenance of project. Each carton/box shall be labeled identifying the type of ceiling tile.

B. Provide quantity of each exposed suspension component equal to 2.0 percent of amount installed.

1.07 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect system components from excessive moisture in shipment, storage, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation.

1.09 WARRANTY

A. Manufacturer Warranty: Submit a written warranty executed by manufacturer for a period of 30 years from date of Substantial Completion, agreeing to repair or replace suspension system components that fail or are compromised within the specified warranty period. Failed or compromised parts can include, but are not limited to:
   1. Rusting or defects directly made by the manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Rockfon, 4849 South Austin Avenue, Chicago, IL 60638, 1-800-323-7164; www.rockfon.com

B. Substitutions: Refer to Section 01 25 13 & 01 25 33.
   1. Substitutions shall meet all requirements of this section including but not limited to UL acoustical performance, panel edge, durability, recycled content, color, texture, size and sheen.

2.02 MATERIALS

A. Acoustical Lay-in Panels: Stone wool panels, Rockfon Hygienic Plus by Rockfon with the following characteristics:
   1. ASTM E1264 Classification: Type XX, Pattern E
   2. Edges: SQ
   3. Size: 24" X 24"
   4. Thickness: 3/4”
   5. NRC: 0.90
   6. CAC: 22
   7. Fire Class: Class A
   8. Fire Performance
      a. UL 723 (ASTM E84) Flame Spread / Smoke Developed: 0/5.
   9. Light Reflectance: 0.83.
   10. Recycled Content: Up to 38%.
   11. R Value (BTU Units): 2.6.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine suspension assemblies, with installer present, for compliance with requirements specified in this and other Sections affecting ceiling panel installation and with requirements for installation tolerances and other conditions affecting performance of acoustic ceiling assemblies.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install ceiling panels to comply with ASTM C636/C636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

3.03 REPAIR

A. Remove damaged or compromised components; replace with undamaged components.

3.04 CLEANING

A. Clean exposed surfaces in accordance with manufacturer’s written instructions.

END OF SECTION

SECTION 09 53 23

METAL ACOUSTICAL CEILING SUSPENSION ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exposed metal suspension systems for acoustical panel ceilings..

1.02 RELATED REQUIREMENTS

A. Section 09 22 26 - Metal Suspension Systems

B. Section 09 51 13 - Acoustical Panel Ceilings.

C. Section 09 51 13.01 - Acoustical Panel Ceilings

D. Division 23 - HVAC Related Sections

E. Division 26 - Electrical Related Sections

1.03 REFERENCE STANDARDS

A. Abbreviations and Acronyms:
   1. CISCA: Ceilings & Interior Systems Construction Association; www.cisca.org.

B. Reference Standards:
   1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
   2. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
   3. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
   4. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
   5. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring

1.04 SUBMITTALS

A. Product Data: Submit sheets listing dimensions, load carrying capacity and standard compliance.

B. Samples: Submit samples of main tee and cross tee with couplings.

1.05 EXTRA MATERIALS

A. Provide 10% of each type of acoustical unit for Owner's use in maintenance of project. Each carton/box shall be labeled identifying the type of ceiling tile.

B. Provide quantity of each exposed suspension component equal to 2.0 percent of amount installed.

1.06 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect system components from excessive moisture in shipment, storage, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver material to building until wet conditions such as concrete, plaster, paint, and adhesives have been completed and cured to a condition of equilibrium.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Chicago Metallic Heavy Duty Non-Fire Rated Double Web Suspension System manufactured by ROCKFON, 4849 South Austin Avenue, Chicago, IL 60638. 1-800-323-7164; www.rockfon.com.

B. Substitutions: Refer to Section 01 25 13 & 01 25 33.
   1. Substitutions shall meet all requirements of this section including but not limited to UL acoustical performance, panel edge, durability, recycled content, color, texture, size and sheen.

2.02 MATERIALS

A. Basic Steel Material and Finish: Commercial quality, CS Type A to ASTM A653/A653M, hot-dip galvanized to not less than Z275 (G90) zinc coating designation.

B. Main Tees and Cross Tees: All suspension main tee and cross tee components are manufactured from commercial quality steel with factory punched cross tee slots, hanger holes and integral bayonet-style end couplings. The main tees are capped with steel capping affixed to a flange and is coated with factory applied baked-on enamel paint.
   1. Structural Classification Standard: ASTM C635/C635M Heavy Duty.
   2. Color: Standard white unless otherwise noted.
   3. Specified Product: “Chicago Metallic 15/16” Exterior Grade System” by ROCKFON.

C. Perimeter Treatment Components:
   1. Angle Moldings: Manufactured from 0.530 mm (0.020”) thick steel 19 mm (3/4”) wide and finished identical to main tees and cross tees.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas and conditions, including structural framing to which metal acoustical ceiling suspension assemblies attach or abut, with installer present, for compliance with requirements specified in this and other Sections affecting ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of metal acoustical ceiling suspension assemblies.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install metal acoustical ceiling suspension assemblies to comply with ASTM C636/C636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Main Tees: Installed 1220 mm (48”) on centre, by direct suspension from existing structure in accordance with ASTM C754 and ASTM C841 with not less than 2.642 mm (12 ga) steel hanger wires, wrapped tightly 3 full turns, spaced 1220 mm (48”) on centre along component length.

C. Cross Tees:
   1. Installed perpendicular to main tees 610 mm (24”) on centre.
   2. Installed perpendicular to module forming cross tees.
   3. Installed adjacent to each unsupported side of recessed fixtures.

D. Angle Moldings: Installed on vertical surfaces, intersecting suspension components by appropriate method in accordance with industry accepted practice.

E. Additional Hanger Wires: Wrapped tightly 3 full turns to structure and components at locations where imposed loads could cause deflection exceeding 1/360 span.

3.03 REPAIR

A. Remove damaged or compromised components; replace with undamaged components.

3.04 CLEANING

A. Clean exposed grid with non-solvent based non-abrasive commercial cleaning solution. Comply with manufacturer’s instructions for cleaning grid components. Remove any components that cannot be effectively cleaned or repaired.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING AND BASE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Installation accessories.

1.02 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete

B. Section 09 06 00 - Finish Schedule

C. Section 09 21 16 - Gypsum Board Assemblies

D. Section 09 30 10 - Transition and Joint Profiles

1.03 REFERENCES

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2010e1.

B. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2010)e1.

C. ASTM F1344 - Standard Specification for Rubber Floor Tile; 2010.

D. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008.

E. BAAQMD 8-51 - Bay Area Air Quality Management District Regulation 8, Rule 51, Adhesive and Sealant Products; www.baaqmd.gov; 2002.

F. FS RR-T-650 - Treads, Metallic and Nonmetallic, Skid Resistant; Federal Specifications and Standards; Revision E, 1994.

G. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.

H. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

I. ACI 302.2R-06 - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials; American Concrete Institute International; 2006.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Shop Drawings: Indicate seaming plan.

D. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

E. Verification Samples: Submit two full sized samples in size illustrating color and pattern for each resilient flooring product specified.

F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

G. Closeout documents - submit warranty.

1.05 WARRANTY

A. See Section 01 78 00 Closeout Submittals.

1.06 QUALITY ASSURANCE

A. Manufacturer qualifications: Company specializing in manufacturing the products specified in this section with a minimum 10 years documented experience.

1.07 PRE-INSTALLATION MEETING

A. Convene one month before start of work.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Protect roll materials from damage by storing on end.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature in storage area between 65 degrees F (13 degrees C) and 85 degrees F (72 degrees C) or per manufacturer's requirements.

1.10 EXTRA MATERIALS

A. Provide (2) cartons/boxes of flooring of each tile type, color and pattern selected, (1) carton/box of base of each type and color selected and 5 percent of installed stair materials of each type and color specified. Extra materials to be in labeled carton/boxes.

PART 2 PRODUCTS

2.01 MATERIALS - TILE FLOORING

A. Vinyl Composition Tile: Homogeneous, with through pattern and color extending throughout thickness
   1. Manufacturers:
      a. Refer to Section 09 06 00 Finish Schedule
      b. Vinyl Composition Tile
         1) Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
         2) Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
         3) Size: 12" x 12"
         4) Thickness: 1/8 inch.
         5) ASTM Specification (F-1066) Class 2
         6) Flooring Radiant Panel Test (ASTM-E-648) >.45 watts / cm², Passes – Class 1
         7) N.B.S. Smoke Chamber Test (ASTM-E-662) <450 Passes
         8) Static Load Limit 125 psi (8.79 kg/cm²)
         9) Colors: Refer to Section 09 06 00 Finish Schedule
         10) Made in the USA
   2. Substitutions: Refer to Section 01 25 13 - Product Substitution Procedures
      a. Substitutions shall meet the original specification material characteristics including but not limited to durability, recycled content, color, texture, pattern and sheen.

2.02 MATERIALS - BASE

A. Adhesive to be full spread with adhesive over at least 80% of wall, leaving no gaps or puddles for all base.

B. Resilient Base: ASTM F 1861, Type TS rubber, vulcanized thermoset; cove base, and as follows:
   1. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
   2. Height: 4 inch (100 mm).
   3. Thickness: 0.125 inch (3.2 mm) thick.
   4. Finish: Satin.
   5. Length: Roll.
   6. Colors: Refer to Section 09 06 00 Finish Schedule
   7. Accessories: Premolded external corners and end stops.

8. Material: PVC free and contains 10% natural rubber a renewable resource
9. Manufacturers
    a. Mannington: www.mannington.com
    b. Johnsonite: www.johnsonite.com
    c. Roppe: www.roppe.com
    d. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.
        1) Substitutions shall meet the original specification material characteristics including but not limited to durability, recycled content, color, texture, pattern and sheen.

2.03 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
    1. Patching and Leveling Compounds must be per the flooring manufacturer's recommendations.

B. Primers, Sealers, Moisture Suppression Membranes, Seaming Materials and Adhesives: Provide primers, sealers, moisture suppression membranes and adhesives; waterproof types recommended by the manufacture for the tested ratings of the concrete at no additional cost to the Owner. The primers, sealers and adhesives must be compatible with materials being adhered; maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

C. Moldings Edge Strips, transitions as shown on drawings, colors as selected by Designer by manufacturers standards. Metal.

D. Adhesive and adhesive spread must be per the flooring manufacturer's recommendations.

E. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive resilient flooring.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Verify that sub-floor surfaces are dust-free and free of substances which would impair bonding of adhesive materials to sub-floor surfaces.

D. If not cured properly, excessive moisture and high pH in concrete floor slabs may cause failure in adhesion of floor finish materials and environmental concerns. Due to incompatibility of concrete sealers with finish adhesives and moisture sensitivity of flooring adhesives and materials, Contractor shall follow the finish material manufacturer's written installation recommendations regarding concrete moisture, concrete pH, building humidity, and building temperature levels at the time of installation including but not limited to use of compatible concrete curing compounds and sealers and shall provide and install upgraded adhesives and sealers as recommended by the manufacturer at no additional cost to the Owner. Contractor shall follow applicable ACI (American Concrete Institute) procedures without exception for type, strength, and moisture content of concrete specified.

E. Using the manufacturer's approved test method the Contractor shall verify moisture content, emission rate, and alkalinity of concrete slab is within approved adhesive and flooring finish manufacturer's recommended range prior to finish installation and shall make such adjustments in adhesives and procedures as recommended by the finish manufacturer at no additional cost to the Owner.

3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

B. Prohibit traffic until filler is cured.

C. Clean substrate.

3.03 INSTALLATION

A. Install per manufacturer's written recommendations.

B. Starting installation constitutes acceptance of sub-floor conditions.

C. Install in accordance with manufacturer's instructions.

D. Spread only enough adhesive to permit installation of materials before initial set.

E. Fit joints tightly.

F. Set flooring in place, press with heavy roller to attain full adhesion.

G. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

H. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

I. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - TILE FLOORING

A. Install per manufacturer's written recommendations.

B. Install in accordance with manufacturer's instructions.

C. Install tile in pattern as indicated on drawings.

D. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise.

E. Spread only enough adhesive to permit installation of materials before initial set.

F. Set flooring in place, press with heavy roller to attain full adhesion.

G. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.

H. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated. After installation of flooring, secure metal strips with stainless steel screws.

3.05 INSTALLATION - BASE

A. Install per manufacturer's written recommendations.

B. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.06 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean, seal, and wax resilient flooring products in accordance with manufacturer's instructions.

3.07 PROTECTION OF FINISHED WORK

A. Prohibit traffic on resilient flooring for 48 hours after installation.

B. Protect flooring from construction.

END OF SECTION

SECTION 09 81 10

ACOUSTICAL TREATMENT - PARTITIONS/CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Airtight construction to optimize the acoustical integrity of general building construction and prevent transmission of airborne noise into acoustically sensitive/critical spaces.
   1. Gaps at base and head of partitions
   2. Intersections of walls with dissimilar materials
   3. Abutments to structure
   4. Openings or gaps in and around acoustical barrier ceilings and floor assemblies
   5. Partial and thru penetrations in acoustically significant construction

B. Acoustical Partition and Ceiling treatments

1.02 RELATED SECTIONS

A. Section 04 20 00 - Unit Masonry

B. Section 07 84 00 - Firestopping

C. Section 09 21 16 - Gypsum Board Assemblies

D. Divisions 22 and 23- Plumbing & Mechanical

E. Division 26 - Electrical

1.03 REFERENCES

A. ASTM C639 - Test Method for Rheological (Flow) Properties of Elastomeric Sealants, 1990.

B. ASTM C717 - Terminology of Building Seals and Sealants, 1 994A.

C. ASTM C919 - Use of Sealants in Acoustical Applications.

D. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

1.04 PERFORMANCE REQUIREMENTS

A. Surface Burning: ASTM E84 with a flame spread/smoke developed rating of 10/250

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide characteristics, performance, limitations.

C. Manufacturer's Instructions: Indicate preparation and installation instructions.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

PART 2 PRODUCTS

2.01 ACOUSTICAL SEALANT

A. Non-drying, nonhardening, non-skimming, nonstaining, nonbleeding gunable grade sealant complying with ASTM C91 9; provide paintable, skinning type where exposed.
   1. Hardness of no more than 50 durometer Shore A as rated in ASTM D2240.
   2. Min. elongation of 500% as rated in ASTM D412.
   3. Min. joint width movement of 25% as rated in ASTM C719.
   4. Self-levelling type (S/L) if applied on floors in accordance with ASTM C639.
   5. Non-sag type (N/S) if applied on walls in accordance with ASTM C639.
   6. Acoustical sealants must meet the following additional requirements where applied in exposed locations:
      a. Paintable

b. Skinning type
c. Non-staining type as rated in ASTM C510

B. For concealed locations, acoustical sealants shall be from the following manufacturers.
1. Tremco Acoustical Sealant
2. GE SilPruf SCS2000
3. PTI Architectural Sealant 707

C. For exposed locations, acoustical sealants shall be from the following manufacturers.
1. STI Spec SEal PEN300
2. GE Sanitary 1700
3. Rhone-Poulenc Rhodorsil 4B or Rhodorsil 5C

D. For fire-rated locations, acoustical sealants shall be from the following manufacturers.
1. HILTI CP 601S
2. STI Spec Seal ES
3. Tremco Fyre-Sil
4. Johns Manville Firetemp CI

2.02 PACKING MATERIAL

A. General: Packing material shall be used at resiliently sealed penetrations, voids created by wall intersections at beams and columns, at gaps between the top of a partition and the slab, and generally as a backing material for application of acoustical sealant.

B. Packing material shall be of the following types:
1. Mineral Fiber
2. Glass Fiber
3. Preformed Pipe Insulation

C. Thickness shall be as shown on the drawings or as required to fully pack voids. Packing material shall be dimensionally stable and shall not slump within the cavity; shall be inorganic, rot, mildew and vermin proof, and shall not corrode steel, copper, and aluminum. Flame spread and smoke developed index not to exceed 25 and 50 respectively per ASTM E84.

D. Manufacturers:
1. Batts from Owens Corning Fiberglass Corp.
2. Pyro Fiber Safing from Manville Corp
3. Thermafiber by U.S. Gypsum Co.
4. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

2.03 MISCELLANEOUS MATERIALS

A. Putty Pads
1. Use for wrapping electrical boxes and other metal enclosures recessed into gypsum board construction.
2. Putty pads shall be made from polybutene-butyl with inert fillers or other approved permanently resilient self-adhering material.
3. Putty pads shall have a min. thickness of 1/8 inch
4. For non-rated locations, putty pads shall be from the following manufacturers
a. Harry A. Lowery & Assoc. Outlet Box Pads
b. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.
5. For fire-rated locations, putty pads shall be from the following manufactures
a. Hevi-Duty Nelson FSP Putty Pads
b. STI Spec SEal SSP Putty Pads
c. 3M Fire Barrier Putty Pads
d. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that opening and partition work are ready to receive work of this section.

B. Coordinate with the work of other trades affecting the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect the bond of acoustical material.

B. Install backing materials to arrest liquid material migration.

3.03 GENERAL

A. Provide the following as required and indicated at acoustically significant construction. Comply with ASTM C919 and manufacturer's recommendations for locations of beads.

B. Sound Flanking Paths: Where acoustically significant partitions intersect standard partitions, extend acoustically significant construction to completely close sound flanking paths through standard construction. Seal joints between face layers at vertical interior angles of intersecting partitions.

C. Ceiling Plenums:Where acoustically significant partitions extend through standard ceilings to structural substrates above, extend the same treatment to that portion of the partition above the ceiling as specified for the portion below the ceiling.

D. Fiberglass Insulation: Install in partitions and above ceilings where indicated. Completely blanket space between studs to full height of partitions and friction fit snug against the wallboard with non gaps between blankets. Butt ends of blanket together. Fit carefully behind electrical outlets and other work which penetrate partitions for tight fit. Attach to back face of gypsum board in accordance with manufacturer's instructions.

E. Packing Material: Pack voids created by wall intersections at beams. Also use to seal gap between top of a partition and the slab to increase the sound transmission loss properties of partitions that are not constructed full height from floor to slab.

F. Clean any excess acoustical materials from adjacent surfaces.

3.04 RESILIENTLY SEALED PENETRATIONS

A. Resiliently sealed penetrations shall be installed in a manner that results in complete air tightness. Penetrations through fire-rated partitions shall be sealed in accordance with ASTM E84 1 and corresponding UL Systems.

B. Resiliently seal all penetrations (conduit, pipes, ducts, cables, recessed boxes, etc.) using acoustical sealant and/or putty pads through all walls, floors and ceilings and the following Locations:
   1. Mechanical, electrical, and elevator equipment rooms
   2. Gypsum board acoustical barrier systems
   3. Other acoustically significant construction

C. At double-wall or triple-wall partitions, resiliently seal penetrations at each wall. Any penetration of a wall assembly, even a non-thru penetration must be sealed as required above.

D. Opening Requirements
   1. In metal stud assemblies, each penetrant must be housed in an individual opening properly sized for that penetrant. Routing multiple penetrants through a single opening is not allowed. The following requirements apply:
      a. Provide a min. of 2X wood blocking or 2 layers of 3/4" plywood between studs for pipe, conduit, cable, and round duct penetrants to form the opening without the use of a sheetmetal sleeve.
      b. Frame openings for rectangular duct penetrants without the use of a sheetmetal sleeve.

c. The space between the opening and the penetrant shall be 1/2 inch min to 3/4 inch max around the penetrant. The penetrant shall be centered within the opening so that there is no contact between the opening and the penetrant.

2. In masonry or precast concrete assemblies, each penetrant must be housed in an individual opening properly sized for that penetrant. Routing multiple penetrants through a single opening is not allowed. The following requirements apply:
   a. At masonry assemblies, properly form openings to minimize the grout needed between the opening and the sleeve.
   b. Provide sleeves that are grouted in place. Sleeve ends shall be flush with surrounding substrates. Provide infill around all sleeves with material of surface weight equal to or greater than the surrounding substrate. All void spaces between sleeve and masonry or precast concrete must be filled airtight.
   c. In grout filled masonry or pre-cast concrete, properly sized core drilled holes may be used in lieu of sleeves.
   d. The space between the sleeve and the penetrant shall be 1/2" min to 3/4" max around the penetrant. The penetrant shall be centered within the opening so that there is no contact between the sleeve and and the penetrant.
   e. At multi-wythe partitions, provide separate sleeves at each wythe.Sleeves may not bridge air-space (s)
3. In poured concrete assemblies, penetrants can be housed in an individual opening properly sized for that penetrant or housed in an opening properly sized for several penetrants.. When multiple penetrants are housed in a single opening, the following requirements apply:
   a. Each penetrant must be sleeved
   b. Sleeve ends shall be flush with surrounding substrates. Provide infill around all sleeves with material of surface weight equal to or greater than the surrounding substrate. All voids and spaces between sleeves shall be filled airtight.
   c. The space between the sleeve and the penetrant shall be 1/2 inch min to 3/4 inch max. around the penetrant. The penetrant shall be centered in the opening so that there is no contact between the sleeve and the penetrant.
   d. At multi-wythe partitions, provide separate sleeves at each wythe. Sleeves may not bridge airspace(s) of multi-wythe partitions.

E. Clearances
1. Maintain a 4 inch min clear space around ducat penetrations so that an airtight seal can be easily installed without conflicts from nearby penetrants, floors, ceilings, walls, or other obstructions.
2. Maintain a 2 inch min clear space around all other penetrations so that an airtight seal can be easily installed without conflicts from nearby penetrants, floors, ceilings, walls, or other obstructions.

F. Sealing
1. Do not proceed with installation if opening requirements or other requirements specified herein are not met.
2. Prepare and install packing material in accordance with manufacturer's recommendations for proper application of sealant.
3. Loosely fill space between opening or sleeve and penetrant with clean packing material to be nearly flush with both ends of opening or sleeve.
4. Seal both ends of penetration with liberal bead of sealant applied continuously around the penetration and joined end to end to form an airtight, continuous membrane.
   a. Sealant shall completely fill the space surrounding the penetrant
   b. Sealant thickness shall be as recommended by the manufacturer, no less than 1/4 inch.
5. When complete, sealant shall be flush with surrounding substrate.

G. Putty Pads
1. Brush or wipe construction dust and dirt from recessed box.

a. If surface is contaminates with oil, wipe with xylene or toloulene to remove oily residue.

2. Before mounting recessed box or attaching conduit, adhere putty pad to box back and mounting side(s). Leave1/2 inch min overlap along the front surface to enable wrapping of plaster ring.
3. Mound recessed box and install plaster ring. Tighten al loose fasteners.
4. Continue wrapping recessed box, all conduit attachments and plaster ring with putty pad. Press putty pad firmly into surfaces.
   a. If necessary, cut and apply additional pieces of putty pad to achieve an airtight seal around the recessed box, conduit attachments, and plaster ring.
5. After gypsum board installation, press putty pad firmly against gypsum board to create an airtight seal.
   a. If airtight seal is not continuous around the plaster ring perimeter, seal any gaps or voids with a liberal bead of acoustical sealant to create an airtight seal.

H. Putty
1. Brush or wipe construction dust and dirt from cables and conduit.
   a. If surfaces are contaminated with oil, wipe with xylene or toloulene to remove oily residue.
2. Properly space cables away from each other inside the conduit.
3. Tightly pack mineral fiber between all cables.
   a. Pack mineral fiber tight around cables the full depth of the sleeve, holding back the mineral fiber 1/4 inch from both ends of the conduit sleeve.
4. Fill all spaces between the cables and conduit with putty to a 14 inch depth to create an airtight seal. The putty shall be flush with both ends of the conduit sleeve or conduit stub.

3.05 PENETRATIONS OF ACOUSTICAL BARRIER CEILINGS

A. Approved penetrations through acoustical barrier ceilings must be resiliently sealed according to the requirements above.

B. Approved flush mounted electrical boxes at acoustical barrier ceilings must be wrapped with putty pads and sealed airtight as described above.

C. Barrier ceilings must hang independently of other building structure. Provide flexible conduit connections to any electrical boxes attached to acoustical barrier ceilings, whether flush or surface mounted, so that the resilient spring ceiling hangars are not bridged. No rigid conduit connections to devices on or within barrier ceilings will be permitted.

3.06 PERIMETER SEALS AT ACOUSTICALLY SIGNIFICANT CONSTRUCTION

A. Provide packing material and continuous beads of acoustical sealant along the full perimeter of acoustically significant gypsum board partitions, including partition heads and bases as indicated on the drawings. Provide min 1/2 inch gaps where such airtight seals occur.

B. Provide packing material and continuous beads of acoustical sealant wherever acoustically significant gypsum board construction abuts building structure, dissimilar material, or adjacent gypsum board partitions as indicted on the drawings.

C. Provide packing material and continuous beads of acoustical sealant where acoustically significant masonry partitions intersect concrete columns, beams, or slabs, or other adjacent masonry construction. Provide min 1/2 inch gaps where such airtight seals occur.

D. At control joints, provide continuous bead of sealant between edges of wall construction. Seal prior to installation of surface-applied control joint accessories and locate at proper depth in joint to allow for inserting of expansion portion of control joint assembly.

E. Provide double seal of multi-layer partition faces. Install face layer with 1/4 inch edge clearance at termination of work, and install continuous bead of acoustical sealant all around.

F. At openings and cutouts, fill open spaces between edges of wall construction and fixtures, cabinets, and oather flush or penetrating items and fill pack tightly with glass or mineral fiber insulation and seal with continuous bead of acoustical sealant.

G. Do not span gaps greater than 1 inch or that required by the acoustical sealant manufacturer.

3.07 BOARD INTERSECTION WITH METAL DECK

A. When a gypsum board partition is constructed full height with acoustical treatment indicated, and intersects with a corrugated metal deck, detailing shall be as follows:
   1. Wall perpendicular or at a sharp angle to the flutes: Secure top channel of wall framing to deck. Pack the void between the deck flutes with manufacturer recommended packing material shaped to the profile of the deck so that it is tight and compact with no air or light gaps. Extend gypsum board to within 1/2 inch of the bottom of the deck and seal both sides with a continuous application of spray applied acoustical sealant.
   2. Wall parallel or at a shallow angle to the ribs: Secure a 1/2 inch sheet of Homasote board to the underside of the deck flutes, spanning the flute to where the top channel of the wall will attach. Board should span the full with of as many flutes as is necessary to be wider than the thickness of the partition. Pack the void between the flutes with packing material so that it is tight and compact with no air or light gaps. Secure top channel of wall to Homasote and/or deck where applicable. Extend gypsum board to within 1/2 inch of the bottom of the deck and seal both sides with a continuous application of spray-applied acoustical sealant.
   3. These intersections shall be installed in a manner that results in complete air tightness through the structure.

3.08 PARTITION INTERSECTION WITH METAL DECK

A. When a concrete, brick masonry, or poured concrete wall is constructed full height with acoustical treatment indicated, and intersects with a corrugated metal deck, detailing shall be as follows:
   1. Wall perpendicular or at a sharp angle to the flutes: Construct the wall up to within 1 inch of the deck. Insert 1 inch thick fiberglass board between wall and bottom of the deck flutes for the full width of the wall leaving a 1/4 to 1/2 inch gap at the ends for sealant. Pack the voids between the deck flutes and the fiberglass board with manufacturer recommended packing material shaped to the deck profile so that it is tight and compact with no air or light gaps. Apply a continuous application of spray-applied acoustical sealant between bottom of deck and intersecting walls.
   2. Wall parallel of at a shallow angle to the flutes: Build the wall up to within 1 inch of the deck. Pack the void between the flutes above the masonry wall with packing material so that it is tight and compact with no air or light gaps. Insert 1 inch thick fiberglass board between wall and bottom of deck. Apply a continuous application of spray-applied acoustical sealant between bottom of deck and intersecting wall.
   3. intersections shall be installed in a manner that results in complete air tightness through the structure.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, and other coatings.

C. See Schedule - Surfaces to be Finished, at end of Section.

1.02 RELATED REQUIREMENTS

A. Section 09 06 00 - Finish Schedule

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on all finishing products, including VOC content.

C. Samples: Submit two paper chip samples, 6 x 6 in size illustrating range of colors and textures available for each surface finishing product scheduled.

D. Documentation from the manufacturer identifying VOC and chemical component limits.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum 3 years experience.

C. Primer and top coat to be from the same manufacturer.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.06 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 4 feel long by 4 feet wide, illustrating coating color, texture, and finish.

C. Provide door and frame assembly illustrating paint coating color, texture, and finish.

D. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.08 EXTRA MATERIALS

A. Provide at least 1 gallon of each color and type in labeled containers.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PPG Paints

B. Farrell Calhoun

C. Benjamin Moore

D. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form
   1. Substitutions shall meet the original specification material characteristics including but not limited to durability, recycled content, color, texture, pattern and sheen.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, except field-catalyzed coatings. Prepare pigments:
   1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
   2. For good flow and brushing properties.
   3. Capable of drying or curing free of streaks or sags.

B. Volatile Organic Compound (VOC) Content:
   1. Provide coatings that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
      b. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Chemical Content: The following compounds are prohibited:
   1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
   2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.

2.03 PAINT SYSTEMS - EXTERIOR

A. Paint - Wood, Opaque, Latex, 3 Coat:
   1. One coat:
      a. PPG Paints 100% Acrylic 17-921 Seal Grip 40% Vol. Solids (< 50 g/L VOC).
      b. Benjamin Moore Fresh Start 100% Acrylic No. 23 31.8% Vol. Solids (44 g/L VOC).
      c. Farrell Calhoun 100% Acrylic Undercoater 235 41.3% Vol. Solids (35 g/L VOC).
   2. Two coats:
      a. PPG Paints Speedhide Ext. Semi-Gloss 100% Acrylic 35% Vol. Solids 6-900 (<50 g/L VOC)
      b. Benjamin Moore Superspec Semi-Gloss 100% Acrylic 31.3% Vol Solids 170 (135 g/L VOC)
      c. Farrell Calhoun 100% Acrylic Exterior Gloss 37% Vol Solids 2400 Line (95 g/L VOC).

B. Paint - Masonry/Concrete, Latex, 3 Coat:
   1. One coat:
      a. PPG Paints Speedhide 44.4% Vol. Solids Acrylic Block Filler 6-15.
      b. Benjamin Moore Moorcraft Super Craft 53% Vol. Solids Block Filler 285
      c. Farrell Calhoun Int/Ext Acrylic 51% Vol. Solids Latex Block Filler 470A.
   2. Two coats:
      a. PPG Paints Speedhide Ext. Semi-Gloss 100% Acrylic 35% Vol. Solids 6-900 (<50 g/L VOC)

b. Benjamin Moore Superspec Semi-Gloss 100% Acrylic 31.3% Vol Solids 170 (135 g/L VOC)
c. Farrell Calhoun 100% Acrylic Exterior Gloss 37% Vol Solids 2400 Line (95 g/L VOC).

C. Paint - Ferrous Metals, Unprimed, Alkyd and Acrylic, 3 Coat:
1. One coat:
a. PPG Paints Speedhide Int/Ext Rust Inhibitive Steel 6-208 or 6-212 (330 g/L VOC)
b. Benjamin Moore Ultra Spec HP DTM Acrylic Gloss HP 28 (142 g/L VOC)
c. Farrell Calhoun Tuff Boy Rust-Stop Primer 1022 (370 g/L VOC)
2. Two coats:
a. PPG Paints Pitt Tech Plus Int/Ext 100% Acrylic DTM Semi Gloss 90-1210
b. Benjamin Moore Ultra Spec HP DTM Acrylic 46% Vol. Solids Gloss HP28.
c. Farrell Calhoun Tuff Boy Water Borne 100% Acrylic DTM 8000.

D. Paint - Ferrous Metals, Primed, Alkyd and Acrylic, 2 Coat:
1. Touch-up with one coat:
a. PPG Paints Speedhide Int/Ext Rust Inhibitive Steel 6-208 or 6-212 (330 g/L VOC)
b. Benjamin Moore Ultra Spec HP DTM Acrylic Gloss HP 28 (142 g/L VOC)
c. Farrell Calhoun Tuff Boy Rust-Stop Primer 1022 (370 g/L VOC)
2. Two Coats:
a. PPG Paints Pitt Tech Plus Int/Ext 100% Acrylic DTM Semi Gloss 90-1210.
b. Benjamin Moore Ultra Spec HP DTM Acrylic 46% Vol. Solids Gloss HP 28.
c. Farrell Calhoun Tuff Boy Water Borne 100% Acrylic DTM 8000.

E. Paint - Galvanized Metals, Acrylic, 3 Coat:
1. One coat:
a. PPG Paints Pitt Tech Int/Ext 100% Acrylic DTM Primer 90-712.
b. Benjamin Moore Universal Metal Primer M07.
c. Farrell Calhoun 100% Acrylic Primer 697.
2. Two coats:
a. PPG Paints Pitt Tech Plus Int/Ext 100% Acrylic DTM Semi Gloss 90-1210.
b. Benjamin Moore Ultra Spec HP DTM 46% Vol. Solids Gloss HP 28.
c. Farrell Calhoun Tuff Boy Water Borne 100% Acrylic DTM 8000.

F. Paint - Pavement Marking Paint:
1. Two coats:
a. PPG Paints Speedhide Zone Marking Paints 11-3 Series
b. Benjamin Moore Safety & Zone Marking Alkyd M56.
c. Farrell Calhoun Tuff Boy Marking Paint Alkyd Zone 1030/1031.

2.04 PAINT SYSTEMS - INTERIOR

A. Paint - Wood, Opaque, 3 Coat:
1. One coat:
a. PPG Paints; 9-900 Pure Performance 100% Acrylic Primer (0.00 g/L VOC)
b. Benjamin Moore 100% Acrylic Fresh Start Primer 046 (44 g/L VOC).
c. Farrell Calhoun 100% Acrylic Enamel Undercoater 699 (46 g/L VOC).
2. Two coats:
a. PPG Paints; 100% Acrylic 9-500 Series Pure Performance Semigloss (0.0 g/L VOC)
b. Benjamin Moore 100% Acrylic ECO SPEC WB Semi-gloss 376 (0 g/L VOC).
c. Farrell Calhoun 100% Acrylic Interior Semi-Gloss Enamel 3300 Series (<5 g/L VOC).

B. Paint - Wood, Transparent, Varnish, No Stain:
1. Self Priming. Do not use sanding sealer.
2. Two coats:
a. PPG Paints: DFT 159 Deft Stain Water Based Polyurethane (<275 g/L VOC).
b. Benjamin Moore Benwood Polyurethane Finish Low Lustre 435 (342 g/L VOC).
c. Farrell Calhoun Wood Kraft Waterborne Polyurethane 1192 (146 g/L VOC).

C. Paint - Wood, Transparent, Varnish, Waterborne Stain:

1. Filler coat (for open grained wood only).
2. Two coats:
    a. PPG Paints Deft 300 Series is Water-Based Stain (<250 g/L VOC).
    b. Benjamin Moore Benwood Waterborne Interior Stain (231 g/L VOC).
    c. Farrell Calhoun Wood Kraft Waterborne Wiping Stain Alkyd 1500 (96 g/L VOC).
3. Two coats:
    a. PPG Paints DFT 159 Deft Satin Water Based Polyurethane (<275 g/L VOC).
    b. Benjamin Moore Benwood Polyurethane Finish Low Lustre 435 (342 g/L VOC).
    c. Farrell Calhoun Wood Kraft Waterborne Polyurethane Varnish 1192 (146 g/L)

D. Paint - Concrete/Masonry, 3 Coat:(All except wet areas)
1. One coat:
    a. PPG Paints Perma-Crete Block & Masonry Filler 4-100 (63 g/L VOC).
    b. Benjamin Moore Super Spec HI-BUILD Block Filler 206 (45 g/L VOC).
    c. Farrell Calhoun Interior/Exterior High Solids Block Filler 470 (20 g/L VOC).
2. Two coats:
    a. PPG Paints; 9-500 Pure Performance Semi-Gloss 100% Acrylic (0 g/L VOC).
    b. Benjamin Moore 100% Acrylic ECO SPEC WB Semi-gloss 376 (0 g/L VOC).
    c. Farrell Calhoun 100% Acrylic Interior Semi-Gloss Enamel 3300 Series (<5 g/L VOC).

E. Paint - Concrete/Masonry, Latex, 3 Coat:(All wet areas including toilet rooms and concession).
1. One coat:
    a. PPG 16-90 Pitt-Glaze Block Acrylic Filler VOC 51.8% Vol. Solids (138 g/L VOC)
    b. Benjamin Moore V155 100% Solids Epoxy Pre-Primer 98% Vol. Solids (6 g/L VOC)
    c. Devran Tru-Glaze-WB 4015 Water Borne Epoxy Block Filler 53% Volume Solids (99 g/L VOC)
2. Two coats:
    a. PPG Amercoat Amerlock 2 VOC Semi-Gloss 83% Vol. Solids (84.0 g/L VOC)
    b. Benjamin Moore V160 Epoxy Coating 79% Vol. Solids (184 g/L VOC)
    c. Devran 224V Two-Component Epoxy Semi-Gloss 77% Vol. Solids (28 g/L VOC)

F. Paint - Ferrous Metals, Unprimed, 3 Coat:
1. One coat:
    a. PPG Paints 90-712 Pitt-Tech Int/Ext Industrial DTM 39% Vol. Solids (123 g/L VOC)
    b. Benjamin Moore Ultra Spec HP DTM 100% Acrylic Gloss HP28 46% Vol. Solids (142 g/L VOC).
    c. Farrell Calhoun Tuff Boy Waterborne 100% Acrylic DTM Primer 5-56 39% Vol. Solids (45 g/L VOC).
2. Two coats:
    a. PPG Paints; Int/Ext 100% Acrylic Gloss DTM 90-1310 41% Vol. Solids (90 g/L VOC).
    b. Benjamin Moore Ultra Spec HP DTM Gloss HP28 46% Vol. Solids (142 g/L VOC).
    c. Farrell Calhoun 100% Acrylic Int/Ext High Gloss 3000 Line 40.1% Vol. Solids (96 g/L)

G. Paint - Ferrous Metals, Primed, Acrylic, 2 Coat:
1. One coat:
    a. PPG Paints 90-712 Pitt-Tech Int/Ext Industrial DTM 39% Vol. Solids (123 g/L VOC).
    b. Benjamin Moore Ultra Spec HP DTM 100% Acrylic Gloss HP28 46% Vol. Solids (142 g/L VOC).
    c. Farrell Calhoun Tuff Boy Waterborne 100% Acrylic DTM Primer 5-56 40.1% Vol. Solids (45 g/L VOC).
2. Two coats:
    a. PPG Paints; Int/Ext 100% Acrylic Gloss DTM 90-1310 41% Vol. Solids (90 g/L VOC).
    b. Benjamin Moore Ultra Spec HP DTM Gloss HP 28 46% Vol. Solids (142 g/L VOC)
    c. Farrell Calhoun 100% Acrylic Int/Ext High Gloss 3000 40.1 % Vol. Solids (96 g/L)

H. Paint - Galvanized Metals, Acrylic, 3 Coat:
1. One coat:
    a. PPG Paints 90-712 Pitt-Tech Int/Ext Industrial DTM 39% Vol. Solids (123 g/L VOC)

b. Benjamin Moore Super Spec HP Acrylic Primer 04 43% Vol. Solids (54 g/L VOC).
c. Farrell Calhoun 100% Acrylic Stain Blocking 697 40.1% Vol. Solids (40 g/L VOC).

2. Two coats:
a. PPG Paints; Int/Ext 100% Acrylic Gloss DTM 90-1310 41% Vol. Solids (90 g/L VOC).
b. Benjamin Moore Advance Waterborne Gloss N794 42% Vol. Solids (46 g/L VOC).
c. Farrell Calhoun 100% Acrylic Int/Ext High Gloss 3000 40.1% Vol. Solids (96 g/L)

I. Paint - Gypsum Board/Plaster, Latex, Eggshell 3 Coat: (All walls except wet areas unless otherwise indicated)
1. One coat:
a. PPG Paints; 9-900 Pure Performance 100% Acrylic 35% Vol. Solids (0 g/L VOC)
b. Benjamin Moore Fresh Start 100% Acrylic 32% Vol. Solids (50 g/L VOC).
c. Farrell Calhoun 100% Acrylic Undercoater 34.5% Vol. Solids 699 (46 g/L VOC).
2. Two coats:
a. PPG Paints; 9-500 Pure Performance Semi-Gloss 100% Acrylic (0 g/L VOC).
b. Benjamin Moore 100% Acrylic ECO SPEC WB Semi-gloss 376 (0 g/L VOC).
c. Farrell Calhoun 100% Acrylic Interior Semi-Gloss Enamel 3300 Series (<5 g/L VOC).

J. Paint - Gypsum Board/Plaster Latex 3 Coat (All ceilings except wet areas).
1. One coat:
a. PPG Paints; 9-900 Pure Performance 100% Acrylic 35% Vol. Solids (0 g/L VOC).
b. Benjamin Moore Fresh Start 100% Acrylic 32% Vol. Solids (50 g/L VOC).
c. Farrell Calhoun 100% Acrylic Undercoater 699 34.5% Vol. Solids (46 g/L VOC).
2. Two coats:
a. PPG Paints Premium Ceiling Flat Latex 17-45 32% Vol. Solids (23 g/L VOC).
b. Benjamin Moore Muresco Ceiling White 258 30% Vol. Solids (44 g/L VOC).
c. Farrell Calhoun Flat Latex Ceiling White 401 30.6% Vol. Solids (27 g/L VOC).

K. Paint - Hollow Metal Doors and Frames
1. One coat:
a. PPG Paints 90-712 Pitt-Tech Int/Ext Industrial DTM Primer/Finish (123 g/L VOC).
b. Farrell Calhoun Tuff Boy Waterborne 100% Acrylic DTM Primer 5-56 (45 g/L VOC).
c. Benjamin Moore Super Spec HP Acrylic Primer (54 g/L VOC).
2. Two coats:
a. PPG Paints Pitt Tech Plus 100% Acrylic DTM Semi Gloss 90-1210 (90 g/L VOC).
b. Farrell Calhoun 100% Acrylic Semi-Gloss Enamel 3300 Series (<5 g/L VOC).
c. Benjamin Moore 100% Acrylic Eco Spec WB Silver 476 (0.0 g/L VOC).

L. Sealer for all other concrete floors (not stained) - Approved Products to be installed in accordance with manufacturer's instructions.
1. Kemiko Clear-A-Thane

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Plaster and Gypsum Wallboard: 12 percent.
2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
3. Interior Wood: 15 percent, measured in accordance with ASTM D 4442.
4. Exterior Wood: 15 percent, measured in accordance with ASTM D 4442.

3.02 PREPARATION

A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

B. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

C. Marks: Seal with shellac those which may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

G. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

H. Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

I. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

J. Interior Wood Items to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

K. Interior Wood Items to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Divisions 21, 22, 23 and 26 for schedule of color coding of equipment, duct work, piping, and conduit.

B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

C. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 CLEANING

A. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 SCHEDULE - SURFACES TO BE FINISHED

A. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically noted.
   2. Fire rating labels, equipment serial number and capacity labels.

B. Paint the surfaces described below under Schedule - Paint Systems.

C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
   1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
   2. Paint shop-primed items occurring in finished areas.
   3. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
   4. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

3.07 SCHEDULE - PAINT SYSTEMS

A. Concrete, Concrete Block, Brick Masonry: Finish all surfaces exposed to view.

B. Gypsum Board: Finish all surfaces exposed to view.

C. Wood: Finish all surfaces exposed to view.

D. Wood Cabinets: Finish all exposed and semi-exposed surfaces.

E. Steel Doors and Frames: Finish all surfaces exposed to view.

F. Steel Fabrications: Finish all surfaces exposed to view.

G. Galvanized Steel: Finish all surfaces exposed to view.

H. Shop-Primed Metal Items: Finish all surfaces exposed to view.

I. Pipe and Duct Insulation Jackets: Finish all surfaces exposed to view.

J. Exterior Pavement Markings: Traffic paint.

SECTION 10 11 01
VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Markerboards and Tackboards.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Blocking and supports.

B. Section 09 21 16 - Gypsum Board Assemblies: Concealed supports in metal stud walls.

C. Section 09 06 00 - Finish Schedule

1.03 REFERENCE STANDARDS

A. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.

B. ANSI A208.1 - American National Standard for Particleboard; 2009.

C. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2015.

F. FS L-P-1040 - Plastic Sheets and Strips (Polyvinyl Fluoride); Federal Specifications and Standards; Revision B, 1977.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data on chalkboard, markerboard, tackboard, tackboard surface covering, trim, and accessories.

C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.

D. Samples: Submit color charts for selection of color and texture of chalkboard, markerboard, and trim.

E. Test Reports: Show conformance to specified surface burning characteristics requirements.

F. Manufacturer's printed installation instructions.

G. Maintenance Data: Include data on regular cleaning, stain removal .

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Visual Display Boards:
   1. Claridge Products and Equipment, Inc: www.claridgeproducts.com.
   2. MooreCo, LP: www.best-rite.com.
   3. Egan: www.egan.com
   4. Substitutions: Refer to Section 01 25 13 Product Substitutions Procedures

2.02 VISUAL DISPLAY BOARDS

A. Markerboards: Porcelain enamel on steel, Claridge LCS, 5/8" Satin Anodized Aluminum mitered corners.
   1. Color: White.
   2. Height: as indicated on drawings.
   3. Length: as indicated on drawings.
   4. Frame: 5/8" Extruded aluminum mitered corners, with concealed fasteners.
   5. Frame Finish: Anodized, natural.
   6. Accessories: Provide marker tray and LCS775 Dry Erase Kit with markers, board cleaner and eraser.

B. Size: As indicated on the drawings.

2.03 MATERIALS

A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.

B. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.

C. Foil Backing: Aluminum foil sheet, 0.005 inch thick.

D. Steel Sheet Backing: 28 gage, 0.0149 inch, galvanized.

E. Adhesives: Type used by manufacturer.

2.04 ACCESSORIES

A. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

B. Marker Tray: Aluminum, manufacturer's standard profile one piece full length of markerboard, molded ends; concealed fasteners, same finish as frame.

C. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

C. Verify flat wall surface for frameless adhesive-applied boards.

3.02 INSTALLATION

A. Field verify location with owner.

B. Install boards in accordance with manufacturer's instructions.

C. Secure units level and plumb.

D. Butt Joints: Install with tight hairline joints.

3.03 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

B. Cover with protective cover, taped to frame.

C. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION

SECTION 10 14 00
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Room and door signs.

1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
   2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule with names and numbers from drawings with spaces to fill in actual names and numbers.
   3. Submit for approval by Owner through Architect prior to fabrication.
   4. Signage company to be responsible for correct spelling of all copy except proper nouns.
      a. Proper noun copy to match copy on shop drawings.

D. Signage Drawings: Provide drawings showing materials, construction detail, lay-out, copy, size and mounting methods.

E. Selection Samples: Two sets of color chips of actual material representing manufacturers full range of available colors.

F. Verification Samples: Submit one sample of one sign to be selected by architect, of size similar to that required for project, illustrating sign style, material, font, and method of attachment.

G. Manufacturer's Instructions: Printed installation instructions for each product.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Regulatory Requirements: Sign types to comply with ADAAG requirements.

C. It shall be the responsibility of the successful bidder to meet any and all local, state, and federal code requirements in fabricating and installing signs.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Room and Door Signs: Obtain room and door signs from one source and a single manufacturer. Provide manufacturer's warranty against defects in materials or workmanship for minimum 5 years.
   1. LSI
   2. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

2.02 SIGNAGE TYPES

A. Accessibility Compliance: All signs are required to comply with ADAAG and ANSI/ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Provide a sign for every door and every room, whether is has a door or not, except for corridors, lobbies, and similar open areas.

C. All Signage Types: Unless otherwise indicated:
   1. Sign Material: to match existing
   2. Character Font: to match existing
   3. Character Case: Upper case only.
   4. Sign Back Panel: to match existing
   5. Background Color: to match existing
   6. Character Color: to match existing
   7. Insert:
      a. Inserts to be provided by signage contractor.
   8. Pictograms: Pictogram field height shall be 6" minimum.
   9. All signs to have braille.
   10. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

D. Room and Door Signs:
   1. All signs provide "tactile" signage, with raised 1/32", matte and subsurface colored for scratch resistance, raised copy and Grade II braille.
   2. Provide outdoor sign at all exterior locations.
   3. Sign Type A: Classrooms
      a. Identify with room numbers to be determined later, not the numbers shown on the drawings; in addition, provide "window" section for replacement occupant name on paper insert.
      b. Sign: to match existing
      c. Sign Window: to match existing
   4. Sign Type B: Electrical, Mechanical, Storage,
      a. Identify with room names and numbers to be determined later, not those shown on the drawings.
      b. Sign: to match existing
   5. Sign Type C: Restrooms (MEN, WOMEN)
      a. Identify with pictograms, the names "MEN", "WOMEN" room numbers to be determined later, and braille.
      b. Include room raised number with braille.
      c. Sign: to match existing

E. Fire Extinguisher Sign
   1. 4" x 14" photopolymer sign with raised copy and braille per NFPA.
   2. One per fire extinguisher.

F. Fire Pull Sign
   1. 4" x 4" photopolymer sign with raised copy and braille per NFPA.
   2. One per pull station.

2.03 ROOM AND DOOR SIGNS MATERIALS

A. Signage System: Sign face to match existing.
   1. Refer to drawings for design.
   2. Panel Edges: to match existing
   3. Mounting: All signs shall be provided with appropriate mounting hardware. Hardware shall be finished and architectural in appearance and suitable for the mounting surface.
      a. Signs on glass to have backplate that matches the material and color of the background of the sign front.

4. Insert window shall have non-glare acrylic window and shall be inlayed flush to sign face for a smooth, seamless appearance.
5. The signage contractor shall provide and install all signage inserts with text and custom graphic.
6. Manufacturer shall provide a template containing layout, font, color, artwork and trim lines to allow Owner to produce inserts on laser or ink jet printer. The template shall be in an Acrobat (.pdf) or Word format .
7. Manufacturer to provide 50 additional paper inserts of each size.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 ROOM AND DOOR SIGNS PROGRAMMING

A. Programming - sign contractor shall perform all wayfinding & programming. Programming shall include location plan, message schedule and fire/evacuation graphics. Contractor shall develop a facility-wide room numbering identification system. The numbering plan as well as all programming materials shall be submitted for approval.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Signs shall be level, plumb, and at heights indicated with sign surfaces free from defects.

D. Signs on glass to have backplate that matches the material and color of the background of the sign front.

E. Upon completion of the work, signage contractor shall remove unused or discarded materials, containers and debris from site.

F. Locate signs where indicated.

G. Signage Installer to submit CAD generated location plan noting the location of all signage and cross referenced to message schedule for Designer's approval.

H. Signage Installer to conduct a pre-installation survey prior to manufacturing to verify message schedule copy and sign location. Each location shall be noted using low tack vinyl. Full scale renderings of directories and directionals shall also be provided. Any location discrepancy or message issue shall be submitted to Designer for review.

I. Signage: Manufacturer shall provide a comprehensive Standards Manual in both a paper and PDF format. The manual shall include all renderings, drawings, location plan, message schedule, insert templates, mounting details, and reorder information.

END OF SECTION

SECTION 10 21 13.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid plastic toilet compartments.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Blocking and supports.

B. Section 09 06 00 - Finish Schedule

C. Section 10 28 00 - Toilet & Utility Accessories.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

C. Product Data: Provide data on panel construction, hardware, and accessories.

D. Samples: Submit two samples of partition panels, 2x2 inches in size illustrating panel finish, color, and sheen. Submit two sets of color chips of actual material panel material representing manufacturers full range of available colors.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

1.06 COORDINATION

A. Coordinate the work with placement of support framing and anchors in wall.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 COMPONENTS

A. Toilet Compartments: Solid molded plastic panels, doors, and pilasters, floor mounted and overhead braced.

B. Door and Panel:
   1. High-Density Polyethylene (HDPE) 1 inch thick - which is waterproof, nonabsorbant and has self lubricating surface that resists marks from graffiti.
   2. Door Height: 55 inch
   3. Color: Refer to Section 09 06 00 Finish Schedule.
   4. Texture: Refer to Section 09 06 00 Finish Schedule.
   5. Door hinge must be continuous.

C. Urinal Screens: Wall mounted with two panel brackets

2.03 ACCESSORIES

A. Pilaster Shoes: Satin Brushed finish, 3 in high, concealing floor fastenings.
   1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Etched and anodized aluminum handrail with antigrip profile and stainless steel brackets.

C. Brackets: Continuous type, polished stainless steel.

D. Wall Brackets: Continuous type, polished stainless steel.

E. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.

F. Hardware: Polished stainless steel:

1. Continuous stainless steel - adjust as required.
2. Door Latch: Slide type with exterior emergency access feature. Stainless steel.
3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
4. Coat hook with rubber bumper; one per compartment, mounted on door.
   a. ADA coat hook to be at 44" max.
5. Provide door pull for outswinging doors. Stainless steel.
6. Provide door pull on both sides of ADA doors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

F. Remove all protective films.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 28 00
TOILET & UTILITY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Accessories for toilet rooms and utility rooms.

C. Utility room accessories.

D. Grab bars.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 09 30 00 - Tiling

C. Section 10 21 13.19 - Plastic Toilet Compartments.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

D. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2011.

E. ASTM C1036 - Standard Specification for Flat Glass; 2011.

F. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Verification Samples: Submit two samples of each accessory, if requested by Architect, illustrating color and finish.

D. Selection Samples: Submit two samples of manufacturers full range of colors.

E. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.05 COORDINATION

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: See drawings.

B. Commercial Toilet, Shower, and Bath Accessories:
   1. Bobrick: www.bobrick.com
   2. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form

C. Provide products of each category type by single manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

B. Keys: Provide 5 keys for each accessory to Owner; master key all lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

E. Mirror Glass: ASTM C 1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C 1503.

F. Adhesive: Two component epoxy type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

H. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.

C. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.

2.04 COMMERCIAL TOILET ACCESSORIES

A. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
   1. Size: per drawings.
   2. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
   3. Frame: Tamper proof hanging system

B. Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, nonslip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.

C. Refer to Drawings.

2.05 UTILITY ROOM ACCESSORIES

A. Mop and Broom Holder: Refer to Drawings

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

D. See Section 06 10 00 for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.02 PREPARATION

A. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

END OF SECTION

SECTION 10 73 13
METAL AWNINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Solid panel, drainable,exterior mounted metal awnings including attachment brackets and trim.

1.02 PERFORMANCE REQUIREMENTS

A. Design: Design awnings, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.

B. Structural Performance: Awnings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of awning components and mounting brackets, or permanent damage to fasteners and anchors.
   1. Wind Loads: Determine loads based on a uniform pressure of 30 lb./sq. ft. (1435 Pa), acting perpendicular to awning surfaces.

C. Thermal Movements: Provide awning system that allows for thermal movements resulting from a maximum change in ambient and surface temperature as indicated without buckling, overstressing of components, failure of connections, or other detrimental effects.
   1. Temperature Range: 120° F (49° C) ambient and 180° F (82° C) at material surfaces.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Include technical data demonstrating mounting and fastening methods, material descriptions, construction details, dimensions of assemblies and components, appearance details, and finishes.

B. Shop Drawings: For exterior awnings and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

C. Samples: For each type of metal finish required.

D. Submittal: For awnings indicated to comply with structural performance requirements and design criteria.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aluminum Extrusions: ASTM B 221M, Alloy 6063-T5.

B. Aluminum Sheet: ASTM B 209M, Alloy 3003 with temper as required for forming.

C. Fasteners: Use types and sizes to suit unit installation conditions.
   1. For fastening aluminum, use aluminum or stainless-steel fasteners.

2.02 FABRICATION, GENERAL

A. Fabricate frames, including outriggers, in dimensions as indicated. Include allowances for fabrication and installation tolerances, adjoining material tolerances, and thermal movements.

B. Space the blades as indicated, and the outermost blades within the frame, to create a uniform appearance.

C. Join frame members to each other and to panels with threaded fasteners concealed from view.

2.03 FIXED, EXTRUDED-ALUMINUM AWNINGS

A. Solid Panel Drainable Metal Awning
   1. Basis-of-Design Product: Architectural Louvers Co. (Harray, LLC); Model H8CV. Subject to compliance with requirements, provide the specified product or comparable product by one of the following:

a. Manufacturers of equivalent products submitted and approved in accordance with Section 01 25 13 - Product Substitution Procedures.

2. Frame Depth: 8 inches (204 mm)
3. Trim Profile: Rectangular tube
4. Panel Type: Interlocking ribbed extrusions
5. Siding Option: Double sided (top and bottom panel)
6. Drainage: Provide perimeter and intermediate gutters of sufficient capacity to allow for proper drainage. Provide water diverters at outlets.
7. Outrigger Thickness: Not less than 0.125 inch (2.54 mm) for structural shapes, not less than 0.25 inch (6.35 mm) for flat materials.
8. Frame and Panel Nominal Thickness: Not less than 0.080 inch (2.03 mm).

2.04 ALUMINUM FINISHES

A. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.01 INSTALLATION

A. Locate and mount awnings level, plumb, and at indicated alignment with adjacent work.

B. Use fastening and mounting methods in accordance with manufacturer instructions.

C. Use concealed anchorages where possible, with locations as directed by manufacturer instructions.

D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.

E. Protect galvanized and unfinished nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.

END OF SECTION

SECTION 11 31 00
APPLIANCES AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Appliances and equipment.

1.02 RELATED REQUIREMENTS

A. Division 22 - Plumbing Piping: Plumbing connections for appliances.

B. Division 26 - Equipment Wiring: Electrical connections for appliances.

C. Section 01 30 00 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

D. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance (O&M) data, warranties and bonds.

1.03 REFERENCE STANDARDS

A. UL (EAUED) - Electrical Appliance and Utilization Equipment Directory; Underwriters Laboratories, Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.

C. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Electric Appliances: Listed and labeled by UL and complying with NEMA standards.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 APPLIANCES

A. Reach-in Freezer - Traulsen G22010 (Item 3)

B. Reach-in Refrigerator - Traulsen G10010 (Item 4)

C. Bottle Cooler - True Manufacturing Co., Inc. TD-50-18-HC (Item 5)

D. Microwave Oven - Menumaster MCS10TS (Item 6)

E. Display Merchandiser, Heated, for Multi-Product - Hatco GR2SDS-36D (Item 7)

F. Hot Dog Grill - APW Wyott HR-31SBD (Item 8)

G. Ice Maker, Cube-Style - Ice O Matic CIM0530HA (Item 9)

H. Coffee Brewer - Bunn 04275.0031 (Item 10)

I. Disposer - Salvajor 100-SA-3-ARSS (Item 11)

J. Hot Food Well - Nemco Food Equipment 6055A (Item 12)

K. Sandwich/Salad Preparation Refrigerator - Hoshizaki SR48A-12 (Item 14)

2.02 EQUIPMENT

A. 3-Compartment Sink - Advance Tabco 94-3-54-18RL (Item 1)

B. Wall Mounted Pot Rack - Advance Tabco SW-48-EC-X (Item 2)

C. Work Table - Advance Tabco VKS-306 (Item 13)
D. Wire Shelving - Advance Tabco EG-2472 (Item 15)
E. Shelving, Wall Mounted - Advance Tabco WS-12-48 (Item 16)
F. Shelving, Wall Mounted - Advance Tabco WS-12-36 (Item 17)
G. Microwave Oven, Shelf - Advance Tabco MS-24-24 (Item 18)

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify utility rough-ins are present and correctly labeled.
B. Verify all clearances and conditions of installation location.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Anchor built-in equipment in place.

3.03 ADJUSTING

A. Adjust operating equipment to efficient operation.

3.04 CLEANING

A. Remove packing materials from equipment.
B. Wash and clean equipment.

END OF SECTION

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Submittal Sheet

09/13/2019

ITEM# 1 - 3-COMPARTMENT SINK (1 EA REQ'D)

Advance Tabco 94-3-54-18RL

Regaline Sink, 3-compartment, with left & right-hand drainboards, 20" front-to-back x 16"W sink compartments, 14" deep, with 11"H backsplash, stainless steel legs with welded front-to-rear & adjustable left-to-right cross rails, 18" drainboards, 1" adjustable bullet feet, 14 gauge 304 stainless steel, overall 27" F/B x 91" L/R, NSF

ACCESSORIES

Mfr	Qty	Model	Spec
Advance Tabco	1	K-472	Faucet hole revision (each)
Advance Tabco	3	K-476	Punch hole for overflow drain, (1) punch required for each overflow drain, (please specify make & model of overflow used) (required for overflows unless using K-15)
Advance Tabco	3	K-4	Support Bracket, for lever waste drain handle, (1) support required for each lever drain
Advance Tabco	1	K-454	Side splash, integral (welded), for NSF sinks & dish tables, height matches backsplash height (specify side)
Advance Tabco	1	K-495	Turn Down Backsplash (includes wall clips)
Fisher	3	24074	DrainKing Waste Valve, flat strainer, overflow body, 19 x 21 tube & elbow, 12 GPM drain rate, cast red brass body, with tailpiece (6129)
Fisher	2	81264	Faucet, splash-mounted, 8" centers, with 14" swing spout, 84" supply lines, elbows, 3/4" inlets
Fisher	1	82678	Pre-Rinse Unit, 8" backsplash with elbows & supply lines control valve, with spring action flexible gooseneck, 21" riser, 36" hose, wall bracket & Ultra-Spray™/PLUS spray valve

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1									
2	3/4"			3/4"					
3	1/2"			1/2"					

WASTE

	INDIRECT SIZE	DIRECT SIZE
1	(3) 1-1/2"	
2		
3		

PLUMBING 1 REMARKS

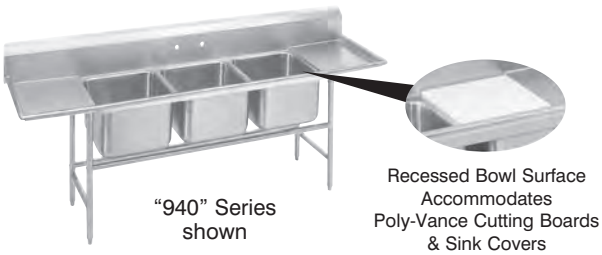
(1) set of 1/2" faucet holes, 8" OC

ADVANCE TABCO® SMART FABRICATION™

STAINLESS STEEL

REGALINE SINKS NSF

Three Compartments - Two Drainboards



"940" Series shown

Recessed Bowl Surface Accommodates Poly-Vance Cutting Boards & Sink Covers

Item #: _____ Qty #: _____

Model #: _____

Project #: _____

FEATURES:

Tile edge for ease of installation.

One piece **Deep Drawn** sink bowls with integral drainboards with splash.

Featuring the single bowl unit design.

All sink bowls have a large liberal 3" radius.

Placement of the welded leg assembly ensures stability and furnishes direct support of the column load requirement for the entire sink unit.

"940" series is supplied with adjustable front and rear cross brace featuring leg casting to secure left to right cross bracing.

CONSTRUCTION:

All TIG welded.

Welded areas blended to match adjacent surfaces and to a satin finish.

Gussets welded to a die-embossed reinforcing channel.

MATERIALS:

Spec-Line (**940 Series**): 14 gauge type 304 stainless steel 11" High Splash.

Standard (**930 Series**): 16 gauge type 304 stainless steel 8" High Splash.

Super Saver (**900 Series**): 18 gauge type 304 stainless steel 8" High Splash.

LEGS:
- 1 5/8" diameter tubular stainless steel.
- Stainless steel gussets & channels.
- Stainless Steel 1" adjustable bullet feet.

YES! It's SeaMLess!

					SPEC-LINE 940 Series		STANDARD 930 Series		SUPER SAVER 900 Series		
					14 Ga. 304 S/S 14" Water Level		16 Ga. 304 S/S 12" Water Level		18 Ga. 304 S/S 12" Water Level		
BOWL SIZE	O.A. LENGTH (inches)	(mm)	DRBD. SIZE (inches)	(mm)	MODEL #	Approx. Wt. (lbs.)	MODEL #	Approx. Wt. (lbs.)	MODEL #	Approx. Wt. (lbs.)	Cubic Feet
16 x 20 (406 x 508)	91"	2311	18"	457	94-3-54-18RL	230	93-3-54-18RL	189	9-3-54-18RL	182	49
	103"	2616	24"	610	94-3-54-24RL	248	93-3-54-24RL	197	9-3-54-24RL	190	55
	127"	3226	*36"	914	94-3-54-36RL	275	93-3-54-36RL	239	9-3-54-36RL	208	96
20 x 20 (508 x 508)	103"	2616	18"	457	94-23-60-18RL	248	93-23-60-18RL	203	9-23-60-18RL	198	59
	115"	2921	24"	610	94-23-60-24RL	276	93-23-60-24RL	220	9-23-60-24RL	195	65
	139"	3531	*36"	914	94-23-60-36RL	408	93-23-60-36RL	387	9-23-60-36RL	364	89
18 x 24 (457 x 610)	97"	2457	18"	457	94-63-54-18RL	323	93-63-54-18RL	289	9-63-54-18RL	226	62
	109"	2762	24"	610	94-63-54-24RL	334	93-63-54-24RL	304	9-63-54-24RL	233	85
	133"	3372	*36"	914	94-63-54-36RL	418	93-63-54-36RL	367	9-63-54-36RL	325	96
24 x 24 (610 x 610)	†127"	3226	24"	610	94-43-72-24RL	390	93-43-72-24RL	331	9-43-72-24RL	318	98
	†151"	3835	*36"	914	94-43-72-36RL	448	93-43-72-36RL	393	9-43-72-36RL	345	110
20 x 28 (508 x 711)	103"	2616	18"	457	94-83-60-18RL	358	93-83-60-18RL	315	9-83-60-18RL	277	83
	115"	2921	24"	610	94-83-60-24RL	394	93-83-60-24RL	346	9-83-60-24RL	305	95
	139"	3531	*36"	914	94-83-60-36RL	451	93-83-60-36RL	398	9-83-60-36RL	350	109
					14" Water Level 17" Flood Level		12" Water Level 15" Flood Level		12" Water Level 15" Flood Level		

† Requires Two Faucets

*** Regalines with 36" Drainboards are Supplied with Two Sets of Legs for Support.**

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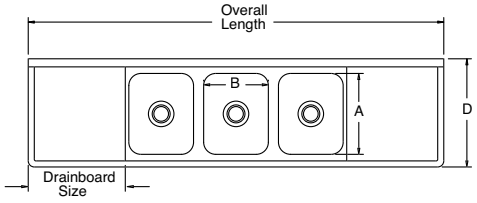
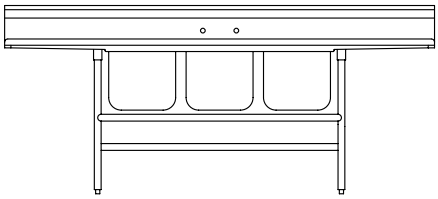
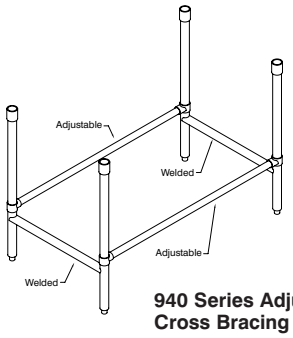
DIMENSIONS and SPECIFICATIONS

TOL Overall: ± .500”
Interior: ± .250”

ALL DIMENSIONS ARE TYPICAL







940 Series Adjustable Cross Bracing

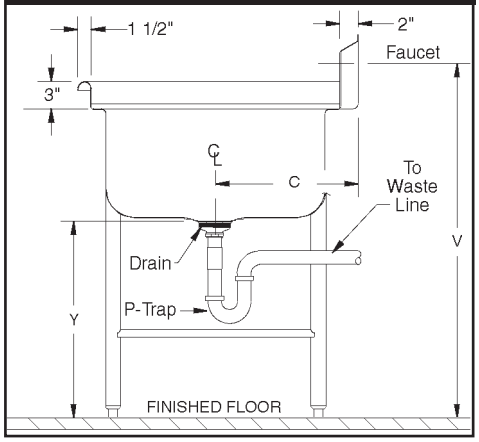
DESCRIPTION

BOWL (SIZE)	Overall Length	DRBD (SIZE)	Recommended Use	A	B	C	D	940 SERIES V	940 SERIES W	940 SERIES X	940 SERIES Y	940 SERIES Z	900 & 930 SERIES V	900 & 930 SERIES W	900 & 930 SERIES X	900 & 930 SERIES Y	900 & 930 SERIES Z
16x20	91” 103” 127”	18” 24” *36”	DISH SINKS	20”	16”	13 5/8”	27”	**38”**	**11”**	**14”**	**20”**	**45”**	38”	8”	12”	22”	42”
20x20	103” 115” 139”	18” 24” *36”	DISH & POT SINKS	20”	20”	13 5/8”	27”	**38”**	**11”**	**14”**	**20”**	**45”**	38”	8”	12”	22”	42”
18x24	97” 109” 133”	18” 24” *36”	POT & PAN SINKS	24”	18”	15 5/8”	31”	**38”**	**11”**	**14”**	**20”**	**45”**	38”	8”	12”	22”	42”
24x24	†127” †151”	24” *36”	POT SINKS	24”	24”	15 5/8”	31”	**38”**	**11”**	**14”**	**20”**	**45”**	38”	8”	12”	22”	42”
20x28	103” 115” 139”	18” 24” *36”	PAN SINKS	28”	20”	17 5/8”	35”	**38”**	**11”**	**14”**	**20”**	**45”**	38”	8”	12”	22”	42”

† Requires Two Faucets

*** Regalines with 36” Drainboards are Supplied with Two Sets of Legs for Support.**

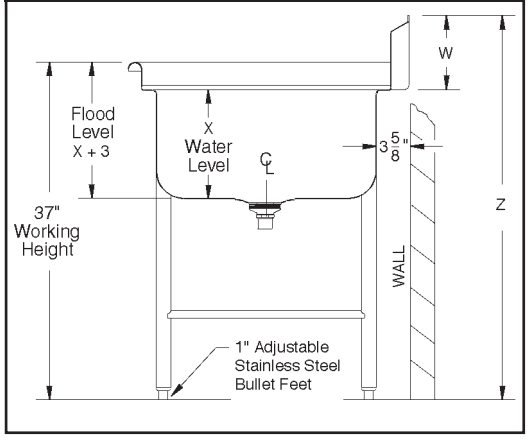
PLUMBING ROUGH-IN



MECHANICAL:

- Supply is 1/2” IPS hot & cold.
- Faucet holes on 8” centers.
- Faucets are not included **(see accessories)**.
- Waste drains are 1 1/2” IPS S/S basket type, located in center of sink bowl, and are included.

SECTION



ADVANCE TABCO
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ADVANCE TABCO is constantly engaged in a program of improving our products. Therefore, we reserve the right to change specifications without prior notice.

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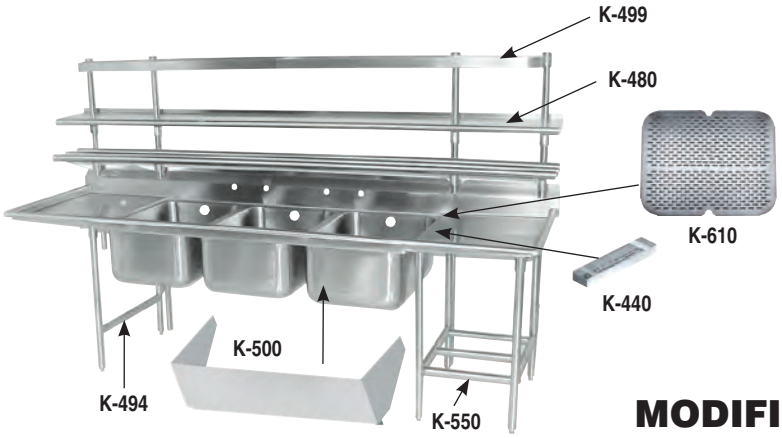
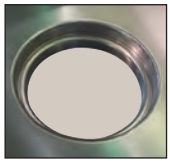
SINK MODIFICATIONS & ACCESSORIES



K-37 Anti-Siphon Vacuum Braker Holes

K-72 Leg-To-Wall Brace

K-460A Disposal Cone w/ Control Bracket & Faucet Holes



K-461A Install Collar w/ Control Bracket

MODIFICATIONS

K-4	Support Bracket for Lever Waste Drain Handle
K-23	Welded Set-Up/Crated
K-24	Shell Crating
K-37	Anti-Siphon Vacuum Breaker Holes
K-57	Welded field Joint *(Welded in field by others)*
K-76	Paint on Sound Deadening
K-77	Splash Cutout (Pipe Chase)
K-106	Mirror Highlite Edge for Sink
K-440	Waste Trough with 2" deep removable basket
K-447	High Backsplash up to 18"
K-448	High Backsplash up to 13"
K-450	Extra Drainboard
K-451	Drainboard Corner Turn
K-452	Control Bracket 8" x 12"
K-452S	Splash Mounted Control Bracket 8" x 12"
K-453	Control Bracket 14" x 16"
K-453S	Splash Mounted Control Bracket 14" x 16"
K-454	Sidesplash
K-456	Scrap Block Installed
K-460	Installation of Disposal Cone with 8" x 12" Control Bracket, Faucet Holes *(Cone supplied by others)*
K-460A	Installation of Disposal Cone with 14" x 16" Control Bracket, Faucet Holes *(Cone supplied by others)*

K-461	Install Collar with 8" x 12" control bracket *(Collar by others)*
K-461A	Install Collar with 14" x 16" control bracket *(Collar by others)*
K-470	Modify Bowl Depth
K-472	Faucet Hole Revision
K-473	Working Height Revision
K-476	Punch for Over Flow Holes *(Holes Only. N/C when ordering K-15)*
K-479	Undershelf Under Drainboard
K-480	Stainless Steel 12" Wide Shelf *(min. of 3 ft.)*
K-480A	Stainless Steel 15" Wide Shelf *(min. of 3 ft.)*
K-490	Provision for Pot Washer *(For "Wells-PW-106" only)*
K-491	Provision for Hatco Heater
K-495	Turn Down Backsplash *(Includes 2 Brackets. See K-397 Addt'l Sets)*
K-498	Tubular Overshelf 12" wide (Min. 3 Ft.)
K-499	Stainless Steel Pot Rack
K-500	Stainless Steel Apron to Cover Sink Bowls
K-500A	17" Stainless Steel Apron to Cover Sink Bowls and Support Lever Drain Handles
K-508	Special Sizing Charge (Larger size cut down to smaller size
K-508A	Special Modification Charge
K-510	Prepare Sink for Undercounter Dishwasher *(24" drainboard or larger)*
K-520	Poly Board/Stainless Steel Cover Holder
K-550	Stainless Steel Tubular Rack Storage

ACCESSORIES

K-30	Faucet Wall Mounting Bracket
K-72	Leg To Wall Brace
K-350	Residential Finish & Packaging
K-397	Wall Brackets for Sink *(Brackets Included with K-495)*
K-457	Replacement Rubber Scrap Block *(See K-456 for install cost)*
K-474	16 ga., '304' Series S/S Leg with S/S Foot
K-475	S/S Legs with S/S Foot
K-478	Stainless Steel Bullet Foot
K-488	Flanged S/S Bullet Foot
K-493	16 ga., '304' Series S/S Welded Leg Assembly with S/S Feet
K-494	S/S Welded Leg Assembly with S/S Feet
K-497	Galv. Welded Leg Assembly with Plastic Feet
K-497A	Galv. Individual Legs with Plastic Feet
K-496	Leg Assembly For Grease Interceptor w/ Adj. Cross-Bracing & S/S Feet *(For Grease Interceptors with 15" Ht. or less. Consult factory for larger Grease Interceptors)*
K-610	Perforated Stainless Steel Sink Grid *(Specify Bowl Size)*

SINK COVERS

Choose Model # & Add The Proper Letter In Place Of The Underscore (_). Example: K-2A or FC-455H

Bowl Size	FOR DEEP DRAWN BOWLS: Poly Covers Model K-2_	FOR DEEP DRAWN BOWLS: S/S Covers Model K-455_	FOR FABRICATED BOWLS: Poly Covers Model K-2_	FOR FABRICATED BOWLS: S/S Covers Model FC-455_
16" x 20"	C	C	CF	C
20" x 20"	E	E	EF	E
24" x 24"	F	F	FF	F
10" x 14"	A	A	AF	A
20" x 28"	G	G	GF	G
14" x 16"	B	B	BF	B
18" x 24"	D	D	DF	D
18" x 18"	Not Available	Not Available	JF	J
20" x 24"	Not Available	Not Available	PF	P
24" x 36"	Not Available	Not Available	RF	R
20" x 30"	Not Available	Not Available	SF	S
24" x 30"	Not Available	Not Available	TF	T
15" x 15"	Not Available	Not Available	MF	M
14" x 14"	H	H	HF	H
12" x 20"	I	I	IF	I

Custom Covers Available. Consult Factory.

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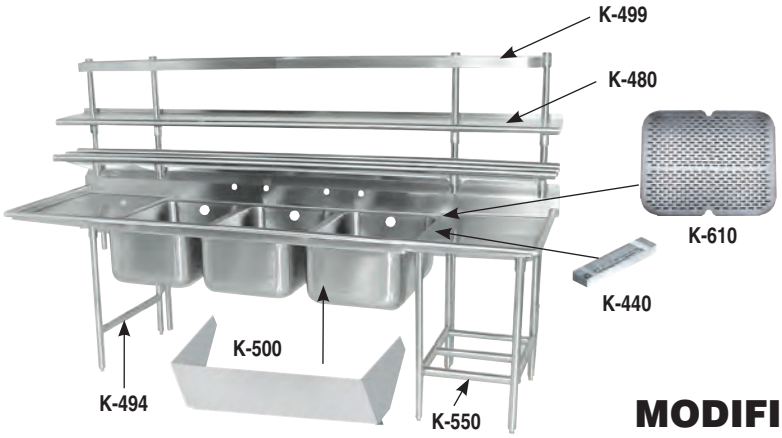
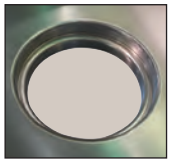
SINK MODIFICATIONS & ACCESSORIES



K-37 Anti-Siphon Vacuum Braker Holes

K-72 Leg-To-Wall Brace

K-460A Disposal Cone w/ Control Bracket & Faucet Holes



K-461A Install Collar w/ Control Bracket

MODIFICATIONS

K-4	Support Bracket for Lever Waste Drain Handle
K-23	Welded Set-Up/Crated
K-24	Shell Crating
K-37	Anti-Siphon Vacuum Breaker Holes
K-57	Welded field Joint *(Welded in field by others)*
K-76	Paint on Sound Deadening
K-77	Splash Cutout (Pipe Chase)
K-106	Mirror Highlite Edge for Sink
K-440	Waste Trough with 2" deep removable basket
K-447	High Backsplash up to 18"
K-448	High Backsplash up to 13"
K-450	Extra Drainboard
K-451	Drainboard Corner Turn
K-452	Control Bracket 8" x 12"
K-452S	Splash Mounted Control Bracket 8" x 12"
K-453	Control Bracket 14" x 16"
K-453S	Splash Mounted Control Bracket 14" x 16"
K-454	Sidesplash
K-456	Scrap Block Installed
K-460	Installation of Disposal Cone with 8" x 12" Control Bracket, Faucet Holes *(Cone supplied by others)*
K-460A	Installation of Disposal Cone with 14" x 16" Control Bracket, Faucet Holes *(Cone supplied by others)*

K-461	Install Collar with 8" x 12" control bracket *(Collar by others)*
K-461A	Install Collar with 14" x 16" control bracket *(Collar by others)*
K-470	Modify Bowl Depth
K-472	Faucet Hole Revision
K-473	Working Height Revision
K-476	Punch for Over Flow Holes *(Holes Only. N/C when ordering K-15)*
K-479	Undershelf Under Drainboard
K-480	Stainless Steel 12" Wide Shelf *(min. of 3 ft.)*
K-480A	Stainless Steel 15" Wide Shelf *(min. of 3 ft.)*
K-490	Provision for Pot Washer *(For "Wells-PW-106" only)*
K-491	Provision for Hatco Heater
K-495	Turn Down Backsplash *(Includes 2 Brackets. See K-397 Addt'l Sets)*
K-498	Tubular Overshelf 12" wide (Min. 3 Ft.)
K-499	Stainless Steel Pot Rack
K-500	Stainless Steel Apron to Cover Sink Bowls
K-500A	17" Stainless Steel Apron to Cover Sink Bowls and Support Lever Drain Handles
K-508	Special Sizing Charge (Larger size cut down to smaller size
K-508A	Special Modification Charge
K-510	Prepare Sink for Undercounter Dishwasher *(24" drainboard or larger)*
K-520	Poly Board/Stainless Steel Cover Holder
K-550	Stainless Steel Tubular Rack Storage

ACCESSORIES

K-30	Faucet Wall Mounting Bracket
K-72	Leg To Wall Brace
K-350	Residential Finish & Packaging
K-397	Wall Brackets for Sink *(Brackets Included with K-495)*
K-457	Replacement Rubber Scrap Block *(See K-456 for install cost)*
K-474	16 ga., '304' Series S/S Leg with S/S Foot
K-475	S/S Legs with S/S Foot
K-478	Stainless Steel Bullet Foot
K-488	Flanged S/S Bullet Foot
K-493	16 ga., '304' Series S/S Welded Leg Assembly with S/S Feet
K-494	S/S Welded Leg Assembly with S/S Feet
K-497	Galv. Welded Leg Assembly with Plastic Feet
K-497A	Galv. Individual Legs with Plastic Feet
K-496	Leg Assembly For Grease Interceptor w/ Adj. Cross-Bracing & S/S Feet *(For Grease Interceptors with 15" Ht. or less. Consult factory for larger Grease Interceptors)*
K-610	Perforated Stainless Steel Sink Grid *(Specify Bowl Size)*

SINK COVERS

Choose Model # & Add The Proper Letter In Place Of The Underscore (_). Example: K-2A or FC-455H

Bowl Size	FOR DEEP DRAWN BOWLS: Poly Covers Model K-2_	FOR DEEP DRAWN BOWLS: S/S Covers Model K-455_	FOR FABRICATED BOWLS: Poly Covers Model K-2_	FOR FABRICATED BOWLS: S/S Covers Model FC-455_
16" x 20"	C	C	CF	C
20" x 20"	E	E	EF	E
24" x 24"	F	F	FF	F
10" x 14"	A	A	AF	A
20" x 28"	G	G	GF	G
14" x 16"	B	B	BF	B
18" x 24"	D	D	DF	D
18" x 18"	Not Available	Not Available	JF	J
20" x 24"	Not Available	Not Available	PF	P
24" x 36"	Not Available	Not Available	RF	R
20" x 30"	Not Available	Not Available	SF	S
24" x 30"	Not Available	Not Available	TF	T
15" x 15"	Not Available	Not Available	MF	M
14" x 14"	H	H	HF	H
12" x 20"	I	I	IF	I

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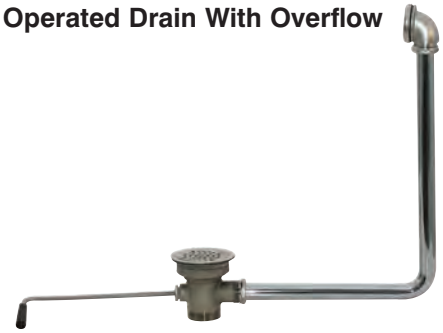
SINK DRAINS & ACCESSORIES

Twist Handle Operated Drain

K-5

Twist Handle Operated Drain With Overflow



K-15

Lever Operated Drains For Hand Sinks

with Overflow

K-26

No Overflow

K-67

SPEC-LINE Twist Handle Operated Drain All Stainless Steel

K-40

3-1/2" Basket Drain

K-6

Replacement Drain Basket For K-6

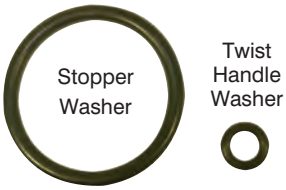
K-310

2" Drain with Strainer Plate

K-63

Replacement "O" Rings For Twist Handle Drains

(For K-5 & K-15 Drains)



K-05

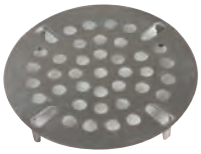
Twist Drain Support Bracket

K-4

Replacement Strainer For 3-1/2" Drains

K-410

Replacement Strainer For 2" Drains



K-411

Replacement Washers For 3-1/2" Drains

(Set of 2)

K-67F

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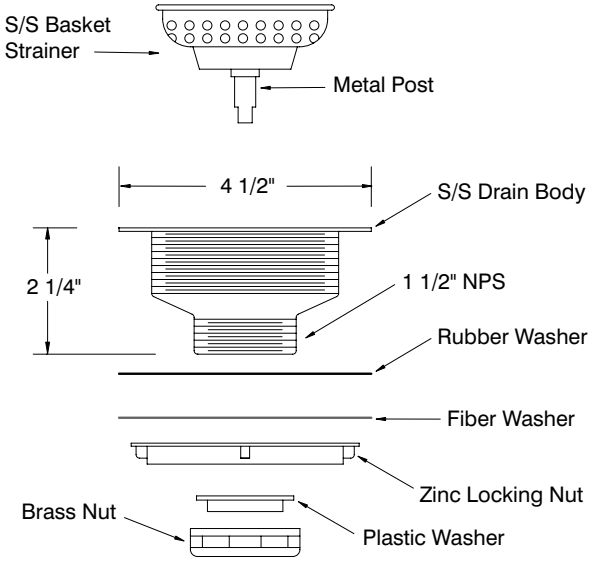
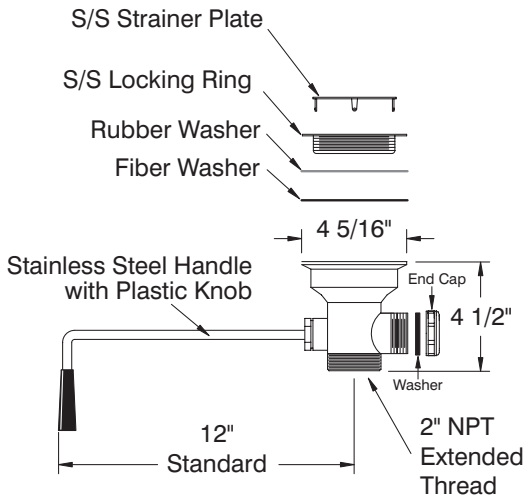
DIMENSIONS and SPECIFICATIONS

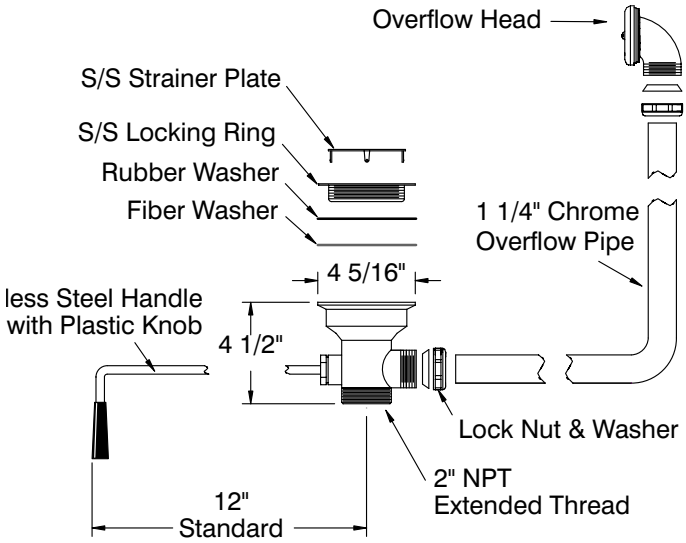
TOL ± .125" ALL DIMENSIONS ARE TYPICAL



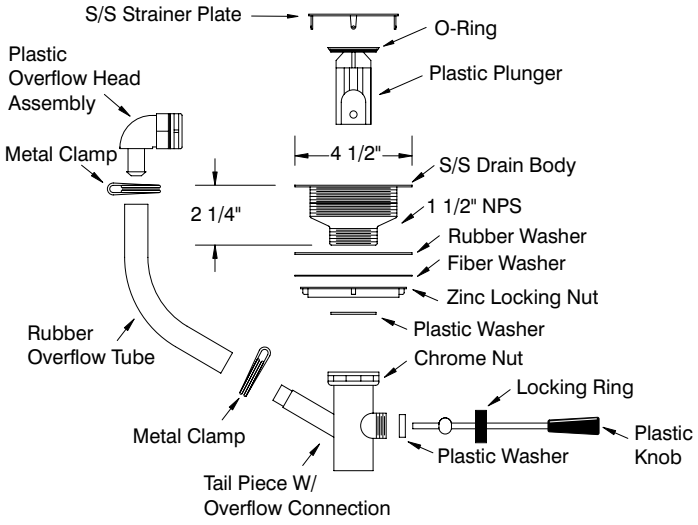
K-6



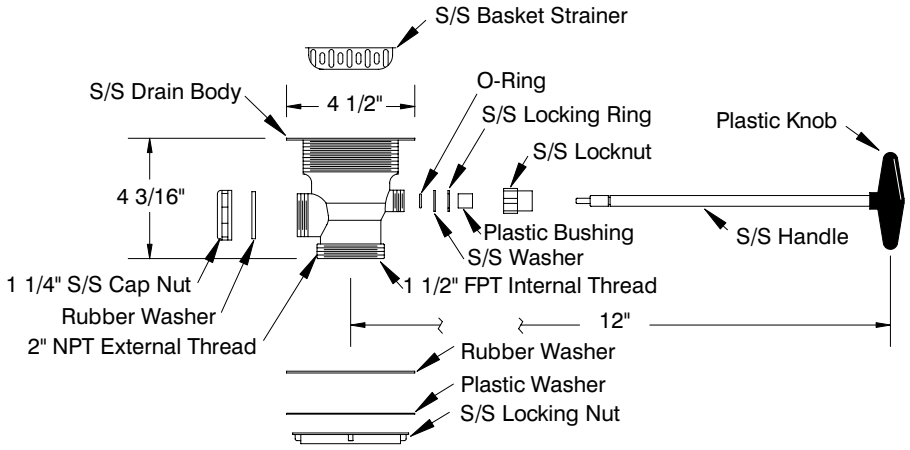
K-5



K-15



K-26 & K-67 For Hand Sinks (K-67 Excludes Overflow)



K-40

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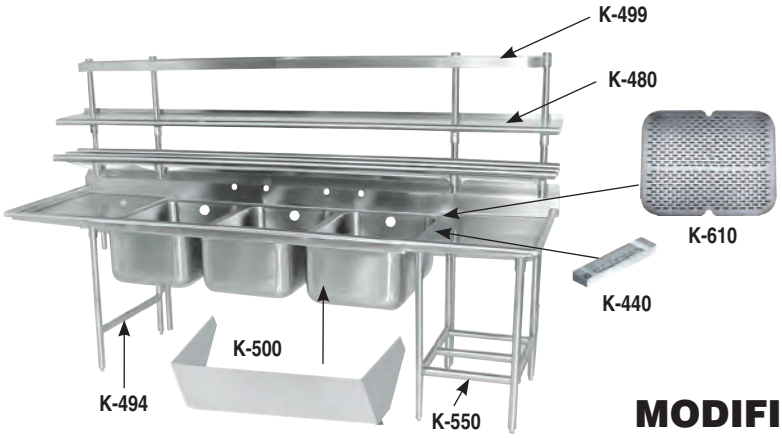
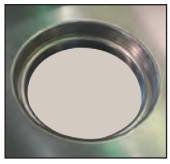
SINK MODIFICATIONS & ACCESSORIES



K-37 Anti-Siphon Vacuum Braker Holes

K-72 Leg-To-Wall Brace

K-460A Disposal Cone w/ Control Bracket & Faucet Holes



K-461A Install Collar w/ Control Bracket

MODIFICATIONS

K-4	Support Bracket for Lever Waste Drain Handle
K-23	Welded Set-Up/Crated
K-24	Shell Crating
K-37	Anti-Siphon Vacuum Breaker Holes
K-57	Welded field Joint *(Welded in field by others)*
K-76	Paint on Sound Deadening
K-77	Splash Cutout (Pipe Chase)
K-106	Mirror Highlite Edge for Sink
K-440	Waste Trough with 2" deep removable basket
K-447	High Backsplash up to 18"
K-448	High Backsplash up to 13"
K-450	Extra Drainboard
K-451	Drainboard Corner Turn
K-452	Control Bracket 8" x 12"
K-452S	Splash Mounted Control Bracket 8" x 12"
K-453	Control Bracket 14" x 16"
K-453S	Splash Mounted Control Bracket 14" x 16"
K-454	Sidesplash
K-456	Scrap Block Installed
K-460	Installation of Disposal Cone with 8" x 12" Control Bracket, Faucet Holes *(Cone supplied by others)*
K-460A	Installation of Disposal Cone with 14" x 16" Control Bracket, Faucet Holes *(Cone supplied by others)*

K-461	Install Collar with 8" x 12" control bracket *(Collar by others)*
K-461A	Install Collar with 14" x 16" control bracket *(Collar by others)*
K-470	Modify Bowl Depth
K-472	Faucet Hole Revision
K-473	Working Height Revision
K-476	Punch for Over Flow Holes *(Holes Only. N/C when ordering K-15)*
K-479	Undershelf Under Drainboard
K-480	Stainless Steel 12" Wide Shelf *(min. of 3 ft.)*
K-480A	Stainless Steel 15" Wide Shelf *(min. of 3 ft.)*
K-490	Provision for Pot Washer *(For "Wells-PW-106" only)*
K-491	Provision for Hatco Heater
K-495	Turn Down Backsplash *(Includes 2 Brackets. See K-397 Addt'l Sets)*
K-498	Tubular Overshelf 12" wide (Min. 3 Ft.)
K-499	Stainless Steel Pot Rack
K-500	Stainless Steel Apron to Cover Sink Bowls
K-500A	17" Stainless Steel Apron to Cover Sink Bowls and Support Lever Drain Handles
K-508	Special Sizing Charge (Larger size cut down to smaller size
K-508A	Special Modification Charge
K-510	Prepare Sink for Undercounter Dishwasher *(24" drainboard or larger)*
K-520	Poly Board/Stainless Steel Cover Holder
K-550	Stainless Steel Tubular Rack Storage

ACCESSORIES

K-30	Faucet Wall Mounting Bracket
K-72	Leg To Wall Brace
K-350	Residential Finish & Packaging
K-397	Wall Brackets for Sink *(Brackets Included with K-495)*
K-457	Replacement Rubber Scrap Block *(See K-456 for install cost)*
K-474	16 ga., '304' Series S/S Leg with S/S Foot
K-475	S/S Legs with S/S Foot
K-478	Stainless Steel Bullet Foot
K-488	Flanged S/S Bullet Foot
K-493	16 ga., '304' Series S/S Welded Leg Assembly with S/S Feet
K-494	S/S Welded Leg Assembly with S/S Feet
K-497	Galv. Welded Leg Assembly with Plastic Feet
K-497A	Galv. Individual Legs with Plastic Feet
K-496	Leg Assembly For Grease Interceptor w/ Adj. Cross-Bracing & S/S Feet *(For Grease Interceptors with 15" Ht. or less. Consult factory for larger Grease Interceptors)*
K-610	Perforated Stainless Steel Sink Grid *(Specify Bowl Size)*

SINK COVERS

Choose Model # & Add The Proper Letter In Place Of The Underscore (_). Example: K-2A or FC-455H

Bowl Size	FOR DEEP DRAWN BOWLS: Poly Covers Model K-2_	FOR DEEP DRAWN BOWLS: S/S Covers Model K-455_	FOR FABRICATED BOWLS: Poly Covers Model K-2_	FOR FABRICATED BOWLS: S/S Covers Model FC-455_
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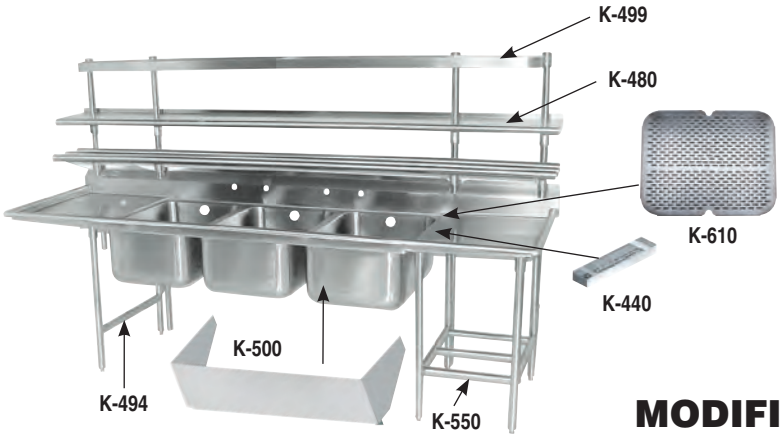
SINK MODIFICATIONS & ACCESSORIES



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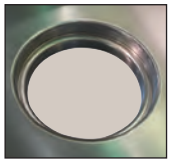
K-460A Disposal Cone w/ Control Bracket & Faucet Holes



K-461A Install Collar w/ Control Bracket

MODIFICATIONS

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20" x 20"	E	E	EF	E
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10" x 14"	A	A	AF	A
20" x 28"	G	G	GF	G
14" x 16"	B	B	BF	B
18" x 24"	D	D	DF	D
18" x 18"	Not Available	Not Available	JF	J
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APPLICATION:

PRODUCT NAME:

8” C/C BACKSPLASH FAUCET WITH
14” SWING SPOUT

JOB NAME:

QUANTITY: | ITEM NO.

■ 81264 SPECIAL CONFIGURATION
(CHECK BASE MODEL AND OPTIONS)

MODEL:

☐ 5412 W/ 10” SWING SPOUT

■ 5414 W/ 14” SWING SPOUT

OPTIONS OR MODIFICATIONS

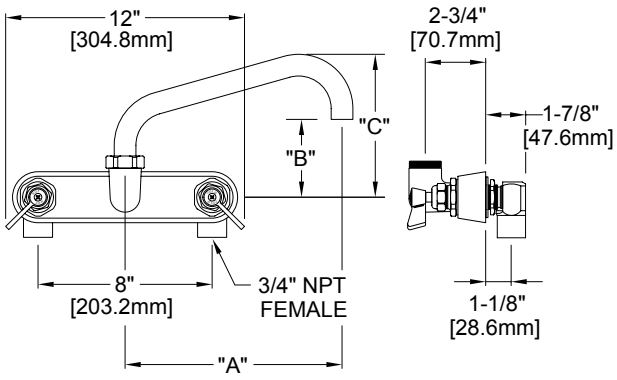
☐ VANDAL RESISTANT KIT

☐ HANDLES (CROSS OR WRIST) CIRCLE STYLE

■ SUPPLY LINES (84”)

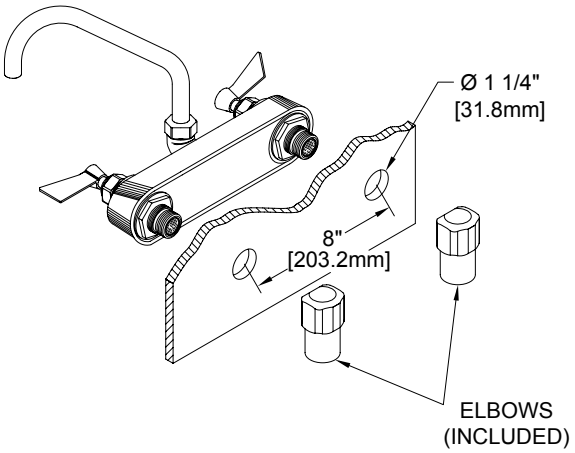
■ ELBOWS

☐ OTHER _____



MODEL	DIM "A"	DIM "B"	DIM "C"
5412	10" [254.0mm]	3-1/2" [88.9mm]	6-5/8" [168.3mm]
5414	14" [355.6mm]	4-5/8" [117.5mm]	7-3/4" [196.9mm]

ROUGH-IN:



FEATURES:

CONTROL VALVE
* 8” C/C BACKSPLASH FAUCET
* SWIVELLING SEAT DISKS
* HOT SIDE STEM - LEFT HAND
* COLD SIDE STEM - RIGHT HAND
* STAINLESS STEEL SEATS
* STAINLESS STEEL SEAT SCREWS
* STAINLESS STEEL HANDLE SCREWS
* CLOSE ELBOWS

SYSTEM LIMITS
* TEMP: 40°F MIN. TO 140°F MAX.
* PRESSURE 200 PSI MAX. STATIC
* 37 GPM AT 80 PSI

SHIPPING WEIGHT
* 11.0 LBS

SPEC. 81264 REV. A

ANSI/A112.18.1M

FISHER MANUFACTURING COMPANY
TOLL FREE: 800-421-6162 - FAX: 800-832-8238
information@fisher-mfg.com - www.fisher-mfg.com

APPLICATION:

PRODUCT NAME:

8” C/C BACKSPLASH PRE-RINSE

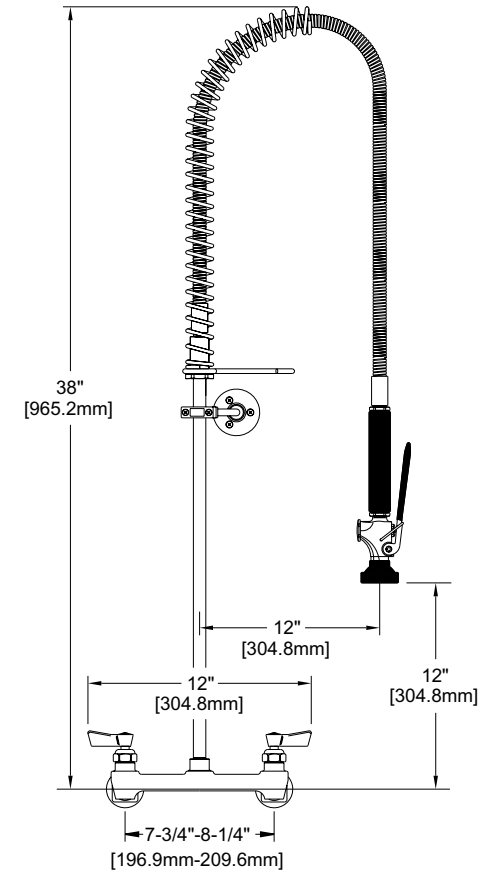
JOB NAME:

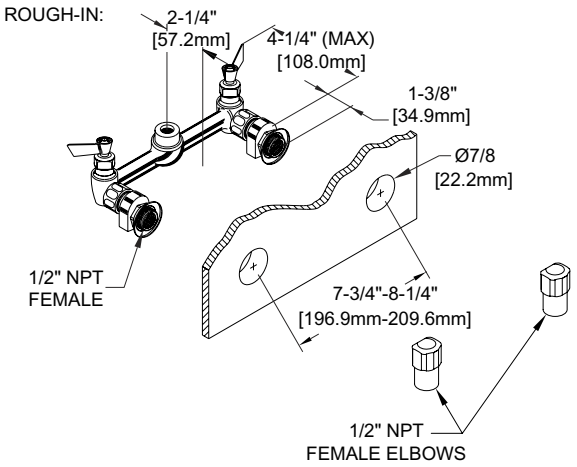
QUANTITY: | ITEM NO.

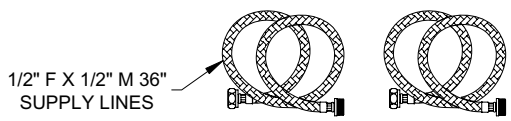
■ 82678 SPECIAL CONFIGURATION (CHECK BASE MODEL AND OPTIONS)

MODEL:

■ 13390







OPTIONS OR MODIFICATIONS

- ■ SUPPLY LINES (24” OR (36”)) CIRCLE LENGTH
- □ ADD-ON FAUCET (6”, 8”, 10”, 12”, 14”, 16”) CIRCLE
- □ IN-LINE DUAL CHECK VALVE
- □ BRUSH
- □ NIPPLES
- ■ ELBOWS
- □ VANDAL RESISTANT KIT
- □ HANDLES (CROSS OR WRIST) CIRCLE STYLE
- □ OTHER _____

FEATURES:

CONTROL VALVE
* ECCENTRICS ADJUST FROM 7 3/4” TO 8 1/4”
* INTERNAL SPRING LOADED CHECK VALVES
* SWIVELLING SEAT DISKS
* HOT SIDE STEM - RIGHT HAND
* COLD SIDE STEM - LEFT HAND
* STAINLESS STEEL SEATS
* STAINLESS STEEL SEAT SCREWS
* STAINLESS STEEL HANDLE SCREWS
* 1/2” SLIP JOINT

HOSE
* 36” LENGTH
* STAINLESS STEEL END FITTINGS
* STAINLESS STEEL EXTERNAL JACKET
* 3-PLY FIBER REINFORCED INTERNAL RUBBER HOSE

ULTRA SPRAY VALVE
* 1.6 GPM @ 80 PSI ENERGY EFFICIENT NOZZLE
* BRONZE HANDLE - NOT PLASTIC - MEANS FULL “ON”
* FITS ALL BRANDS

SYSTEM LIMITS
* TEMP: 40°F MIN. TO 140°F MAX.
* PRESSURE 200 PSI MAX. STATIC
* 2.65 GPM AT 80 PSI

SHIPPING WEIGHT
* 12.0 LBS

ANSI/A112.18.1M

FISHER MANUFACTURING COMPANY
TOLL FREE: 800-421-6162 - FAX: 800-832-8238
information@fisher-mfg.com - www.fisher-mfg.com

SPEC. 82678 REV. B

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Suppliers/Designers to the Food Service Industry

Submittal Sheet

09/13/2019

ITEM# 2 - WALL-MOUNTED POT RACK (1 EA REQ'D)

Advance Tabco SW-48-EC-X

Special Value Pot Rack, wall-mounted, double bar design, 48"W x 12"D x 12"H, constructed of 1/4" x 2" stainless steel, includes: (12) plated double pot hooks

STAINLESS STEEL

VALUE POT RACKS

Item #: _____ Qty #: _____

Model #: _____

Project #: _____

Wall Mounted

Single Bar

Double Bar

FEATURES:

Secured to wall by means of bolts through welded brackets. (Hardware not provided)

MATERIAL:

Flat steel bar is 2" x 1/4", stainless steel.

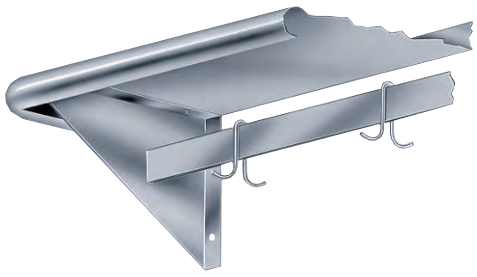
Pot hooks are plated.

CONSTRUCTION:

Welded stainless steel units are blended to a satin finish.

	Model #	O.A. Length	A	# of Hooks	Approx. Weight	Approx. Cu. Ft.
SINGLE BAR	SW1-36-EC-X	41"	36"	6	13 lbs.	2
	SW1-48-EC-X	53"	48"	6	15 lbs.	2
	SW1-60-EC-X	65"	60"	9	17 lbs.	3
	SW1-72-EC-X	77"	72"	9	19 lbs.	3
	SW1-96-EC-X	101"	96"	9	23 lbs.	4
DOUBLE BAR	SW-36-EC-X	36"	-	12	22 lbs.	5
	SW-48-EC-X	48"	-	12	26 lbs.	6
	SW-60-EC-X	60"	-	18	30 lbs.	7
	SW-72-EC-X	72"	-	18	34 lbs.	9
	SW-96-EC-X	96"	-	18	48 lbs.	12

12" Wide Shelf with Pot Rack



FEATURES:

A dual purpose unit for shelf and utensil storage.

Secured to wall by means of bolts through welded brackets. (Hardware not provided)

MATERIAL:

Flat stainless steel bar is 2" x 1/4". Pot hooks are plated.
Type "430" stainless steel shelf.

CONSTRUCTION:

All welded stainless steel units are blended to a satin finish.

Model #	Size W x L	# of Hooks	Approx. Wt.	Approx. Cu. Ft.
PS-12-36-EC-X	12" x 36"	6	20 lbs.	4
PS-12-48-EC-X	12" x 48"	6	30 lbs.	5
PS-12-60-EC-X	12" x 60"	9	40 lbs.	6
PS-12-72-EC-X	12" x 72"	9	50 lbs.	7

ADVANCE TABCO SMART FABRICATION™ www.advancetabco.com

Customer Service Available To Assist You 1-800-645-3166 8:30 am - 8:00 pm E.S.T.

For Orders & Customer Service:
Email: customer@advancetabco.com or **Fax:** 631-242-6900

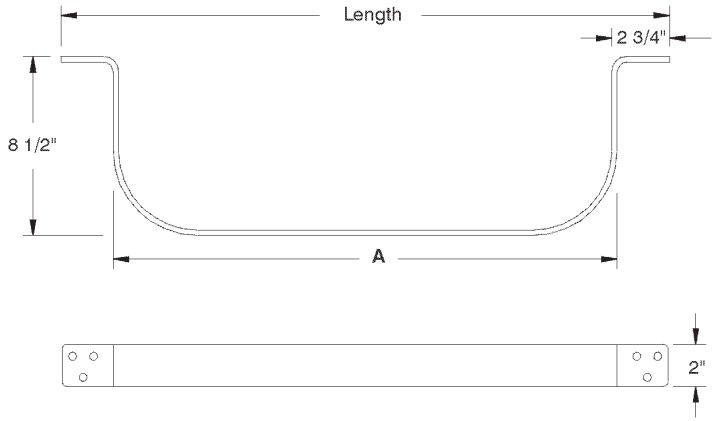
For Smart Fabrication™ Quotes:
Email: smartfab@advancetabco.com or **Fax:** 631-586-2933

REF-L

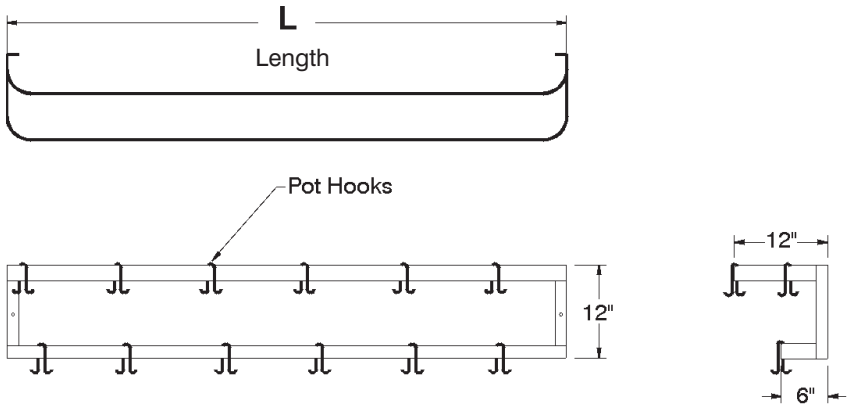
DETAILS and SPECIFICATIONS

TOL ± .500” ALL DIMENSIONS ARE TYPICAL

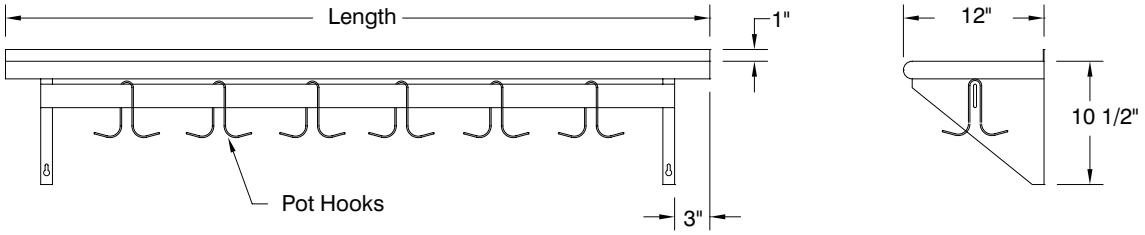
Single Bar



Double Bar



Shelf with Pot Rack



ADVANCE TABCO
SMART FABRICATION™

ADVANCE TABCO is constantly engaged in a program of improving our products. Therefore, we reserve the right to change specifications without prior notice.

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Submittal Sheet

09/13/2019

ITEM# 3 - REACH-IN FREEZER (1 EA REQ'D)

Traulsen G22010

Dealer's Choice Freezer, Reach-in, two-section, self-contained refrigeration, microprocessor control with LED display, stainless steel front, full-height solid doors (hinged left/right), anodized aluminum sides & interior, (3) epoxy coated shelves per section (factory installed), LED interior lights, 6" high casters, eco-friendly, non-flammable R-448A refrigerant, unit can be programmed to operate at -10 degrees Fahrenheit, 3/4 hp, cETLus, NSF, ENERGY STAR®

ACCESSORIES

Mfr	Qty	Model	Spec
Traulsen	1		3 year parts & labor and 5 year compressor warranty, standard
Traulsen	1		115v/60/1-ph, 11.2 amps, NEMA 5-15P, standard

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1									3/4		
2	115	60	1	Cord & Plug		5-15P	11.2				

Project _____

AIA #_____ SIS #_____

Item #_____ Quantity _____ C.S.I. Section 114000

COMMERCIAL REFRIGERATION

DEALERS CHOICE G-SERIES

G-SERIES

2-Section Freezer Reach-In Self-Contained Solid Door(s)

ENERGY STAR

Many models are ENERGY STAR® listed. Please refer to www.energystar.gov to view the most up-to-date product listing and performance data.

Intertek 4004142

This unit is listed to the applicable UL, CSA and NSF Standards by an approved NRTL. Consult the factory or unit's data plate for approval information.

STANDARD PRODUCT FEATURES

- High Performance, Energy Efficient Refrigeration System
- Reliable Microprocessor Control With LED Temperature Display
- Evaporator Coil Outside Food Zone Provides More Usable Space
- Load-Sure Guard Prevents Problems From Improper Loading
- Durable All-Metal Construction
- Stainless Steel Front & Doors, Anodized Aluminum Sides & Interior
- Full or Half Height Door Models with a Variety of Hinging Configurations
- Long Life EZ-Clean Door Gasket(s)
- Three (3) Epoxy Coated Shelves Per Section (factory installed)
- Easy to Maintain Front Facing Condenser Coil
- 6" High Locking Casters
- Guaranteed for Life Door Handles & Hinges
- 3-Year Parts & Labor Warranty
- 2-Years Additional Compressor Parts Warranty

ACCESSORIES & OPTIONS (*field installed)

- Tray Slides for 18" x 26" Sheet Pans*
- Tray Slides for 12" x 20" Food Pans*
- Tray Slides for 14" x 18" Sheet Pans*
- Tray Slides for 18" x 26, 12" x 20" & 14" x 18" Pans*
- Additional Shelves*
- 6" High Legs*
- Lower Height Casters*
- Optional Remote Applications

*Please refer to form number TR35872 for precise kit details. See back page for tray slide versatility chart.

AVAILABLE CONFIGURATIONS

Half-Height Door Models	Hinging
G22000	Left/Right
G22001	Right/Left
G22002	Right/Right
G22003	Left/Left

Full-Height Door Models	Hinging
G22010	Left/Right
G22011	Right/Left
G22012	Right/Right
G22013	Left/Left

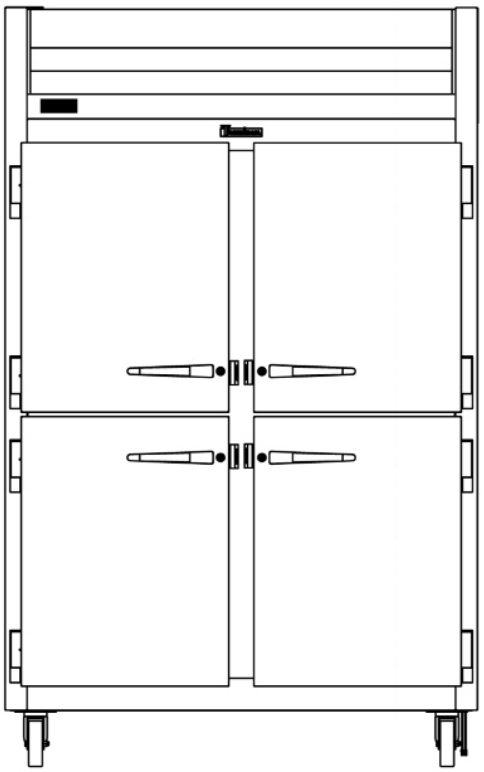
SECTION 4-4

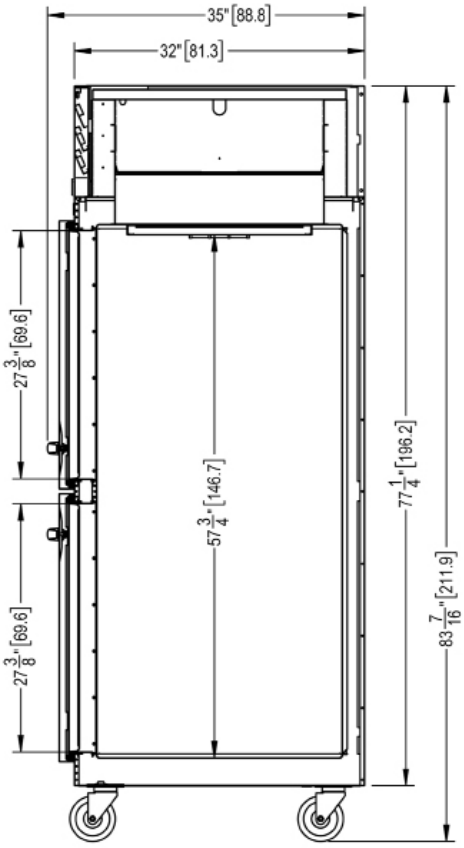
Approved by_____ Date_____ Approved by_____ Date_____

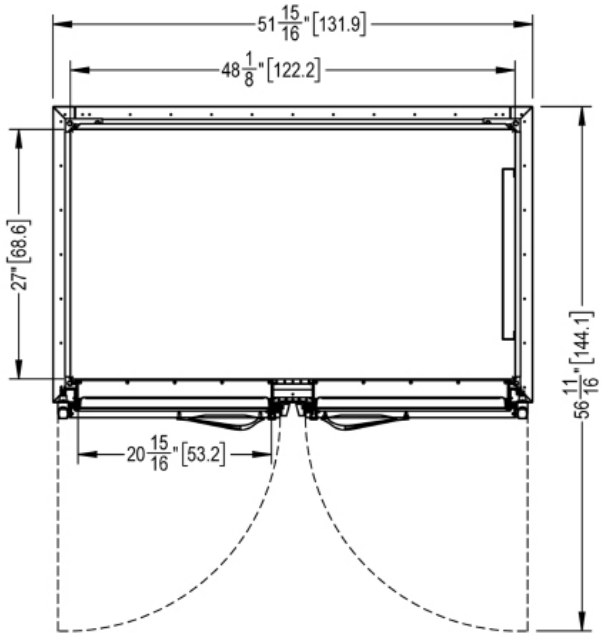
MODELS

Half Height Door Models: G22000, G22001, G22002, G22003

CLICK
TRANSFER
For KCL CADalog Website





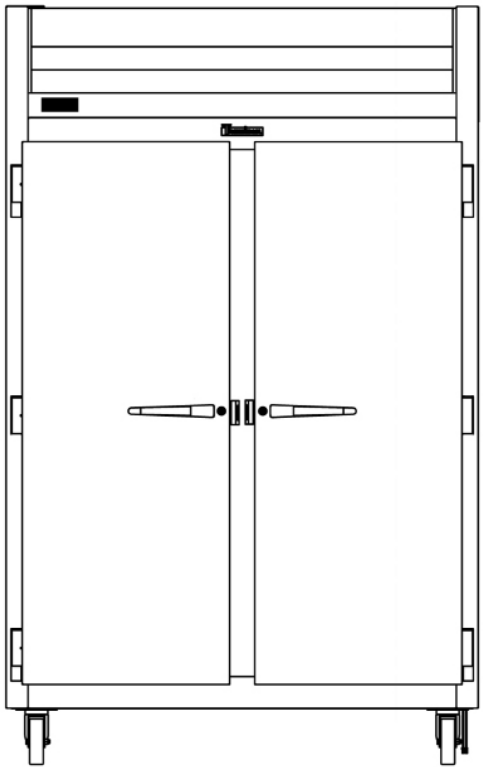


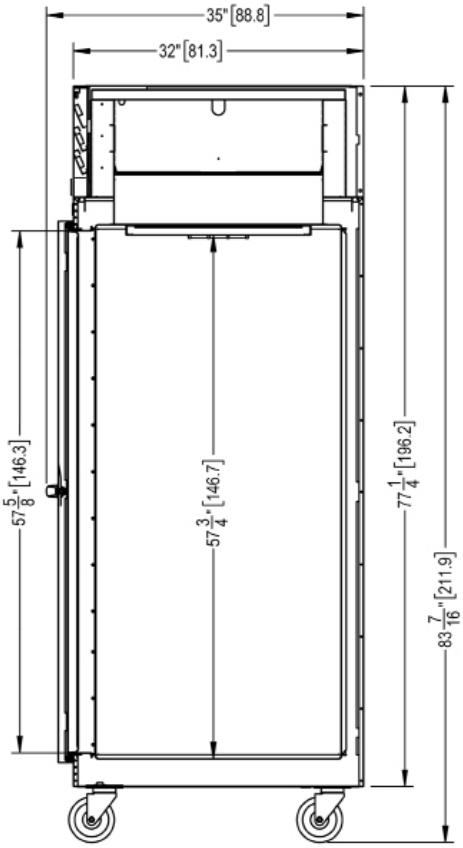
G-SERIES
2-Section Freezer Reach-In
Self-Contained Solid Door(s)

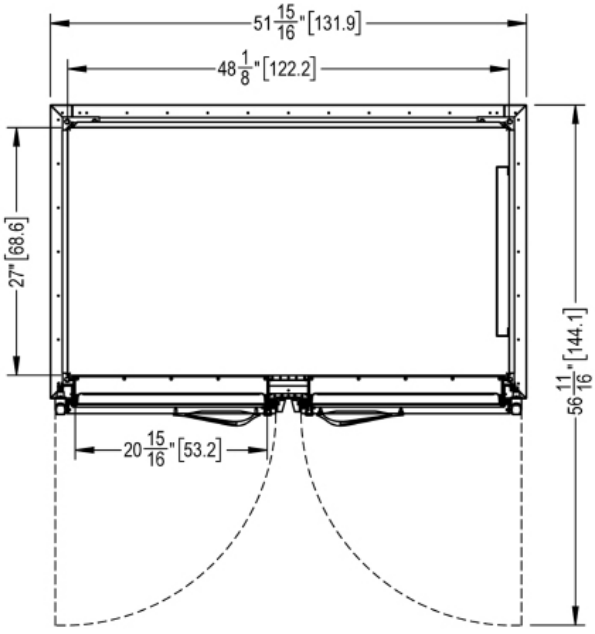
MODELS

Full Height Door Models: G22010, G22011, G22012, G22013

CLICK TRANSFER For KCL CADalog Website







G-SERIES
2-Section Freezer Reach-In
Self-Contained Solid Door(s)

MODELS

Half Height Door Models: G22000, G22001, G22002, G22003
Full Height Door Models: G22010, G22011, G22012, G22013

MODELS	G220_ _
DIMENSIONAL DATA	
Net Capacity cu. ft.[1]	45.89 (1299 l) | 46.02 (1303 l)
L x D x H - Overall in.[2]	52⅛ (132.4 cm) x 35 (88.8 cm) x 83⁷⁄₁₆ (211.9 cm)
Depth - over body in.	32 (81.3 cm)
Depth - door open 90° in.	57⅝ (146.3 cm)
Clear half-door W x H in.	21⅛ (53.6 cm) x 27½ (69.9 cm)
Clear full-door W X H in.	21⅛ (53.6 cm) x 57⅝ (146.3 cm)
No. Standard Shelves	6
Shelf Area sq. ft.[3]	34.6 (3.21 sq m)
ELECTRICAL DATA	
Voltage | Plug	115/60/1 | NEMA 5-15P (attached)
Feed wires with ground	3
Full Load Amperes | MDEC[4]	11.2 | 9.89 KWH/Day
REFRIGERATION DATA	
Refrigerant	R-448A
Refrigerant Charge oz.	23 (652 g)
BTU/HR | H.P.[5]	2270 | 3/4 HP
Required Clearance	12" Above
SHIPPING DATA	
L x D x H Crated in.	62 (158 cm) x 42 (107 cm) x 85 (216 cm)
Volume Crated cu. ft.	128 (3625 l)

NOTES:
1. Net Capacity cu. ft. = Half Height Door | Full Height Door models.
2. Height shown when mounted on standard 6" high casters.
3. Figure shown reflects the area of standard shelf compliment.
4. MDEC = Maximum Daily Energy Consumption
5. Based on a 90°F ambient and -20°F evaporator. For remote data please refer to spec sheet TR35837.

EQUIPMENT SPECIFICATIONS

CONSTRUCTION, HARDWARE, INSULATION
Cabinet exterior front, louver assembly and door(s) are constructed of 20 gauge stainless steel. Cabinet sides (including returns), interior and door liners are constructed of anodized aluminum. The exterior cabinet top, back and bottom are constructed of heavy gauge galvanized steel. A set of four (4) 6" high locking casters are included. Doors are equipped with a gasket protecting, raised metal door pan, cylinder locks, and guaranteed for life self-closing cam-lift hinges with a stay open feature at 120 degrees. Hinges include a concealed switch to automatically activate the interior LED lighting. Guaranteed for life, metal work flow door handles are mounted horizontally over recess in door which limits protrusion into aisle ways. Gasket profile and durable long life material simplify cleaning and increase overall gasket life. Anti condensate heaters are located behind each door opening. Both the cabinet and door(s) are insulated with an average of 2" thick high density, non-CFC, 100% foamed in place polyurethane.

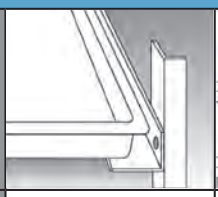
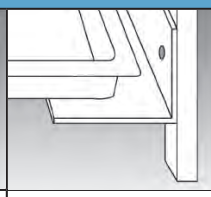
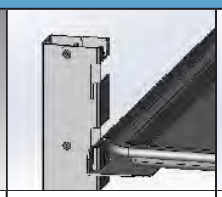
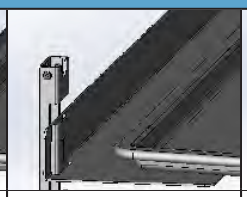
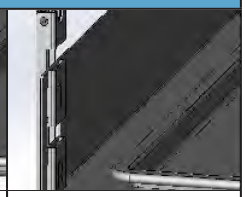
SELF-CONTAINED REFRIGERATION SYSTEM
A top mounted, self-contained, balanced refrigeration system using environmentally friendly, non-flammable R-448A refrigerant is conveniently located behind the one piece louver assembly. It features an easy to clean front facing condenser, thermostatic expansion valve metering device, air-cooled hermetic compressor, large, high humidity evaporator coil located outside the food zone and a top mounted non-electric condensate evaporator. A 9' cord and plug is provided. Standard operating temperature is 0 to -5°F and can be adjusted to operate as low as -10°F in a 90°F or less ambient.

CONTROL
The easy to use water resistant microprocessor control is supplied standard. It includes a 3-Digit LED Display, and a Fahrenheit or Celsius Temperature Scale Display Capability.

INTERIOR ARRANGEMENTS
Standard interior arrangements include three (3) epoxy coated steel wire shelves per section, mounted on shelf pins, installed at the factory. Shelves are full-width, and do not have any large gaps between them requiring the use of "bridge" or "junior shelves." Recommended load limit per shelf should not exceed 225 lbs.

DOMESTIC WARRANTY
Both a three year parts and labor warranty and an additional two year compressor parts warranty (for a total of five on self-contained models) are provided standard.

OPTIONAL ACCESSORY TRAY SLIDE VERSATILITY CHART

TRAY SLIDE DRAWINGS						
TRAY SLIDE OFFERING	#1 (1) 18" x26" or (2) 14"x18"	#4 (Rod Type) (1) 18" x26"	Universal (1) 18" x26" or (2) 14"x18" or (2) 12"x20"	#1 EZ-Change (1) 18" x26" or (2) 14"x18"	Universal EZ-Change (1) 18" x26" or (2) 14"x18" or (2) 12"x20"	HD Universal EZ-Change (1) 18" x26" or (2) 14"x18" or (2) 12"x20"
SPACING CAPACITY DOOR SIZE	2" 28 Pairs Full Door & 13 Half 3" 19 Pairs Full Door & 09 Half 4" 14 Pairs Full Door & 07 Half 5" 11 Pairs Full Door & 05 Half	1 1/2" 38 Pairs Full Door (2 Pair) 1 1/2" 18 Pairs Half Door (1 Pair)	4" 14 Pairs Full Door & 06 Half[1] 4" 14 Pairs Full Door & 07 Half[2] 5" 11 Pairs Full Door & 05 Half 6" 09 Pairs Full Door & 04 Half	2" 26 Pairs Full Door & 12 Half 4" 13 Pairs Full Door & 06 Half	2 1/4" 22 Pairs Full Door & 11 Half 4 1/2" 11 Pairs Full Door & 05 Half	4 1/2" 11 Pairs Full Door & 05 Half 9" 05 Pairs Full Door & 02 Half

- **Upper Half Height Door[1]**
- **Lower Half Height Door[2]**

CONTINUED PRODUCT DEVELOPMENT MAY NECESSITATE SPECIFICATION CHANGES WITHOUT NOTICE.

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Submittal Sheet

09/13/2019

ITEM# 4 - REACH-IN REFRIGERATOR (1 EA REQ'D)

Traulsen G10010

Dealer's Choice Refrigerator, Reach-in, one-section, 23.43 cu. ft., top mounted self-contained refrigeration, (1) full height solid door (hinged right), (3) epoxy coated shelves (factory installed), microprocessor control with LED display, LED interior lights, stainless steel front, anodized aluminum sides & interior, 6" high locking casters, non-flammable R-450A refrigerant, 1/5 HP, cETLus, NSF

ACCESSORIES

Mfr	Qty	Model	Spec
Traulsen	1		3 year parts & labor and 5 year compressor warranty, standard
Traulsen	1		115v/60/1-ph, 4.9 amps, NEMA 5-15P, standard

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1									1/5		
2	115	60	1	Cord & Plug		5-15P	4.9				

Project _____

AIA #_____ SIS # _____

Item #_____ Quantity _____ C.S.I. Section 114000

COMMERCIAL REFRIGERATION

DEALERS CHOICE G-SERIES

G-SERIES

1-Section Refrigerator Reach-In Self-Contained Solid Door(s)

ENERGY STAR

Many models are ENERGY STAR® listed. Please refer to www.energystar.gov to view the most up-to-date product listing and performance data.

Intertek 4004142

This unit is listed to the applicable UL, CSA and NSF Standards by an approved NRTL. Consult the factory or unit's data plate for approval information.

STANDARD PRODUCT FEATURES

- High Performance, Energy Efficient Refrigeration System
- Reliable Microprocessor Control With LED Temperature Display
- Evaporator Coil Outside Food Zone Provides More Usable Space
- Load-Sure Guard Prevents Problems From Improper Loading
- Durable All Metal Construction
- Stainless Steel Front & Doors, Anodized Aluminum Sides & Interior
- Full or Half Height Door Models with a Variety of Hinging Configurations
- Long Life EZ Clean Door Gaskets
- Three (3) Epoxy Coated Shelves Per Section (factory installed)
- Easy to Maintain Front Facing Condenser Coil
- 6" High Locking Casters
- Guaranteed for Life Door Handles & Hinges
- 3-Year Parts & Labor Warranty
- 2-Years Additional Compressor Parts Warranty

ACCESSORIES & OPTIONS (*field installed)

- Tray Slides for 18" x 26" Sheet Pans*
- Tray Slides for 12" x 20" Food Pans*
- Tray Slides for 14" x 18" Sheet Pans*
- Tray Slides for 18" x 26, 12" x 20" & 14" x 18" Pans*
- Additional Shelves*
- 6" High Legs*
- Lower Height Casters*
- Optional Remote Applications

*Please refer to form number TR35872 for precise kit details. See back page for tray slide versatility chart.

AVAILABLE CONFIGURATIONS

Half-Height Door Models	Hinging
G10000	Right
G10001	Left

Full-Height Door Models	Hinging
G10010	Right
G10011	Left

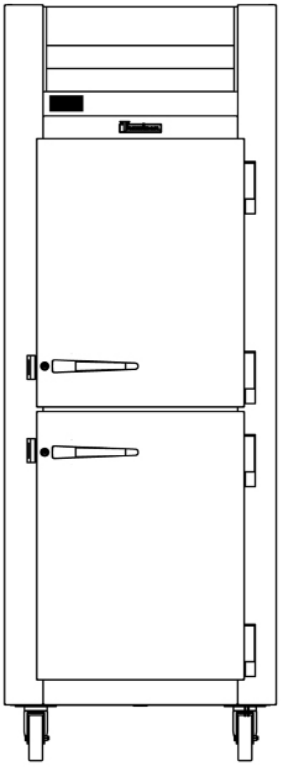
SECTION 4-1

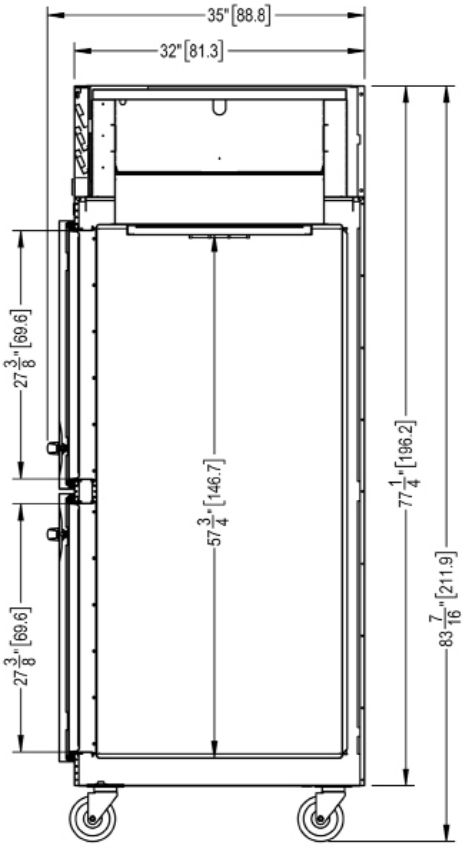
Approved by_____ Date_____ Approved by_____ Date_____

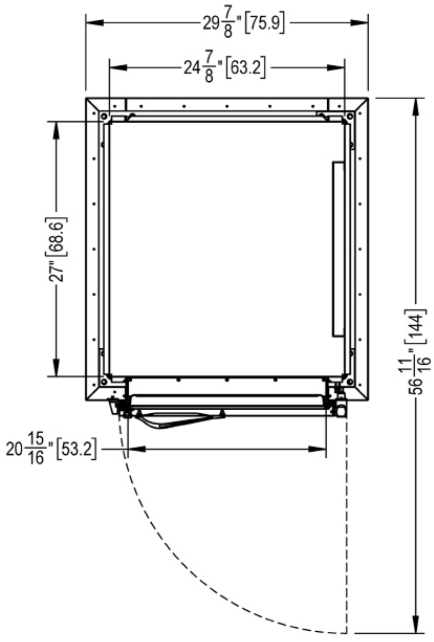
MODELS

Half Height Door Models: G10000, G10001

CLICK
TRANSFER
For KCL CADalog Website







G-SERIES

1-Section Refrigerator Reach-In
Self-Contained Solid Door(s)

MODELS

Full Height Door Models: G10010, G10011

CLICK
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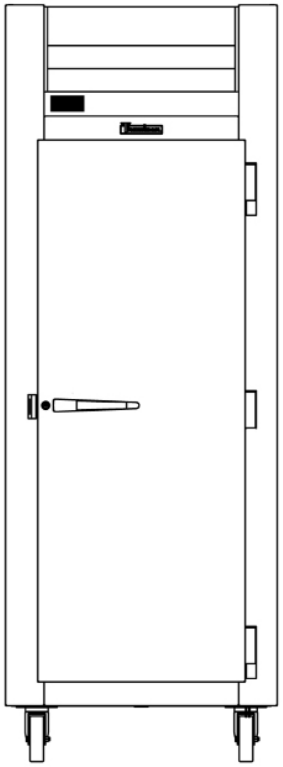
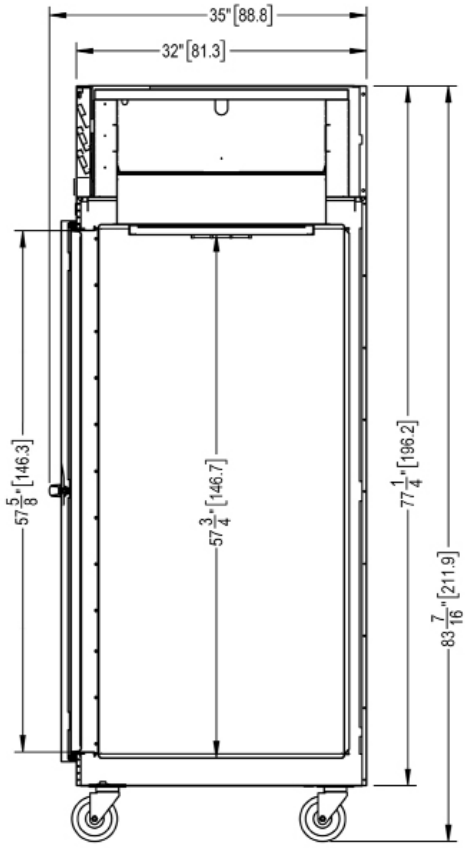
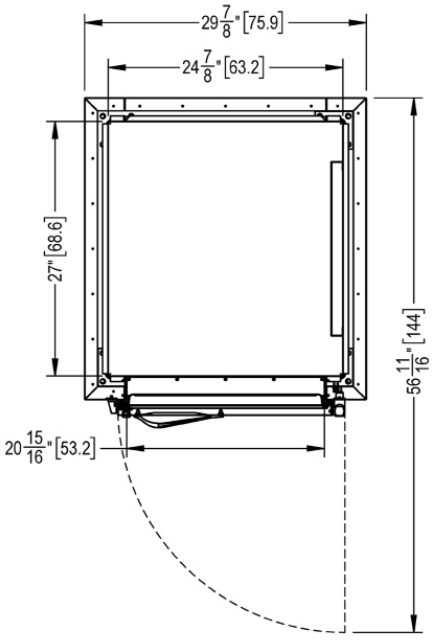
For KCL CADalog Website







G-SERIES

1-Section Refrigerator Reach-In
Self-Contained Solid Door(s)

MODELS

Half Height Door Models: G10000, G10001
Full Height Door Models: G10010, G10011

MODELS	G100_ _
DIMENSIONAL DATA	
Net Capacity cu. ft.[1]	23.37 (661.8 l) | 23.43 (663.5 l)
L x D x H - Overall in.[2]	29⅞ (75.9 cm) x 35 (88.8 cm) x 83 7/16 (211.9 cm)
Depth - over body in.	32 (81.3 cm)
Depth - door open 90° in.	57⅝ (146.3 cm)
Clear half-door W x H in.	21⅛ (53.6 cm) x 27½ (69.9 cm)
Clear full-door W X H in.	21⅛ (53.6 cm) x 57⅝ (146.3 cm)
No. Standard Shelves	3
Shelf Area sq. ft.[3]	18.8 (1.75 sq m)
ELECTRICAL DATA	
Voltage | Plug	115/60/1 | NEMA 5-15P (attached)
Feed wires with ground	3
Full Load Amperes | MDEC[4]	4.9 | 1.76 KWH/Day
REFRIGERATION DATA	
Refrigerant	R-450A
Refrigerant Charge Amount	16 oz
BTU/HR | H.P.[5]	1650 | 1/5 HP
Required Clearance	12" Above
SHIPPING DATA	
L x D x H Crated in.	48 (122 cm) x 42 (107 cm) x 85 (216cm)
Volume Crated cu. ft.	99 (2803 l)
Uncrated | Crated Weight lbs.	305 (138 kg) | 350 (150 kg)

NOTES:
1. Net Capacity cu. ft. = Half Height Door | Full Height Door models.
2. Height shown when mounted on standard 6" high casters.
3. Figure shown reflects the area of standard shelf compliment.
4. MDEC = Maximum Daily Energy Consumption
5. Based on a 90°F ambient and 20°F evaporator. For remote data please refer to spec sheet TR35837.

EQUIPMENT SPECIFICATIONS

CONSTRUCTION, HARDWARE, INSULATION

Cabinet exterior front, louver assembly and door(s) are constructed of 20 gauge stainless steel. Cabinet sides (including returns), interior and door liners are constructed of anodized aluminum. The exterior cabinet top, back and bottom are constructed of heavy gauge galvanized steel. A set of four (4) 6" high locking casters are included. Doors are equipped with a gasket protecting, raised metal door pan, cylinder locks, and guaranteed for life self-closing cam-lift hinges with a stay open feature at 120°F. Hinges include a concealed switch to automatically activate the interior LED lighting. Guaranteed for life, metal work flow door handles are mounted horizontally over recess in door which limits protrusion into aisle ways. Gasket profile and durable long life material simplify cleaning and increase overall gasket life. Anti-condensate heaters are located behind each door opening. Both the cabinet and door(s) are insulated with an average of 2" thick high density, non-CFC, 100% foamed in place polyurethane.

SELF-CONTAINED REFRIGERATION SYSTEM

A top mounted, self-contained, balanced refrigeration system using environmentally friendly, non-flammable R-450A refrigerant is conveniently located behind the one piece louver assembly. It features an easy to clean front facing condenser, thermostatic expansion valve metering device, air-cooled hermetic compressor, large, high humidity evaporator coil located outside the food zone and a top mounted non-electric condensate evaporator. A 9' cord and plug is provided. Standard operating temperature is 34 to 38°F.

CONTROL

The easy to use water resistant microprocessor control is supplied standard. It includes a 3-Digit LED Display, and a Fahrenheit or Celsius Temperature Scale Display Capability.

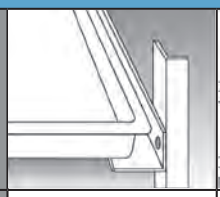
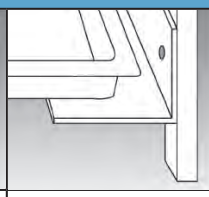
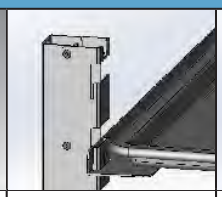
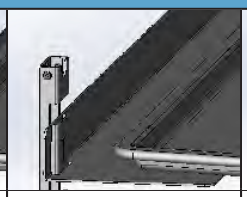
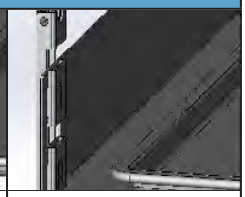
INTERIOR ARRANGEMENTS

Standard interior arrangements include three (3) epoxy coated steel wire shelves, mounted on shelf pins, installed at the factory. Recommended load limit per shelf should not exceed 225 lbs.

DOMESTIC WARRANTY

Both a three year parts and labor warranty and an additional two year compressor parts warranty (for a total of five on self-contained models) are provided standard.

OPTIONAL ACCESSORY TRAY SLIDE VERSATILITY CHART

TRAY SLIDE DRAWINGS						
TRAY SLIDE OFFERING	#1 (1) 18"x26" or (2) 14"x18"	#4 (Rod Type) (1) 18"x26"	Universal (1) 18"x26" or (2) 14"x18" or (2) 12"x20"	#1 EZ-Change (1) 18"x26" or (2) 14"x18"	Universal EZ-Change (1) 18"x26" or (2) 14"x18" or (2) 12"x20"	HD Universal EZ-Change (1) 18"x26" or (2) 14"x18" or (2) 12"x20"
SPACING CAPACITY DOOR SIZE	2" 28 Pairs Full Door & 13 Half 3" 19 Pairs Full Door & 09 Half 4" 14 Pairs Full Door & 07 Half 5" 11 Pairs Full Door & 05 Half	1 1/2" 38 Pairs Full Door (2 Pair) 1 1/2" 18 Pairs Half Door (1 Pair)	4" 14 Pairs Full Door & 06 Half[1] 4" 14 Pairs Full Door & 07 Half[2] 5" 11 Pairs Full Door & 05 Half 6" 09 Pairs Full Door & 04 Half	2" 26 Pairs Full Door & 12 Half 4" 13 Pairs Full Door & 06 Half	2 1/4" 22 Pairs Full Door & 11 Half 4 1/2" 11 Pairs Full Door & 05 Half	4 1/2" 11 Pairs Full Door & 05 Half 9" 05 Pairs Full Door & 02 Half

- Upper Half Height Door[1]
- Lower Half Height Door[2]

CONTINUED PRODUCT DEVELOPMENT MAY NECESSITATE SPECIFICATION CHANGES WITHOUT NOTICE.

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Hotel & Restaurant Supply
Suppliers/Designers to the Food Service Industry

Submittal Sheet

09/13/2019

ITEM# 5 - BOTTLE COOLER (1 EA REQ'D)

True TD-50-18-HC

Bottle Cooler, flat top, (16.5cs) 12oz bottles or (24cs) 12oz can capacity, stainless steel counter top & (2) lids, barrel locks standard, well design, galvanized interior, black powder coated exterior, (3) PVC coated adjustable bin dividers, LED interior lighting, bottle cap opener & cap catcher, R290 Hydrocarbon refrigerant, 1/5 HP, 115v/60/1, 1.9 amps, NEMA 5-15P, cULus, UL EPH Classified, MADE IN USA

ACCESSORIES

Mfr	Qty	Model	Spec
True	1		Self-contained refrigeration standard
True	1		Warranty - 5 year compressor (self-contained only), please visit www.Truemfg.com for specifics
True	1		Warranty - 3 year parts and labor, please visit www.Truemfg.com for specifics

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	115	60	1	Cord & Plug		5-15P	1.9		1/5	15.0	

TRUE MANUFACTURING CO., INC.
U.S.A. FOODSERVICE DIVISION
2001 East Terra Lane • O'Fallon, Missouri 63366-4434 • (636)240-2400
Fax (636)272-2408 • Toll Free (800)325-6152 • Intl Fax# (001)636-272-7546
Parts Dept. (800)424-TRUE • Parts Dept. Fax# (636)272-9471 • www.truemfg.com

Project Name: _____ *AIA #*

Location: _____ *SIS #*

Item #: _____ *Qty:* _____

Model #: _____

Model:
TD-50-18-HC

Underbar Refrigeration:

Solid Slide Lid Deep Well Horizontal Bottle Cooler with Hydrocarbon Refrigerant

TD-50-18-HC

- True's horizontal bottle coolers are designed with enduring quality and value. Our commitment to using the highest quality materials and oversized refrigeration assures colder product temperatures and years of trouble free service.
- Factory engineered, self-contained, capillary tube system using environmentally friendly R290 hydro carbon refrigerant that has zero (0) ozone depletion potential (ODP), & three (3) global warming potential (GWP).
- High capacity, factory balanced refrigeration system that maintains cabinet temperatures of 33°F to 38°F (.5°C to 3.3°C) for the best in food preservation.
- Forced-air cooling. Positively guided airflow cools bottles on top first. Evaporator coil virtually runs length of cooler for balanced temperatures throughout the cabinet.
- Exterior - stainless steel countertop and lids, black powder coated cold rolled steal front, sides, and back.
- Interior - long lasting, heavy duty galvanized steel. Complies with NSF/ ANSI Standard 7 for packaged and bottled product.
- Evaporator is epoxy coated to eliminate the potential of corrosion.
- Heavy duty, 10 mil thick pure grade PVC coated adjustable bin dividers.
- Entire cabinet structure is foamed-in-place using a high density, polyurethane insulation that has zero ozone depletion potential (ODP) and zero global warming potential (GWP).

ROUGH-IN DATA

Specifications subject to change without notice.
Chart dimensions rounded up to the nearest ⅛" (millimeters rounded up to next whole number).

Model	Lids	Capacity		Cabinet Dimensions (inches) (mm)			HP	Voltage	Amps	NEMA Config.	Cord Length (total ft.) (total m)	Crated Weight (lbs.) (kg)
		12 oz. Btls.	12 oz. Cans	W	D†	H						
TD-50-18-HC	2	16.5 Cases	24 Cases	49½ 1255	26⅞ 683	33½ 850	⅕ N/A	115/60/1	1.9 N/A	5-15P	7 2.13	275 125

† Depth does not include 1" (26 mm) for rear bumpers.

MADE WITH INNOVATION IN THE USA · 5 YEAR COMPRESSOR WARRANTY USA · c UL us · CLASSIFIED UL EPA · natural refrigerant

10/18 Printed in U.S.A.

APPROVALS:

AVAILABLE AT:

Model:
TD-50-18-HC

Underbar Refrigeration:
Solid Slide Lid Deep Well Horizontal Bottle Cooler with Hydrocarbon Refrigerant

STANDARD FEATURES

DESIGN
- True's refrigerated horizontal bottle coolers are designed with enduring quality and value. Our commitment to using the highest quality materials and oversized refrigeration assures colder product temperatures and years of trouble free service.

REFRIGERATION SYSTEM
- Factory engineered, self-contained, capillary tube system using environmentally friendly R290 hydrocarbon refrigerant that has zero (0) ozone depletion potential (ODP), & three (3) global warming potential (GWP).
- High capacity, factory balanced refrigeration system that maintains cabinet temperatures of 33°F to 38°F (.5°C to 3.3°C).
- State of the art, electronically commutated evaporator and condenser fan motors. ECM motors operate at higher peak efficiencies and move a more consistent volume of air which produces less heat, reduces energy consumption and provides greater motor reliability.
- Condensing unit accessed from behind front grill, slides out for easy maintenance.
- Forced-air cooling. Positively guided air flow cools bottles on top first. Evaporator coil virtually runs length of cooler for balanced temperatures throughout the cabinet.

CABINET CONSTRUCTION
- Exterior - Stainless steel countertop and lids, black powder coated cold rolled steal front, sides, and back.
- Interior - long lasting, heavy duty galvanized steel.
- Insulation - entire cabinet structure is foamed-in-place using a high density, polyurethane insulation that has zero ozone depletion potential (ODP) and zero global warming potential (GWP).
- Welded, heavy duty steel frame rail, black powder coated for corrosion protection.
- Bottle cap opener and cap catcher included. Field installed.

BIN DIVIDERS
- Three (3) heavy duty, 10 mil thick pure grade PVC coated adjustable bin dividers to maximize storage.

LIGHTING
- LED interior lighting provides more even lighting throughout the cabinet. Safety shielded.

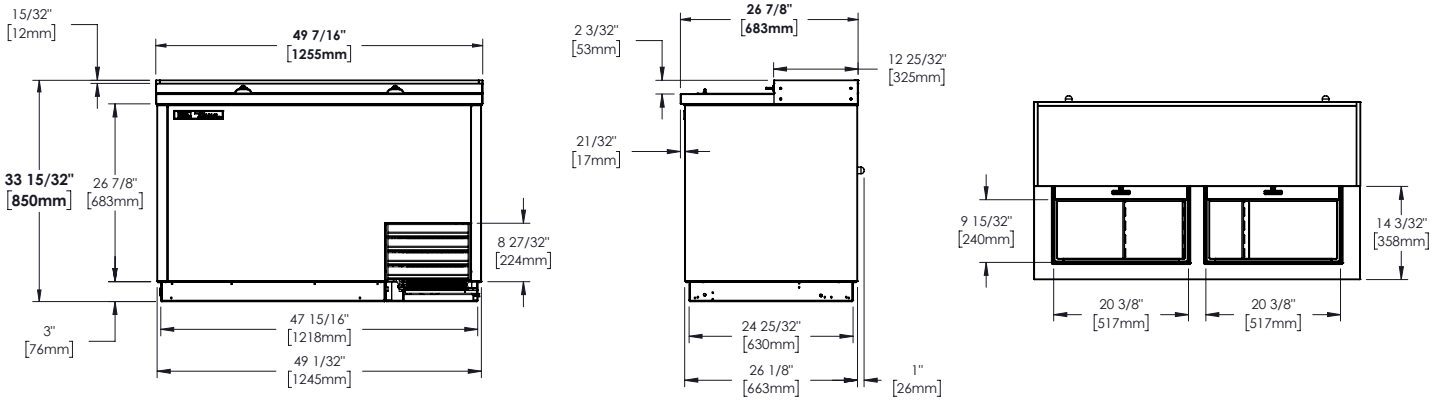
MODEL FEATURES
- Evaporator is epoxy coated to eliminate the potential of corrosion.
- Barrel locks standard.
- Complies with NSF/ANSI Standard 7 for the storage and/or display of packaged or bottled product.

ELECTRICAL
- Unit completely pre-wired at factory and ready for final connection to a 115/60/1 phase, 15 amp dedicated outlet. Cord and plug set included.

115/60/1
NEMA-5-15R

OPTIONAL FEATURES/ACCESSORIES
Upcharge and lead times may apply.
- ❑6" (153 mm) standard legs.
- ❑6" (153 mm) seismic/flanged legs.
- ❑2½" (64 mm) diameter rail castors.
- ❑3" (77 mm) diameter rail castors.

PLAN VIEW



WARRANTY
Three year warranty on all parts and labor and an additional 2 year warranty on compressor. (U.S.A. only)

METRIC DIMENSIONS ROUNDED UP TO THE NEAREST WHOLE MILLIMETER

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Model	Elevation	Right	Plan	3D	Back
TD-50-18-HC					

TRUE MANUFACTURING CO., INC.
2001 East Terra Lane • O'Fallon, Missouri 63366-4434 • (636)240-2400 • Fax (636)272-2408 • Toll Free (800)325-6152 • Intl. Fax# (001)636-272-7546 • www.truemfg.com

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Submittal Sheet

09/13/2019

ITEM# 6 - MICROWAVE OVEN (1 EA REQ'D)

Menumaster MCS10TS

Menumaster® Commercial Microwave Oven, 1000 watts, 1.2 cu. ft. capacity, stackable, medium volume, stainless steel exterior wrap & interior, 4-stage cooking, (5) power levels, (100) memory settings, ADA compliant braille touch pads, sealed in ceramic shelf, side hinged door with glass window, stationary air filter, power consumption 120v/60/1-ph, 1550 total watts, 13.0 amps, cord, NEMA 5-15P, cETLus, ETL

ACCESSORIES

Mfr	Qty	Model	Spec
Menumaster	1		3-year limited warranty (1 year full)

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1	Cord & Plug		5-15P	13	1.55			

MENUMASTER® Commercial

Project #: _____

Item #: _____

AIA File #:

Specification #:

Model MCS10TS shown

Medium Volume

This category of microwave is ideal for...

Applications:

- Pizza restaurants
- Casual dining
- Clubs
- Deli

Defrost:

- Defrosts most frozen food products

All ACP, Inc. commercial ovens are backed by our Culinary Center. Call us with any question regarding food preparation, menu development and cooking times. 866-426-2621.

Medium Volume

Menumaster Commercial Microwave Model MCS10TS

Power Output

- 1000 watts of power.
- Five power levels for consistent, delicious results for frozen, refrigerated and fresh foods - from the freezer to table in minutes.

Easy to Use

- Up to 100 programmable menu items simplifies cooking and ensures consistent results.
- Four stage cooking option for easy one-touch cooking.
- Multiple quantity pad calculates the proper cooking times for multiple portions.
- User friendly touch controls are easy to use.
- Time entry option for added flexibility.
- Digital display with countdown timer for simple operation and “at-a-glance” monitoring.
- Braille touch pads are ADA compliant.
- See-through door and lighted interior for monitoring without opening the door.
- 1.2 cubic ft. (34 liter) capacity accommodates a 14” (356 mm) platter, prepackaged foods and single servings.
- Stackable to save valuable counter space.

Easy to Maintain

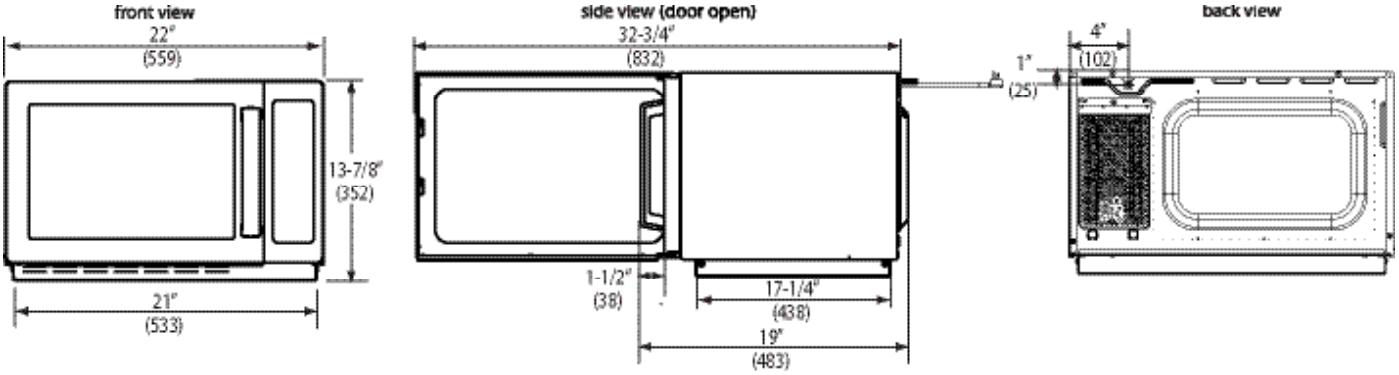
- Stainless steel exterior and interior for easy cleaning and a professional look.
- Non-removable air filter protects oven components.
- Constructed to withstand the foodservice environment.
- Backed by the ACP, Inc. 24/7 ComServ Support Center, 866-426-2621.
- ETL Listed.

Part No. 20154727
Updated 6/16/16
Original Instructions

© 2016 ACP, Inc.
Cedar Rapids, Iowa 52404

225 49th Ave. Dr. SW Cedar Rapids, IA 52404 U.S.A. | 800-233-2366 | 319-368-8120 | Fax: 319-368-8198 | www.acpsolutions.com

Menumaster Commercial Microwave Model MCS10TS | Medium Volume



Installation Clearances - Top: 2" (51), Sides: 1" (25), Back: None

Drawings available from KCL CADlog - techs@kclcad.com

Specification #:

Specifications			
Model	MCS10TS	UPC Code 728028020748	
Configuration	Countertop		
Control System	Touch		
Programmable Control	10		
Settings Programmable	100		
Braille	Yes		
Max. Cooking Time	60:00		
Power Levels	5		
Defrost	Yes		
Time Entry Option	Yes		
Microwave Distribution	Rotating antenna, top		
Magnetron(s)	1		
Display	VFD		
Stackable	Yes		
Stage Cooking	Yes, 4		
Interior Light	Yes		
Door Handle	Grab & Go		
Signal	End of cycle, adjustable		
Air Filter	Non-removable with cleaning reminder		
Multiple Portion Setting	Yes, X2		
Exterior Dimensions	H 13 ⅞" (352)	W 22" (559)	D*19" (483)
Cavity Dimensions	H 8 ½" (216)	W 14 ½" (368)	D 15" (381)
Door Depth	32 ¾" (832), 90°+ door open		
Usable Cavity Space	1.2 cubic ft. (34 liter)		
Exterior Finish	Stainless steel		
Interior Finish	Stainless steel		
Power Consumption	1550 W, 13 A		
Power Output**	1000 W** Microwave		
Power Source	120V, 60 Hz, 15 A single phase		
Plug Configuration / Cord	NEMA 5-15	5 ft. (1.5m)	
Frequency	2450 MHz		
Product Weight	41 lbs. (18.6 kg.)		
Ship weight (approx.)	48 lbs. (21.8 kg.)		
Shipping Carton Size	H 16 ⅝" (422)	W 25 3⁄16" (640)	D 19 ¾" (502)
UPS Shippable	Yes		

AIA File #:

Measurements in ( ) are millimeters
* Includes handle
** IEC 60705 Tested

Specifications
Commercial microwave 10 touch pad control panel shall be programmable with the ability to program up to 100 menu items with two multiple portions. Touch pad shall include Braille for ADA compliance. Cooking timer shall be 60 minute, countdown style with a time entry option and an adjustable end of cycle audible signal. There shall be 5 power levels, including defrost and 4 cooking stages. Microwave output shall be 1000 watts distributed by one magnetron with a rotating top antenna to provide superior even heating throughout the cavity. Durable door shall have a tempered glass window and a grab and go handle with a 90°+ opening for easy access. An interior light shall facilitate monitoring without opening the door. The large 1.2 cubic ft. (34 liter) cavity shall accommodate a 14" (356 mm) platter. Interior ceramic shelf shall be sealed and recessed on oven bottom to reduce plate-to-shelf edge impact. Oven shall have a stainless steel interior and exterior and be stackable to save counter and shelf space. Front air filter shall be permanently affixed to the front of the oven and have a clean filter reminder. Microwave oven shall comply with standards set by the U.S Department of Health and Human Services, UL923 for safety and NSF4 for sanitation.

Warranty
Warranty Certificate for this product can be found on the ACP, Inc. website at:
www.acpsolutions.com/warranty

Service
All products are backed by the ACP, Inc. 24/7 ComServ Support Center.

Part No. 20154727
Updated 6/16/16
Original Instructions

© 2016 ACP, Inc.
Cedar Rapids, Iowa 52404

225 49th Ave. Dr. SW Cedar Rapids, IA 52404 U.S.A. | 800-233-2366 | 319-368-8120 | Fax: 319-368-8198 | www.acpsolutions.com

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Submittal Sheet

09/13/2019

ITEM# 7 - DISPLAY MERCHANDISER, HEATED, FOR MULTI-PRODUCT (1 EA REQ'D)

Hatco GR2SDS-36D

Glo-Ray® Designer Slant Display Warmer, countertop, (2) shelves with (14) rods, adjustable thermostat, pre-focused infrared top heat, incandescent light, hardcoat aluminum base, tempered glass end panels, designer panels & corner caps, 4" legs, cULus, UL EPH Classified, Made in USA

ACCESSORIES

Mfr	Qty	Model	Spec
Hatco	1		NOTE: Sale of this product must comply with Hatco's Minimum Resale Price Policy; consult order acknowledgement for details
Hatco	1		NOTE: Includes 24/7 parts & service assistance, call 800-558-0607
Hatco	1		One year on-site parts and labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
Hatco	1		120/208v/60/1-ph, 2440 watts, 10.2 amps, NEMA L14-20P (Domestic voltage), standard
Hatco	1	BLACK	Black, designer color (housing) (Available at time of purchase only)
Hatco	1		The color selected is considered custom and is NOT returnable
Hatco	1	STANDARD	Black designer color, standard (Available at time of purchase only)
Hatco	1	BLACK	Black, designer corner cap color (Available at time of purchase only)

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120/208	60	1	Cord & Plug		L14-20P	10.2	2.44			

Project _____

Item # _____

Quantity _____

Glo-Ray® *Designer* Slant Merchandising Display Warmers

Models: GR2SDS-24, -30, -36, -42, -48, -54, -60
GR2SDS-24D, -30D, -36D, -42D, -48D, -54D, -60D

Hatco's Glo-Ray® *Designer* Slant Merchandising Display Warmers are designed specifically to hold hot wrapped or boxed product safely, and at proper serving temperatures while enhancing your setting with style and color. With pre-focused infrared top heat and a thermostatically-controlled hardcoated heated base, they excel at extending the holding times of most food, offering the convenience of self-serve and the efficiency of kitchen-to-server holding.

GRS2DS-30
Slant single shelf in optional Designer White Granite and standard Black insets

GR2SDS-30D
Slant dual shelf in optional Designer Black and standard Black insets

Standard features

- Shelves are slanted for the convience of self-service
- Models have pre-focused infrared top heat directing heat to the outer edges of the holding surface where heat loss is the greatest
- Thermostatically-controlled, hardcoated heated base has a temperature range of 185°- 200°F (85°- 93°C)
- Coated shatter-resistant incandescent lights enhance product display while safeguarding food products from bulb breakage
- NSF requires units over 36" (914 mm) in width or weighing more than 80 lbs. (36 kg) to be either sealed to the installation surface or raised with the 4" (102 mm) legs included
- Standard units shipped with: tempered glass side panels, a thermostatically controlled heated base, infrared upper heating elements, incandescent lights, product divider rods, 4" (102 mm) legs and a 6' (1829 mm) cord with plug

Options (available at time of purchase only)

Designer Colors
Non-standard colors are non-returnable –
Clear Anodized Aluminum standard
☐Warm Red ☐Black ☐Gray Granite ☐White Granite
☐Navy Blue ☐Hunter Green ☐Antique Copper

Designer Inset Panel Colors
Non-standard colors are non-returnable – Black standard
☐Warm Red ☐Gray Granite ☐White Granite
☐Navy Blue ☐Hunter Green ☐Antique Copper

☐Dark Gray Corner Caps – Non-standard colors are non-returnable – Black standard

☐5" (127 mm) Sneeze Guard on customer side only

☐Plexi-Glass Flip Up Doors (split-door on models G2SDS-48 and larger)

☐60 Watt Halogen Bulb in lieu of Standard Display Light (not available on export voltages)

☐Indicating Temperature Control (LED) (adds 1⅞" [48 mm] to unit depth)

Accessories

☐Stainless Steel Rods

☐Flip-up Control Cover

For operation, location and safety information, please refer to the Installation & Operating Manual.

ANSI/NSF 4

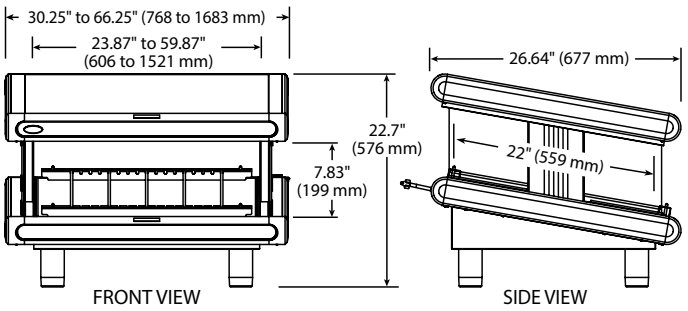
MADE IN THE USA

HATCO CORPORATION | P.O. Box 340500 Milwaukee, WI 53234-0500 U.S.A.
(800) 558-0607 | (414) 671-6350 | www.hatcocorp.com | support@hatcocorp.com

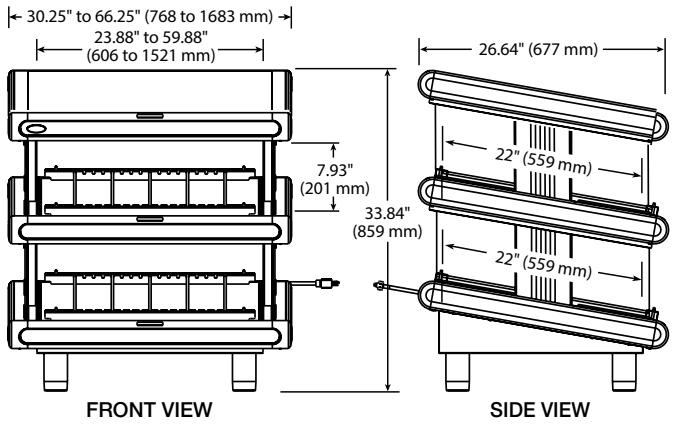
Glo-Ray® *Designer* Slant Merchandising Display Warmers

Models: GR2SDS-24, -30, -36, -42, -48, -54, -60
GR2SDS-24D, -30D, -36D, -42D, -48D, -54D, -60D

SLANT SINGLE SHELF



SLANT DUAL SHELF



SPECIFICATIONS
Single Shelf — SLANT MERCHANDISING DISPLAY WARMERS

The shaded areas contain electrical information for International models

Model	No. of Bulbs, Divider Rods	Dimensions (W x D x H) includes legs	Usable Heated Shelf Space (W x D)	Average Chute Width	Volts	Watts	Amps	Plug	Ship Weight*
GR2SDS-24	2, 5	30.25" x 26.64" x 22.7" (768 x 677 x 576 mm)	23.87" x 22" (606 x 559 mm)	3.73" (95 mm)	120	820	6.8	NEMA 5-15P	102 lbs. (46 kg)
					220	800	3.6	CEE 7/7 Schuko, BS-1363	
					240	820	3.4	BS-1363, AS 3112	
					220-230 (CE)	800-875	3.6-3.8	CEE 7/7 Schuko, BS-1363	
					230-240 (CE)	753-820	3.3-3.4	BS-1363	
GR2SDS-30	2, 6	36.25" x 26.64" x 22.7" (921 x 677 x 576 mm)	29.87" x 22" (759 x 559 mm)	4.02" (102 mm)	120	1020	8.5	NEMA 5-15P	110 lbs. (50 kg)
					220	1000	4.5	CEE 7/7 Schuko, BS-1363	
					240	1020	4.3	BS-1363, AS 3112	
					220-230 (CE)	1000-1093	4.5-4.8	CEE 7/7 Schuko, BS-1363	
					230-240 (CE)	937-1020	4.1-4.3	BS-1363	
GR2SDS-36	2, 7	42.25" x 26.64" x 22.7" (1073 x 677 x 576 mm)	35.87" x 22" (911 x 559 mm)	4.23" (107 mm)	120	1220	10.2	NEMA 5-15P	136 lbs. (62 kg)
					220	1200	5.5	CEE 7/7 Schuko, BS-1363	
					240	1220	5.1	BS-1363, AS 3112	
					220-230 (CE)	1200-1312	5.5-5.7	CEE 7/7 Schuko, BS-1363	
					230-240 (CE)	1120-1220	4.9-5.1	BS-1363	
GR2SDS-42	4, 8	48.25" x 26.64" x 22.7" (1226 x 677 x 576 mm)	41.87" x 22" (1064 x 559 mm)	4.40" (111 mm)	120	1490	12.4	NEMA 5-15P▲	155 lbs. (70 kg)
					220	1450	6.6	CEE 7/7 Schuko, BS-1363	
					240	1490	6.2	BS-1363, AS 3112	
					220-230 (CE)	1450-1585	6.6-6.9	CEE 7/7 Schuko, BS-1363	
					230-240 (CE)	1368-1490	6.0-6.2	BS-1363	
GR2SDS-48	4, 9	54.25" x 26.64" x 22.7" (1378 x 677 x 576 mm)	47.87" x 22" (1216 x 559 mm)	4.54" (115 mm)	120	1690	14.1	NEMA 5-15P▲	164 lbs. (75 kg)
					220	1650	7.5	CEE 7/7 Schuko, BS-1363	
					240	1690	7.1	BS-1363, AS 3112	
					220-230 (CE)	1650-1804	7.5-7.8	CEE 7/7 Schuko, BS-1363	
					230-240 (CE)	1552-1690	6.8-7.1	BS-1363	
GR2SDS-54	4, 10	60.25" x 26.64" x 22.7" (1530 x 677 x 576 mm)	53.87" x 22" (1368 x 559 mm))	4.65" (118 mm)	120	1890	15.8	NEMA 5-20P	182 lbs. (83 kg)
					220	1850	8.4	CEE 7/7 Schuko, BS-1363	
					240	1890	7.9	BS-1363, AS 3112	
					220-230 (CE)	1850-2022	8.4-8.8	CEE 7/7 Schuko, BS-1363	
					230-240 (CE)	1736-1890	7.6-7.9	BS-1363	
GR2SDS-60	6, 12	66.25" x 26.64" x 22.7" (1683 x 677 x 576 mm)	59.87" x 22" (1521 x 559 mm)	4.36" (110 mm)	120	2210	18.4	NEMA 5-30P	202 lbs. (92 kg)
					220	2150	9.8	CEE 7/7 Schuko, BS-1363	
					240	2210	9.2	BS-1363, AS 3112	
					220-230 (CE)	2150-2350	9.8-10.2	CEE 7/7 Schuko, BS-1363	
					230-240 (CE)	2030-2210	8.8-9.2	BS-1363	

* Shipping weight includes packaging.
▲ Canadian models use NEMA 5-20P.

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(800) 558-0607 | (414) 671-6350 | www.hatcocorp.com | support@hatcocorp.com

Glo-Ray® *Designer* Slant Merchandising Display Warmers

Models: GR2SDS-24, -30, -36, -42, -48, -54, -60
GR2SDS-24D, -30D, -36D, -42D, -48D, -54D, -60D

SPECIFICATIONS
Dual Shelf — SLANT MERCHANDISING DISPLAY WARMERS

The shaded areas contain electrical information for International models

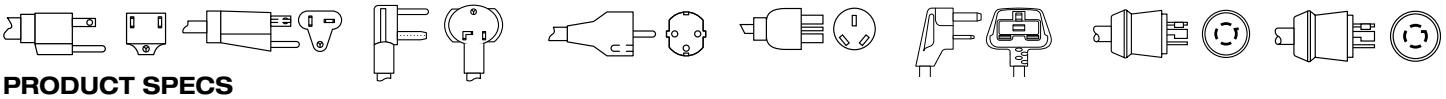
Model	No. of Bulbs, Divider Rods	Dimensions (W x D x H) includes legs	Usable Heated Shelf Space (W x D)	Average Chute Width	Volts	Watts	Amps	Plug	Ship Weight*
GR2SDS-24D	4, 10	30.25" x 26.64" x 33.84" (768 x 677 x 859 mm)	23.87" x 22" (606 x 559 mm)	3.73" (95 mm)	120	1640	13.7	NEMA 5-15P▲	160 lbs. (73 kg)
					220	1600	7.3	CEE 7/7 Schuko, BS-1363	
					240	1640	6.8	BS-1363, AS 3112	
					220-230 (CE)	1600-1749	7.3-7.6	CEE 7/7 Schuko, BS-1363	
					230-240 (CE)	1506-1640	6.6-6.8	BS-1363	
GR2SDS-30D	4, 12	36.25" x 26.64" x 33.84" (921 x 677 x 859 mm)	29.87" x 22" (759 x 559 mm)	4.02" (102 mm)	120/208	2040	8.5	NEMA L14-20P	184 lbs. (84 kg)
					120/240	2040	8.5	NEMA L14-20P	
					220	2000	9.1	CEE 7/7 Schuko, BS-1363	
					240	2040	8.5	BS-1363, AS 3112	
					220-230 (CE)	2000-2186	9.1-9.5	CEE 7/7 Schuko, BS-1363	
					230-240 (CE)	1874-2040	8.2-8.5	BS-1363	
GR2SDS-36D	4, 14	42.25" x 26.64" x 33.84" (1073 x 677 x 859 mm)	35.87" x 22" (911 x 559 mm)	4.23" (107 mm)	120/208	2440	10.2	NEMA L14-20P	200 lbs. (91 kg)
					120/240	2440	10.2	NEMA L14-20P	
					220	2400	10.9	CEE 7/7 Schuko, BS-1363	
					240	2440	10.2	BS-1363, AS 3112	
					220-230 (CE)	2400-2623	10.9-11.4	CEE 7/7 Schuko, BS-1363	
					230-240 (CE)	2241-2440	9.7-10.2	BS-1363	
GR2SDS-42D	8, 16	48.25" x 26.64" x 33.84" (1226 x 677 x 859 mm)	41.87" x 22" (1064 x 559 mm)	4.40" (111 mm)	120/208	2980	12.4	NEMA L14-20P	218 lbs. (99 kg)
					120/240	2980	12.4	NEMA L14-20P	
					220	2900	13.2	CEE 7/7 Schuko, No Plug	
					240	2980	12.4	BS-1363, AS 3112	
					220-230 (CE)	2900-3170	13.2-13.8	CEE 7/7 Schuko, No Plug	
					230-240 (CE)	2737-2980	11.9-12.4	BS-1363	
GR2SDS-48D	8, 18	54.25" x 26.64" x 33.84" (1378 x 677 x 859 mm)	47.87" x 22" (1216 x 559 mm)	4.54" (115 mm)	120/208	3380	14.1	NEMA L14-20P	255 lbs. (116 kg)
					120/240	3380	14.1	NEMA L14-20P	
					220	3300	15.0	CEE 7/7 Schuko, No Plug	
					240	3380	14.1	AS 3112, No Plug	
					220-230 (CE)	3300-3607	15.0-15.7	CEE 7/7 Schuko, No Plug	
					230-240 (CE)	3104-3380	13.5-14.1	No Plug	
GR2SDS-54D	8, 20	60.25" x 26.64" x 33.84" (1530 x 677 x 859 mm)	53.87" x 22" (1368 x 559 mm)	4.65" (118 mm)	120/208	3780	15.8	NEMA L14-20P	265 lbs. (120 kg)
					120/240	3780	15.8	NEMA L14-20P	
					220	3700	16.8	No Plug	
					240	3780	15.8	No Plug	
					220-230 (CE)	3700-4044	16.8-17.6	No Plug	
					230-240 (CE)	3472-3780	15.1-15.8	No Plug	
GR2SDS-60D	12, 24	66.25" x 26.64" x 33.84" (1683 x 677 x 859 mm)	59.87" x 22" (1521 x 559 mm)	4.36" (110 mm)	120/208	4420	18.4	NEMA L14-30P	296 lbs. (135 kg)
					120/240	4420	18.4	NEMA L14-30P	
					220	4300	19.6	No Plug	
					240	4420	18.4	No Plug	
					220-230 (CE)	4300-4700	19.6-20.4	No Plug	
					230-240 (CE)	4049-4420	17.6-18.4	No Plug	

* Shipping weight includes packaging.
▲ Canadian models use NEMA 5-20P.

CORD LOCATION
Back of unit, top right side.

PLUG CONFIGURATIONS

NEMA 5-15P | NEMA 5-20P | NEMA 5-30P | CEE 7/7 Schuko | AS 3112 | BS-1363 | NEMA L-14-20P | NEMA L-14-30P



PRODUCT SPECS
Glo-Ray® *Desinger* Slant Merchandising Warmers

The *Designer* Merchandising Warmer shall be a Glo-Ray® Model ... as manufactured by the Hatco Corporation, Milwaukee, WI 53234 U.S.A.

The warmer shall be rated at ... watts, ... volts, and be ... inches (millimeters) in overall width. It shall consist of a thermostatically-controlled hardcoated heated base, infrared heat from above, full view tempered glass sides, adjustable divider rods, Designer color inser panels and incandescent display lights. The infrared heating element shall be tubular metal sheathed and the warmer shall have a 6' (1829 mm) cord with plug attached.

Accessories shall include control covers and additional stainless steel dividers rods.

Warranty consists of 24/7 parts and service assistance (US and Canada only).

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Submittal Sheet

09/13/2019

ITEM# 8 - HOT DOG GRILL (1 EA REQ'D)

APW Wyott HR-31SBD

X*PERT™ HotRod® Hot Dog Grill with Bun Drawer, (10) slanted chrome surface rollers, infinite controls, unheated bun drawer, lift up plexiglass door, stainless steel grill exterior, drawer, slides & cabinet, cULus, NSF, CSA, CE

ACCESSORIES

Mfr	Qty	Model	Spec
APW Wyott	1		1 year limited warranty, standard
APW Wyott	1		120v/60/1-ph, 900 watts, 7.4 amps, NEMA 5-15P, standard (nc) [service class C-4 business week lead time]

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1	Cord & Plug		5-15P	7.4	.9			

X-PERT™ Series All-in-One Roller Grill System

MODELS: □ HR-31BW □ HR-50BW □ HR-31SBW □ HR-50SBW □ HRS-31BW □ HRS-50BW □ HRS-31SBW □ HRS-50SBW
MODELS: □ HR-31BD □ HR-50BD □ HR-31SBD □ HR-50SBD □ HRS-31BD □ HRS-50BD □ HRS-31SBD □ HRS-50SBD
MODELS: □ HR-31BC □ HR-50BC □ HR-31SBC □ HR-50SBC □ HRS-31BC □ HRS-50BC □ HRS-31SBC □ HRS-50SBC

PRODUCT: QUANTITY: ITEM #:

Roller Grill/Bun Warmer "All In One" Combination Equipment Package to fit your High Volume Operation!

APW Wyott® built-in roller grill and bun warming drawer combination saves space, reduces cost and provides sanitary storage of a warm bun. "All In One" unit is designed for great merchandising all while maintaining even temperatures for a wide variety of roller grill products like hot dogs, taquitos, corn-dogs, and sausage products while resulting in longer product life and the highest quality product integrity for increased foodservice sales and less spoils.

Designed Smart
Multi-Zone Controls (Roller Grill)

•Dual infinite temperature controls provide more linear heat control for better performance and adjustability to allow switching from cook to hold cycles easily while maintaining proper temperatures. Tru-Heat system has less than a 7° degree temperature variance on the roller tube surface
•Multi-zone temperature selection (front & rear allows for product to be cooked while already cooked products can be held at NSF safe temps and served. Easy access control knobs provide sectional heating for front and rear rollers.
•Improved Tru-Turn coating for better product turning, more even heating and easy cleaning.
•Full sized bun warmer drawer built-in with single button heat control for a great tasting "hot" bun.

Easy to Operate and Maintain!
•The HRS-BW Series HotRod® Roller Grills/Bun Warmer combination is designed to require minimal labor.
•Tru-Turn" coated rollers just wipe clean with damp rag.
•Raised rollers allow cleaning in hard to reach areas.
•Removable stainless steel grease collection pan is simple to clean.
•Easiest roller grill/bun warmer combo in the industry to service.
•Unit is supplied with easy to remove side and bottom panels.
•Dependable, high torque motor is one of the most dependable in the industry

Built Solid. Built to Last

- Exterior cabinet constructed of stainless steel for maximum durability
- Made with heavy duty wiring
- "Tru-Turn" coating is 30% thicker than competitive non-stick coatings.
- Heavy duty industrial superior grade roller bearing and dual seal combination provides smother operation, longer life, low maintenance and grease free internal compartments.
- Polytetrafluoroethylene seals at end of rollers stop grease from migrating into motors and chains.

Options

- S =Tru-Turn coating on roller tubes
- BW = Bun warmer, Heated bun drawer
- BC = Unheated bun cabinet
- BD = Unheated bun drawer
- R = Reverse controls on back of unit (available only on slanted models)
- W = Wide spacing for bigger products

Reliability Backed by APW Wyott's Warranty

All APW Wyott roller grill equipment are backed by a 1 year parts and labor warranty, including on-site service calls within 50 miles of authorized service technicians.

Certified by the following agencies:

1 YEAR LIMITED WARRANTY

APW Wyott Foodservice Equipment Company • *1307 N Watters Rd. Suite 180, Allen, TX 75013*
• (800) 527-2100 • (972) 908-6100• Fax (214) 565-0976 • *www.apwwyott.com*

X-PERT™ Series All-in-One Roller Grill System

MODELS: ☐ HR-31BW ☐ HR-50BW ☐ HR-31SBW ☐ HR-50SBW ☐ HRS-31BW ☐ HRS-50BW ☐ HRS-31SBW ☐ HRS-50SBW
MODELS: ☐ HR-31BD ☐ HR-50BD ☐ HR-31SBD ☐ HR-50SBD ☐ HRS-31BD ☐ HRS-50BD ☐ HRS-31SBD ☐ HRS-50SBD
MODELS: ☐ HR-31BC ☐ HR-50BC ☐ HR-31SBC ☐ HR-50SBC ☐ HRS-31BC ☐ HRS-50BC ☐ HRS-31SBC ☐ HRS-50SBC

PRODUCT: QUANTITY: ITEM #:

PRODUCT SPECIFICATIONS

Model	Width	Depth	Height	Voltage	Amps	Model	Width	Depth	Height	Voltage	Amps
HR-31	23.75"	18.625"	8.5"	120	8.2	HR-50SBD	34.75"	18.625"	12.75"	120	10.8
HR-31BC	23.75"	18.625"	12.75"	120	8.2	HR-50SBW	34.75"	18.625"	12.75"	120	14.2
HR-31BD	23.75"	18.625"	12.75"	120	8.2	HRS-50S	34.75"	18.625"	8.5"	120	10.8
HR-31BW	23.75"	18.625"	12.75"	120	9.9	HRS-50SBC	34.75"	18.625"	12.75"	120	10.8
HRS-31	23.75"	18.625"	8.5"	120	8.2	HRS-50SBD	34.75"	18.625"	12.75"	120	10.8
HRS-31BC	23.75"	18.625"	12.75"	120	8.2	HRS-50SBW	34.75"	18.625"	12.75"	120	14.2
HRS-31BD	23.75"	18.625"	12.75"	120	8.2	HR-45	23.75"	29.56"	10.25"	120	11.7
HRS-31BW	23.75"	18.625"	12.75"	120	9.9	HR-45BC	23.75"	29.56"	14.25"	120	11.7
HR-31S	23.75"	18.625"	8.5"	120	7.5	HR-45BD	23.75"	29.56"	14.25"	120	11.7
HR-31SBC	23.75"	18.625"	12.75"	120	7.5	HR-45BW	23.75"	29.56"	14.25"	120	14.2
HR-31SBD	23.75"	18.625"	12.75"	120	7.5	HRS-45	23.75"	29.56"	10.25"	120	11.7
HR-31SBW	23.75"	18.625"	12.75"	120	9.2	HRS-45BC	23.75"	29.56"	14.25"	120	11.7
HRS-31S	23.75"	18.625"	8.5"	120	7.5	HRS-45BD	23.75"	29.56"	14.25"	120	11.7
HRS-31SBC	23.75"	18.625"	12.75"	120	7.5	HRS-45BW	23.75"	29.56"	14.25"	120	14.2
HRS-31SBD	23.75"	18.625"	12.75"	120	7.5	HR-75	34.75"	29.56"	10.25"	120	8.7*
HRS-31SBW	23.75"	18.625"	12.75"	120	9.2	HR-75BC	34.75"	29.56"	14.25"	120	8.7*
HR-50	34.75"	18.625"	8.5"	120	11.9	HR-75BD	34.75"	29.56"	14.25"	120	8.7*
HR-50BC	34.75"	18.625"	12.75"	120	11.9	HR-75BW	34.75"	29.56"	14.25"	120	10.4*
HR-50BD	34.75"	18.625"	12.75"	120	11.9	HRS-75	34.75"	29.56"	10.25"	120	8.7*
HR-50BW	34.75"	18.625"	12.75"	120	15.2	HRS-75BC	34.75"	29.56"	14.25"	120	8.7*
HRS-50	34.75"	18.625"	8.5"	120	11.9	HRS-75BD	34.75"	29.56"	14.25"	120	8.7*
HRS-50BC	34.75"	18.625"	12.75"	120	11.9	HRS-75BW	34.75"	29.56"	14.25"	120	10.4*
HRS-50BD	34.75"	18.625"	12.75"	120	11.9	HR-85BW	34.75"	29.56"	14.25"	120	11.5*
HRS-50BW	34.75"	18.625"	12.75"	120	15.2	HRS-85BW	34.75"	29.56"	14.25"	120	11.5*
HR-50S	34.75"	18.625"	8.5"	120	10.8	HR-31	23.75"	18.625"	8.5"	208/240	5.6/6.5
HR-50SBC	34.75"	18.625"	12.75"	120	10.8						

*UNITS SUPPLIED WITH TWO POWER CORDS

Construction:

Stainless steel exterior, aluminum drip pan and coated steel bottom. Chrome or "Tru-Turn" textured rollers. Two heavy-duty high torque motors.

Electrical Information:

120V units use a 5-15P plug. Both the 208V and 240V units are provided with a 60" power cord a NEMA 6-15P plug that exits from the bottom on the left rear corner.

Shipping Weight:

HR-31:	43 lbs	HR-31BC:	73lbs	HR-31BD:	73lbs	HR-31BW:	76lbs
HR-45:	89 lbs	HR-45BC:	89lbs	HR-45BD:	89lbs	HR-45BW:	91lbs
HR-50:	70 lbs	HR-50BC:	105lbs	HR-50BD:	105lbs	HR-50BW:	108lbs
HR-75:	110 lbs	HR-75BC:	205lbs	HR-75BD:	205lbs	HR-75BW:	208lbs

FOB: Allen, TX 75013

APW Wyott reserves the right to modify specifications or discontinue models without incurring obligation.

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Suppliers/Designers to the Food Service Industry

Submittal Sheet

09/13/2019

ITEM# 9 - ICE MAKER, CUBE-STYLE (1 EA REQ'D)

Ice-O-Matic CIM0530HA

Elevation Series™ Modular Cube Ice Maker, air-cooled, self-contained condenser, dual exhaust top/side air discharge, 30" W, approximately 520 lb production/24 hours at 70°/50° (390 lb at 90°/70°), half-size cubes, PURE ICE® built-in antimicrobial protection, LED status display, one touch sanitize/descaling controls, dishwasher safe food zone components, cULus, NSF, CE

ACCESSORIES

Mfr	Qty	Model	Spec
Ice-O-Matic	1		3 yr. parts & labor warranty, standard
Ice-O-Matic	1		5 yr. evaporator warranty, standard
Ice-O-Matic	1		5 yr. parts on the compressor warranty, standard
Ice-O-Matic	1	B110PS	Ice Bin, 854 lb storage capacity, 48"W x 31"D x 50"H, top-hinged, slope front door, for top-mounted ice maker, polyethylene interior, durable stainless finish exterior, 6" legs, NSF
Ice-O-Matic	1		2 yr. parts & labor warranty, standard
Ice-O-Matic	1	BPF-1	Filler panels used on B-110 bin when mounting 30" wide modular cuber
Ice-O-Matic	1	IFQ1	Water Filter Manifold, single filter designed for ice makers producing up to 800 lbs. (363.6 Kg.) of ice per day, 1.5 gpm maximum flow rate, IsoNet scale inhibitor, .5 micron particle reduction, quick connect fittings (water filters must be changed every 180 days (6 months), at a minimum)
Ice-O-Matic	1		1 yr parts & labor warranty (excluding cartridges), standard
Ice-O-Matic	1		7 yr Evaporator warranty in lieu of standard 5 yr, if a water filter is purchased with the machine & filters replaced every 6 mo. (USA & Canada only)
Ice-O-Matic	1		Drain Pump for ice machine

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	115	60	1	Direct			17.8				

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1				3/8"					
2									

WASTE

	INDIRECT SIZE	DIRECT SIZE
1	3/4"	
2	3/4"	

PLUMBING 1 REMARKS

Ice Maker Drain

ELEVATION SERIES CUBE ICE MAKER
CIM0530/0535

Ice-O-Matic
Ice. Pure and Simple

CIM0530/0535 CUBE ICE MAKER

Model:
- ☐ CIM0530
- ☐ CIM0535

CIM0530 ON B55

Features and Benefits

- 30" (768 mm) wide space-saving design.
- Produces up to 530 lbs (240 kg) of ice per day.
- *Energy and Environment*
  - Exceeds new 2018 DOE (Department of Energy) regulations.
  - Up to 20% more energy efficient than other models.
  - Environmentally friendly, including BPA-free plastic and recyclable parts.
- *Sanitation*
  - Plastic Food Zone eliminates hard-to-clean nooks and crannies, allowing for effortless wipe down and easy, long-lasting sanitation.
  - Built in Agion® ensures unbeatable antimicrobial protection.
  - Smart LED light indicates machine status and when cleaning is required.
  - Simple, one-touch controls for sanitization and descaling.
  - BPA-free snap-in, snap-out dishwasher-safe components.
- *Unique Dual Exhaust* - Air-cooled machines are designed to discharge hot air from both the side and top of the unit, increasing installation flexibility and reducing the potential of obstructed exhaust.
- *Universal Smart Harness™* control board simplifies installation and servicing with better access, digital diagnostics, universal components and common configuration.

Ice Form

FULL CUBE DIMENSIONS	
W x D x H (in.)	⅞ x ⅞ x ⅞
W x D x H (mm)	22 x 22 x 22
HALF CUBE DIMENSIONS	
W x D x H (in.)	⅜ x ⅞ x ⅞
W x D x H (mm)	10 x 22 x 22

CUBE

Bin Chart *Kits for Combining Wider Bins with Smaller Models*

	ICE STORAGE BINS										
Kits	**Model No.** Capacity Width	**B25** 242 lbs (110 kg) 30 in (762 mm)	**B40** 344 lbs (156 kg) 30 in (762 mm)	**B42** 351 lbs (160 kg) 22 in (559 mm)	**B55** 510 lbs (232 kg) 30 in (762 mm)	**B700** 680 lbs (308 kg) 30 in (762 mm)	**B110** 854 lbs (388 kg) 48 in (1,219 mm)	**B1000** 1,000 lbs (454 kg) 48 in (1,219 mm)	**B1300** 1,320 lbs (599 kg) 48 in (1,219 mm)	**B1325** 1,325 lbs (601 kg) 60 in (1,524 mm)	**B1660** 1,660 lbs (753 kg) 60 in (1524 mm)
	CIM0530	Kit Not Required		N/A	Kit Not Required		BPF-1	Hold Down Securement Recommended			
	CIM0535										

**See Ice-O-Matic Price List for Adapter Kits to combine ice makers with most available ice/beverage dispensers.*

Options & Accessories

WATER FILTERS		
Ice Machine Model	**Manifold**	
	System	Replacement
CIM0530	IFQ1	IOMQ (1)
CIM0535		

Note: All modular cube CIM units can be installed with the O_3-Matic™ Ozone Delivery System.

Ice Maker Warranty

COMMERCIAL WARRANTY	
Ice Maker	**3 YEARS** parts and labor
Evaporator and Compressor	**5 YEARS** parts
Evaporator (when enrolled in our filter program)	**7 YEARS** parts and labor

ELEVATION SERIES CUBE ICE MAKER
CIM0530/0535

Ice-O-Matic
Ice. Pure and Simple

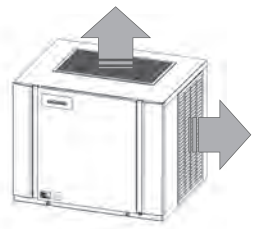
CIM0530/0535 CUBE ICE MAKER

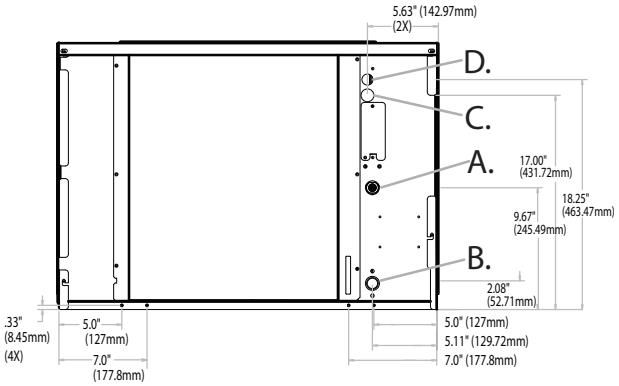
Air Cooled

Please note: air-cooled units require 6" (152 mm) clearance for air intake and exhaust. Top louvers must not be blocked more than 75%.

A. Ice maker potable water in, 3/8" FPT.
B. Ice maker water out, 3/4" FPT.
C. Hole for electrical connections, 7/8".
D. Electrical connection junction box, 7/8".

Dual Exhaust for Installation Flexibility

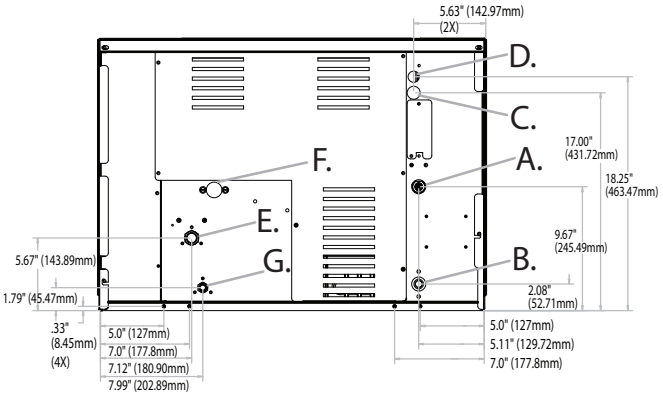




Air Cooled

Water Cooled/Remote Cooled

A. Ice maker potable water in, 3/8" FPT.
B. Ice maker water out, 3/4" FPT.
C. Hole for electrical connections, 7/8".
D. Electrical connection junction box, 7/8" (remote).
E. Condenser water in, 3/8" FPT (water only). Discharge line, 1/2" male quick connect coupling for precharged line set (remote only).
F. Condenser water out, 1/2" FPT (water only).
G. Liquid line, 3/8" male quick connect for precharged line set (remote only).



Water Cooled/Remote Cooled

Operating Requirements

	MINIMUM	MAXIMUM	
		60 Hz	50Hz
Ambient Temp. Range Air	50°F (10°C)	100°F (38°C)	110°F (43°C)
Water Temp.	40°F (4.4°C)		
Water Pressure	20 PSIG (1.4 BAR)	80 PSIG (5.5 BAR)	

Dimensions

ALL MODELS	
W x D x H (in.)	30.25 x 24.25 x 21.25
W x D x H (mm)	768 x 616 x 540

Specifications

Model Number	Cond. Unit	Half-Cube Ice Production per 24hrs		Water Usage gallons per 100 lbs of Ice 90°F air/70°F water		kWH Used per 100 lbs of ice @ 90°F air/ 70°F water	Voltage Characteristics	Min. Circuit Ampacity	Fuse Size	Approx. BTUs per hour
		70°F air/ 50°F water lbs (kg)	90°F air/ 70°F water lbs (kg)	Potable	Condenser					
CIM0530A★	Air	520 (236)	390 (177)	19.9	-	5.87	115/60/1	17.8	30	6,252
CIM0530R	Remote	525 (238)	415 (188)	19.6	-	6.21		20.1		
CIM0530W	Water	530 (240)	470 (213)	20.0	181.0	4.70		17.4		
CIM0535A	Air	500 (227)	400 (181)	20.0	-	6.11	220-240/50/1	11.2	16	
CIM0535R	Remote	490 (222)	425 (193)	20.0	-	6.31		12.0	20	
CIM0535W	Water	525 (238)	445 (202)	19.5	190.0	5.00		11.0	16	

* Daily ice production based on half cube configuration.

Notes:
Number of Wires: 3 (including ground)
Approx. Shipping Weight lbs (kg): CIM0530A 155 (70.3) • CIM0530R 160 (72.5) • CIM0530W 155 (70.3) • CIM0535A 155 (70.3) • CIM0535R 160 (72.5) • CIM0535W 155 (70.3)
Refrigerant Type: R404A

★ENERGY STAR qualified machine. Please see our website www.iceomatic.com for the latest list of ENERGY STAR qualified machines and available rebates

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Rev: 9/17
Part: C003

SLOPE FRONT STORAGE BINS

Ice-O-Matic
Ice. Pure and Simple

B55

Features

- Application storage capacity from 242 lbs (110 kg) to 854 lbs (388 kg).
- Multiple bin tops provide an easy solution for mounting ice makers on different sized bins.
- Polyethylene bin liner is insulated with foam for maximum ice preservation – 1.5" to 3" (38 mm to 76 mm).
- 31" deep for use where space is at a premium.
- Built-in ice scoop holders on certain models.
- Sturdy leg design – 6" (152 mm) adjustable NSF approved legs – standard.
- Durable stainless finish.

SLOPE FRONT STORAGE BINS

Bin Accessories

Ice-O-Matic Part Number	Description
1011517-22	Plastic ice shovel
1011517-23	Hanging bracket for ice shovel
1011517-24	46.5" Plastic paddle
1051517-29	Hanging bracket for ice paddle
9051127-01	82 Ounce ice scoop

Ordering and Specification Information – Required Bin Top/Cover

Bin Model No.	Application Bin Storage lbs (kgs)	Approximate Shipping Weight lbs (kgs)	ICE Series™ Cube Ice Makers			Nugget Ice Makers	Flake Ice Makers
			22" (559 mm) wide	30" (762 mm) wide	48" (1,219 mm) wide	21" (533 mm) wide	21" (533 mm) wide
B25PP*	242 (110)	74 (34)	KBT19	●●	N/A	KBT19	KBT19
B40PS	344 (156)	103 (47)	KBT19	●●	N/A	KBT19	KBT19
B42PS	351 (160)	99 (45)	●●	N/A	N/A	KBT24	KBT24
B55PS	510 (232)	125 (57)	KBT19	●●	N/A	KBT19	KBT19
B110PS	854 (388)	163 (74)	N/A	BPF-1	●●	KBT23	KBT23

●● Kit not required. Hold down securement recommended.
Bin Height includes 6" (423 mm) legs. All bins have polyethylene liners.
*Rotocast finish

Ordering and Specification Information – Side by Side

Bin Model No.	Style	Application Bin Storage lbs (kgs)	Approximate Shipping Weight lbs (kgs)	ICE Series™ Cube Ice Makers			Nugget Ice Makers	Flake Ice Makers
				Two 22" (559 mm) wide	Two 30" (762 mm) wide	Two 48" (1,219 mm) wide	Two 21" (533 mm) wide	Two 21" (533 mm) wide
B25PP*	Slope Front	242 (110)	74 (34)	N/A	N/A	N/A	N/A	N/A
B40PS	Slope Front	344 (156)	103 (47)	N/A	N/A	N/A	N/A	N/A
B42PS	Slope Front	351 (160)	99 (45)	N/A	N/A	N/A	N/A	N/A
B55PS	Slope Front	510 (232)	125 (57)	N/A	N/A	N/A	N/A	N/A
B110PS	Slope Front	854 (388)	163 (74)	N/A	N/A	N/A	KBT22	KBT22

*Rotocast finish

NSF Ice-O-Matic

SLOPE FRONT STORAGE BINS

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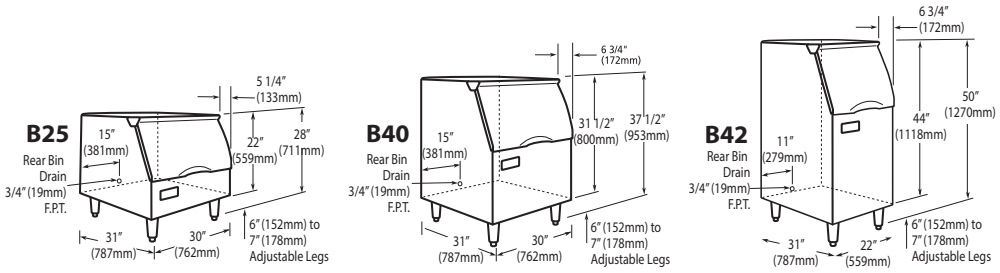
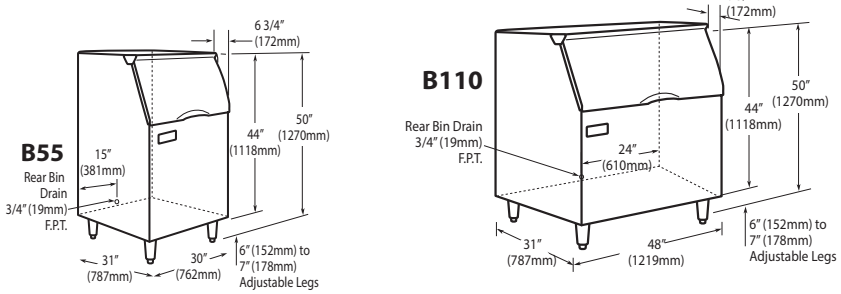
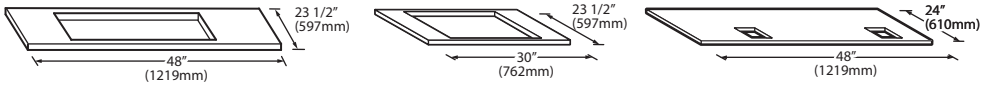
SLOPE FRONT STORAGE BINS

Dimensions



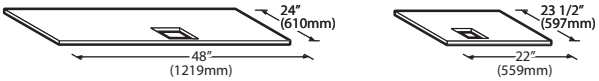




KBT5
Bin Top for 30" (762 mm) ICE series cuber including the ICE1506 family on a B100 bin

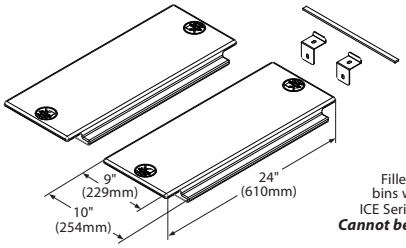
KBT19
Bin Top for 30" (762mm) bins with 22" (559mm) ICE Series Cube Ice Makers GEM Series Ice Makers & MFI Series Ice Makers

KBT22
Bin Top for 48" (1219mm) bins with (2) 21" (533mm) wide GEM Series Ice Makers & MFI Series Ice Makers



KBT23
Bin Top for 48" (1219mm) bins with (1) 21" (533mm) wide GEM Series Ice Makers & MFI Series Ice Makers

KBT24
Bin Top for 22" (559mm) bins with (1) 21" (533mm) wide GEM Series Ice Maker



BPF-1
Filler Panel for B110 bins with 30" (762mm) ICE Series Cube Ice Makers
Cannot be used with the B100

NOTES:
Approx. Shipping Weight lbs (kg): B110 191 (87 kg) • B55 170 (77 kb) • B25 95 (43 kg) • B40 135 (61 kg) • B42 135 (61 kg)

WATER FILTERS

Ice-O-Matic
Ice. Pure and Simple

Snapshot

IFQ Series water treatment systems reduce sediment down to 1/2 micron and reduce chlorine, taste and odor at a flow rate of up to 3.0. The systems include IsoNet®, which delivers consistent protection against the precipitation and accumulation of scale and provides a protective barrier to help guard against corrosion.

Installation Tips

- Feed-water connection to system should be COLD only.
- Do not exceed system specifications for temperature and pressure.
- Allow 3" clearance below system for cartridge removal and replacement.
- Connect filtered water line to ice connections only. Do not use for condenser water.
- No activation procedure or flushing is required for system to perform as specified.

Features and Benefits

- Reduces maintenance frequency and cost, and extends equipment life.
- Improves equipment operating efficiency
- Incorporates IsoNet – patented scale-inhibiting technology.
- Gradient-density depth filtration reduces dirt, rust and other debris as small as 1/2 micron to ensure clean, clear ice and protect solenoids, valves and other fittings against wear and plugging.
- High-capacity activated carbon filtration reduces taste and odor and protects equipment against corrosive chlorine.
- 1/4 turn QT "Quick-Twist" cartridge makes changing the filter quick, easy and sanitary.
- Wall-mount bracket and full-flow inlet shut-off valve make installation simple.
- NSF certified under Standard 42

IFQ SERIES FILTER SYSTEM

Model Number	Description	Service Flow Rate Max. gpm (lpm)	Pressure Max. Psi (bar)	Inlet Water Temp Range °F (°C)	Micron Rating	Approx. Shipping Weight lbs (kg)
IFQ1	Single Filter	1.5 (5.7)	10 - 125 (0.7 - 8.6)	100 (38)	.5	3 (1.3)
IFQ1-XL	Single Filter	2.25 (8.5)		100 (38)		5 (2.3)
IFQ2	Dual Filter	3.0 (11.4)		100 (38)		7 (3.2)

SINGLE INLINE FILTER CARTRIDGES

Model Number	Description	Service Flow Rate Max. gpm (lpm)	Pressure Max. Psi (bar)	Inlet Water Temp Range °F (°C)	Micron Rating	Approx. Shipping Weight lbs (kg)
IFI4C	Single Inline Cartridge 1/4" compression	0.5 (1.9)	10 - 100 (.07 - 6.9)	35 - 100 (2 - 38)	10	2 (.9)
IFI8C	Single Inline Cartridge 3/8" compression					

WATER FILTERS

Ice-O-Matic
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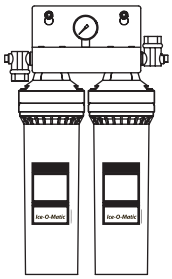
WATER FILTERS

IFQ Series Filter Systems

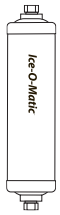
IFQ1
15"H × 6"W × 4"D
(381 mm × 152 mm × 102 mm)



IFQ2
16"H × 10"W × 7.125"D
(406 mm × 254 mm × 102 mm)

IFQ1-XL
21"H × 6"W × 4"D
(533 mm × 152 mm × 102 mm)

Single Inline Filter



IFI4C, IFI8C
11.75" × 2.75"
(279 mm × 57 mm)

Replacement Filter Cartridges

IOMQ
12.75" x 4"
(324 mm × 102 mm)

IOMQ-XL
17.49" x 3.9"
(444 mm × 99 mm)

All filter systems include:

Filter cartridge with FDA approved scale inhibitor, inlet shut-off valve, gauge and quick-connect fittings.

*IOMQ replacement cartridges for use with IFQ1 & IFQ2 manifold filter systems. IOMQ-1XL replacement cartridge for use with IFQ1-XL manifold filter system.

WATER FILTERS					
		IF14C, IF18C	IFQ1	IFQ1-XL	IFQ2
Cube Ice	HISU050 - ICEU070	X			
	ICEU150 - ICE800		X		
	ICE0856 - ICE1000			X	
	ICE1400 - ICE2100				X
Flake Ice	MFI0500 - MFI1256		X		
	MFI2406				X
Pearl Ice	GEMU090	X			
	GEM0450 - GEM0950		X		

Extended Warranty Program

- Buy a new Ice-O-Matic Water Filter System with a new ICE Series™ Cube ice maker, replace the filter cartridge every 6 months, and Ice-O-Matic will extend the limited cuber evaporator warranty to 7 years parts and labor (U.S. and Canada only).
- New ice maker and filter must be installed at the same time.
- Ice maker and water filter must be registered with Ice-O-Matic within 10 days of installation. Register ice maker and filter at www.iceomatic.com.
- Water filters must be changed every 180 days (6 months), at a minimum. All changes must be registered with Ice-O-Matic and include the water filter's model and serial numbers. Register water filter changes at www.iceomatic.com.
- Program is available with all Ice-O-Matic IFQ1, IFQ-1XL, IFQ2, IFI4C or IFI8C water filter systems.
- Replacement filter must be Ice-O-Matic models.

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Rev: 10/15
Part: 5000

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Submittal Sheet

09/13/2019

ITEM# 10 - COFFEE BREWER (1 EA REQ'D)

BUNN 04275.0031

04275.0031 VPS BLACK Coffee Brewer, pourover type, brews 3.9 gallons per hour capacity, (2) lower & (1) upper warmer, plastic funnel, black decor, 120v/60/1-ph, 1660w, 13.8 amps, NEMA 5-15P, cord attached, UL, NSF

ACCESSORIES

Mfr	Qty	Model	Spec
BUNN	1		Equipment discount category net prices must be rounded to the nearest dollar
BUNN	1	06100.0103	06100.0103 Easy Pour® Coffee Decanter, 64 oz., drip-proof, fast-pour-lip, plastic decanter with black plastic handle and stainless steel bottom (3 each per pack) (call for pricing on orders over 239 decanters)

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1	Cord & Plug		5-15P	13.8	1.66			

VPS (1U/2L Warmers)

19.2" x 8.0" x 23.0"
(48.8cm x 20.3cm x 58.4cm)

- Pourover brewer requires no plumbing – completely portable
- SplashGard® funnel deflects hot liquids away from the hand
- Three individually controlled warmers

Servers and airpots sold separately

Agency:

Specifications

Product #: 04275.0031
Water Access: Not Plumbed
Finish: Black
Funnel: Black Plastic
Warmers: One Upper / Two Lower

Additional Features

Electrical & Capacity

Volts	Amps	Watts	Cord Attached	Plug Type	8oz cups/hr 236ml cups/hr	Input H²O Temp.	Phase	# Wires plus Ground	Hertz
120	13.8	1660	Yes	NEMA 5-15P	62	60°F (15.5°C)	1	2	60

Plumbing Requirements

PSI	kPa	Fitting Supplied	Water Flow Required (GPM)
-	-	-	-

CAD Drawings

2D	Revit	KLC
●		

BUNN® reserves the right to change specifications and product design without notice. Such revisions do not entitle the buyer to corresponding changes, improvements, additions or replacements for previously purchased equipment. For most current specifications and other info visit bunn.com.

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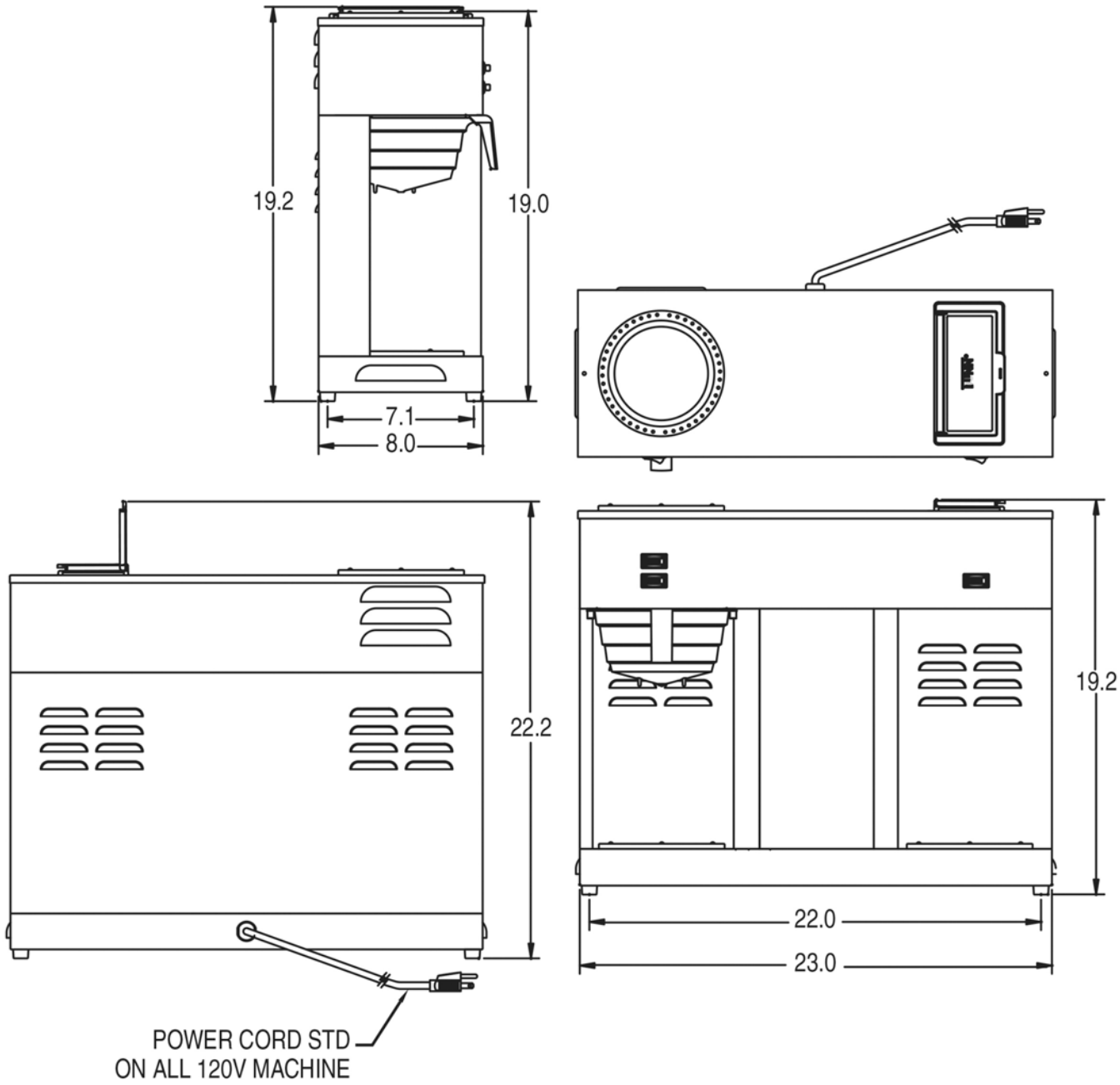

	Unit			Shipping				
	Width	**Height**	**Depth**	**Width**	**Height**	**Depth**	**Weight**	**Volume**
English	23.0 in.	19.2 in.	8.0 in.	-	-	-	26.200 lbs	4.018 ft³
Metric	58.4 cm	48.8 cm	20.3 cm	-	-	-	11.884 kgs	0.114 m³

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Related Products & Accessories: VPS (1U/2L Warmers)(04275.0031)

WX2, 120V

Product #: 06310.0004

PARRILLA

Product #: 06310.0004

WX1, 120V

Product #: 06450.0004

FILTERS,REGULAR1M 500/2 50/CL

Product #: 20115.0000

PAPEL FILTRANTE

Product #: 20115.0000

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Created on: 09/13/2017

Serving & Holding Options: VPS (1U/2L Warmers)(04275.0031)

EASY POUR,(BLK) 1/CS

Product #:06100.0101

EASY POUR,(BLK) 2/CS

Product #:06100.0102

JARRAS

Product #:06100.0102

EASY POUR,(BLK) 3/CS

Product #:06100.0103

JARRAS

Product #:06100.0103

EASY POUR,(BLK) 6/CS

Product #:06100.0106

JARRAS

Product #:06100.0106

EASY POUR,(BLK) 12/CS

Product #:06100.0112

EASY POUR,(BLK) 24/CS

Product #:06100.0124

EASY POUR,(BLK) 6-1/CS

Product #:06100.0156

EASY POUR,(ORN) 1/CS

Product #:06101.0101

EASY POUR,(ORN) 2/CS

Product #:06101.0102

JARRAS

Product #:06101.0102

EASY POUR,(ORN) 3/CS

Product #:06101.0103

EASY POUR,(ORN) 6/CS

Product #:06101.0106

JARRAS

Product #:06101.0106

EASY POUR,(ORN) 12/CS

Product #:06101.0112

EASY POUR,(ORN) 24/CS

Product #:06101.0124

DECANTER,GLASS-BLK 12C 24/CS

Product #:42400.0024

DECANTER,GLASS-BLK 12CUP 1PK

Product #:42400.0101

BUNN® reserves the right to change specifications and product design without notice. Such revisions do not entitle the buyer to corresponding changes, improvements, additions or replacements for previously purchased equipment. For most current specifications and other info visit bunn.com.

Created on: 09/13/2017

Serving & Holding Options: VPS (1U/2L Warmers)(04275.0031)

DECANTER,GLASS-BLK 12C 3/CS

Product #:42400.0103

DECANTER,GLASS-ORN 12C 24/CS

Product #:42401.0024

DECANTER, GLASS-ORN 12 CUP 1PK

Product #:42401.0101

DECANTER,GLASS-ORN 12C 3/CS

Product #:42401.0103

BUNN® reserves the right to change specifications and product design without notice. Such revisions do not entitle the buyer to corresponding changes, improvements, additions or replacements for previously purchased equipment. For most current specifications and other info visit bunn.com.

Created on: 09/13/2017

64oz Blk Hndl Easy Pour Decanter(3pk)

0.0" x 0.0" x 0.0"
(0.0cm x 0.0cm x 0.0cm)

- Base is high quality stainless steel

Agency:

Specifications

Product #: 06100.0103

Handle: Black

Additional Features

Holding Capacity

English	Metric
-	-

BUNN® reserves the right to change specifications and product design without notice. Such revisions do not entitle the buyer to corresponding changes, improvements, additions or replacements for previously purchased equipment. For most current specifications and other info visit bunn.com.

Created on: 07/31/2017

	Unit			Shipping				
	Width	**Height**	**Depth**	**Width**	**Height**	**Depth**	**Weight**	**Volume**
English	-	-	-	-	-	-	3.000 lbs	0.750 ft³
Metric	-	-	-	-	-	-	1.361 kgs	0.021 m³

BUNN® reserves the right to change specifications and product design without notice. Such revisions do not entitle the buyer to corresponding changes, improvements, additions or replacements for previously purchased equipment. For most current specifications and other info visit bunn.com.

Created on: 07/31/2017

Related Products & Accessories: 64oz Blk Hndl Easy Pour Decanter(3pk)(06100.0103)

WX2, 120V

Product #: 06310.0004

PARRILLA

Product #: 06310.0004

WX2A, 230V 50/60HZ

Product #: 06310.0006

STOVE,WX2 120V/200W

Product #: 06310.6000

WX1, 120V

Product #: 06450.0004

STOVE,WX1 120V/100W

Product #: 06450.6000

NO IMAGE AVAILABLE

WL2, 120V

Product #: 11402.0001

NO IMAGE AVAILABLE

STOVE,WL2-120V/200W

Product #: 11402.6000

NO IMAGE AVAILABLE

STOVE,WS2-120V/200W

Product #: 12882.6000

BUNN® reserves the right to change specifications and product design without notice. Such revisions do not entitle the buyer to corresponding changes, improvements, additions or replacements for previously purchased equipment. For most current specifications and other info visit bunn.com.

Created on: 07/31/2017

Since 1953
Hotel & Restaurant Supply
Suppliers/Designers to the Food Service Industry

Submittal Sheet

09/13/2019

ITEM# 11 - DISPOSER (1 EA REQ'D)

Salvajor 100-SA-3-ARSS

Disposer, Sink Assembly, 3-1/2" sink collar, 1 Hp motor, start/stop push button, drain/flush/time delay, automatic reversing & water saving ARSS control, includes fixed nozzle, chrome plated vacuum breaker, solenoid valve, sink stopper & flow control, heat treated aluminum alloy housing, UL, CSA, CE

ACCESSORIES

Mfr	Qty	Model	Spec
Salvajor	1		Specify voltage
Salvajor	1	980105	Mounting bracket for ARSS-2, ARSS, & ARSS-LD
Salvajor	1	LSA8	Disposer support leg, for 3/4 HP - 2 HP disposers

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1									1		

WATER

	HOT SIZE	HOT AFF	HOT GPH	COLD SIZE	COLD AFF	FILTERED SIZE	FILTERED AFF	CONDENSER INLET SIZE	CONDENSER OUTLET SIZE
1				1/2"					

WASTE

	INDIRECT SIZE	DIRECT SIZE
1		2"

1 HP Model 100

JOB: _____ **Item No.:** _____

NEMA 4 Watertight Controls

MSS

MRSS

ARSS-2

ARSS

Optional Line Disconnect (LD) available on MSS, MRSS, & ARSS

FOOD WASTE DISPOSER SPECIFICATIONS

CORROSION RESISTANT BODY
Permanent molded from heat treated aluminum alloy.

EXTENDED LIP WATER SEAL
Protects the motor from damage by water.

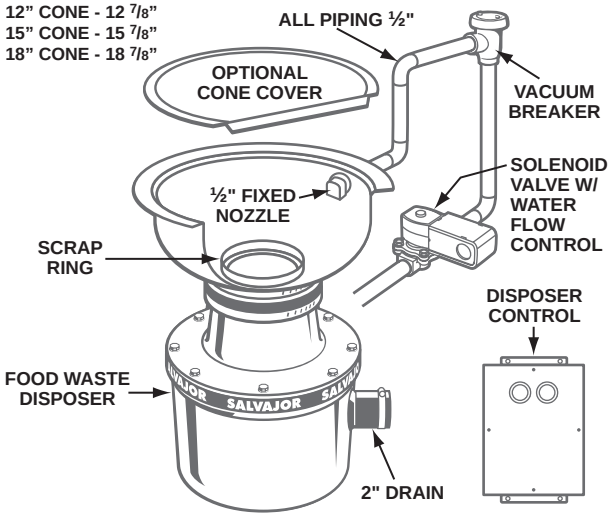
TAPERED ROLLER BEARING
Provides longer motor life, quiet operation and shock absorbing.

WATER COOLED MOTOR
Provides maximum efficiency and longer life.

QUIET OPERATION
Extra thick rubber mounting adaptor and drain outlet isolates sound and eliminates vibration.

Cone Assembly

TABLE CUT-OUT:
12" CONE - 12 7/8"
15" CONE - 15 7/8"
18" CONE - 18 7/8"



NOTE: INSTALL PER ALL APPLICABLE CODES

FULL LOAD AMPS

❑	115 Volts	1 Phase	18.6 Amps
❑	208 Volts	1 Phase	10.2 Amps
❑	230 Volts	1 Phase	9.3 Amps
❑	208 Volts	3 Phase	4.9 Amps
❑	230 Volts	3 Phase	4.5 Amps
❑	460 Volts	3 Phase	2.3 Amps

◆ **SPECIFY EXACT OPERATING VOLTAGE** ◆

Salvajor Model 100

Food Waste Disposer 1 HP – 1 Phase & 3 Phase

DETAILS AND DIMENSIONS

SPECIFICATIONS:

MOUNTING – Rubber adaptor above grind chamber and rubber drain outlet isolates sound and eliminates vibration. No metal to metal contact.

EXTERIOR HOUSING – Permanent molded from heat treated, corrosion resistant aluminum alloy then computer machined to a smooth polished finish. Paint free.

SHREDDER – 8 inch diameter, machined high strength, wear resistant hardened carbide alloy.

ROTOR – 8 inch diameter with 2 cutter bars, machined high strength, wear resistant hardened carbide alloy.

MOTOR – 1 HP totally enclosed. Water cooled for efficiency and longer life. Built-in manual reset thermal overload protection. Available in 208 volts or 115/230 volts, 60 cycle, 1 phase and 208-230/460 volts, 60 cycle, 3 phase.

BEARINGS – Tapered roller (top)
Sealed ball (bottom)

SEAL – Extended Lip Water Seal.

WATER REQUIREMENT – 5 gallons of cold water per minute.

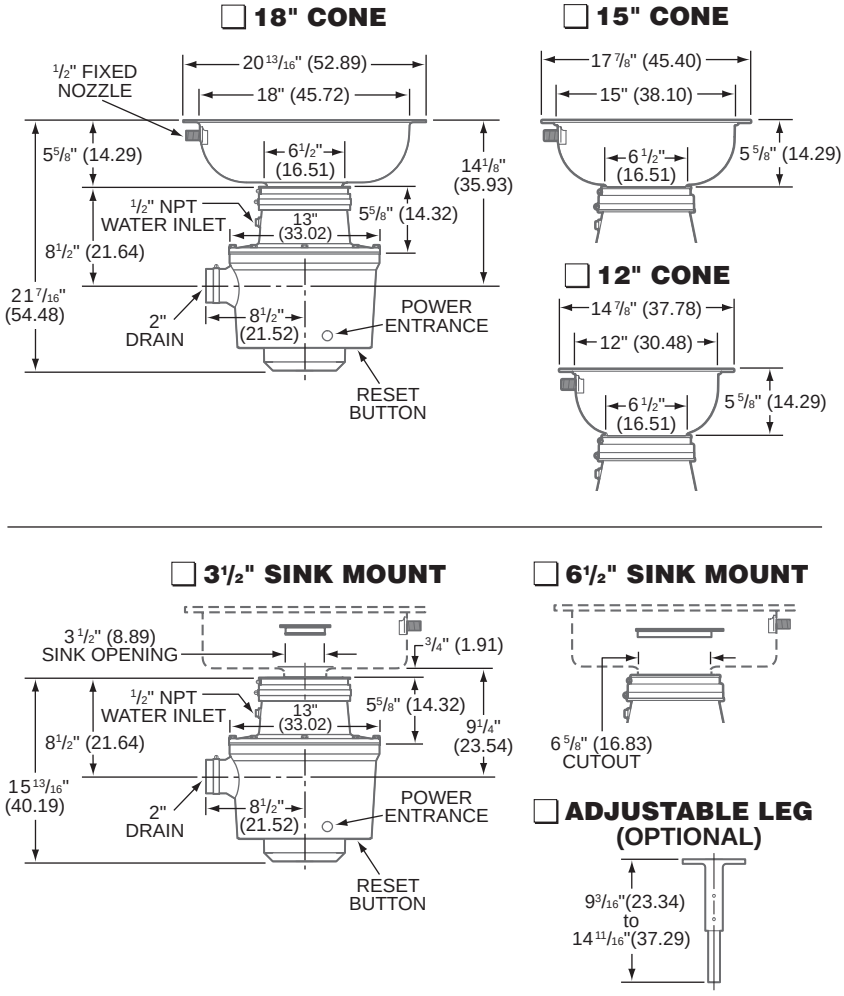
WASTE OUTLET – Rubber drain accepts 2" piping.

DUAL DIRECTION GRINDING – Designed to operate in either direction. Direction of rotation can be controlled when installed with automatic reversing controls. ***Reversing rotation can double cutting teeth life.***

LEG SUPPORT (Optional) – Single leg, adjustable.

ASSEMBLIES: **(See Specification Sheet)**
CA – Cone Assembly with 12", 15" or 18" Cone
SA – Sink Assembly with 3½" or 6½" Sink Collar

DISPOSER CONTROLS: **(See Specification Sheet)**
MSS: (Non Reversing)
MRSS: (Manual Reversing)
ARSS-2: (Automatic Reversing)
ARSS: (Automatic Reversing with Water Saver)



NOTE: Dimensions in parenthesis are in centimeters
(Specifications subject to change without notice)
Current specification details may be found online at www.salvajor.com

SAMPLE SPECIFICATION

100-CA-18	MSS	(230/60/3)
Model / Cone Size / Assembly	Disposer Control	Electrical Specs.

◆ SPECIFY EXACT OPERATING VOLTAGE ◆

The Salvajor Company 4530 East 75th Terrace Kansas City, Missouri 64132-2081, USA
1-800-SALVAJOR (816) 363-1030 FAX: 1-800-832-9373
www.salvajor.com Email: sales@salvajor.com service@salvajor.com

Manufacturers of Commercial Food Waste Disposing Systems since 1944

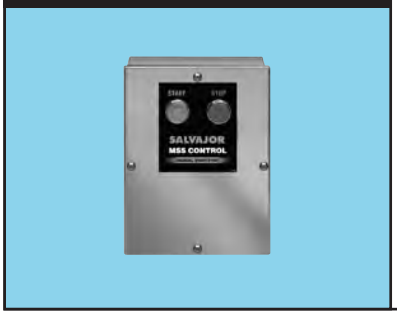
Printed in USA
Form No.S100 (06-17)

Pre-Wired Control Panels

FOR FOOD WASTE DISPOSER

Models: 75-100-150-200-300-500-750

MSS



NON-REVERSING

1-PHASE
115V, 208V, 230V
3-PHASE
208V, 230V, 460V

Best used with Models: 75 & 100

For use in small to medium kitchens, vegetable prep areas, pot sink and soiled dish tables.

SPECIFICATIONS:

- NEMA 4 Stainless Steel Corrosion-Resistant Enclosure
- Magnetic Contactor
- START/STOP Push Buttons
- Terminal Strip Connections

ACCESSORIES:

- Safety Line Disconnect (LD)
- **P** - Mounted Solenoid Valve and Flow Control
- **PP** - Mounted Solenoid Valve, Flow Control and Pressure Switch
- **#980104** - Mounting Bracket

MRSS

MANUAL REVERSING

1-PHASE
115V, 208V, 230V
3-PHASE
208V, 230V, 460V

Best used with Models: 100 & 150

For use in small to medium kitchens, vegetable prep areas, pot sink and soiled dish tables.

SPECIFICATIONS:

- NEMA 4 Stainless Steel Corrosion-Resistant Enclosure
- Manual Reversing Magnetic Contactors
- START/STOP Push Buttons
- Forward/Reverse Switch
- Terminal Strip Connections

ACCESSORIES:

- Safety Line Disconnect (LD)
- **P** - Mounted Solenoid Valve and Flow Control
- **PP** - Mounted Solenoid Valve, Flow Control and Pressure Switch
- **#980104** Mounting Bracket for MRSS
- **#980105** Mounting Bracket for MRSS-LD

ARSS-2

AUTOMATIC REVERSING

1-PHASE
115V, 208V, 230V
3-PHASE
208V, 230V, 460V

Best used with all Models: 75, 100, 150, 200 , 300, 500 & 750

For use in medium to large kitchens, all prep areas and soiled dish tables.

SPECIFICATIONS:

- NEMA 4 Stainless Steel Watertight Enclosure
- 24 Volt Safety Circuitry
- Automatic Reversing Magnetic Contactors
- Terminal Strip Connections
- START/STOP Push Buttons

ACCESSORIES:

- **P** - Mounted Solenoid Valve and Flow Control
- **PP** - Mounted Solenoid Valve, Flow Control and Pressure Switch
- **#980105** Mounting Bracket

ARSS

AUTOMATIC REVERSING

1-PHASE
115V, 208V, 230V
3-PHASE
208V, 230V, 460V

Best used with all Models: 75, 100, 150, 200 , 300, 500 & 750

For use in medium to large kitchens, all prep areas and soiled dish tables.

SPECIFICATIONS:

- NEMA 4 Stainless Steel Watertight Enclosure
- Solid State Control Circuit
- 24 Volt Safety Circuitry
- 45 Second Drain Line Flush
- Automatic Reversing Magnetic Contactors
- Terminal Strip Connections
- START/STOP Push Buttons
- Energy/Water-Saving Mode
- 3 Second Reversing Safety Delay
- User Adjustable Run Time
- LED Status Readout

ACCESSORIES:

- Safety Line Disconnect (LD)
- **P** - Mounted Solenoid Valve and Flow Control
- **PP** - Mounted Solenoid Valve, Flow Control and Pressure Switch
- **#980105** Mounting Bracket

SAFETY FEATURE:

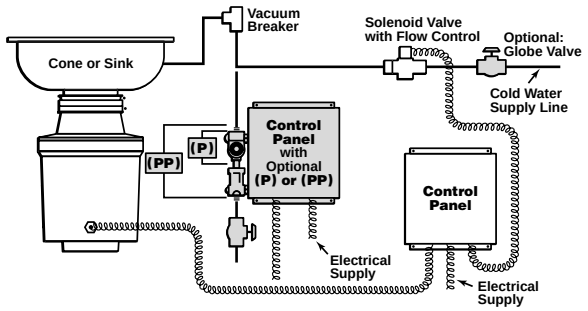
All Salvajor Controls include an operator safety feature that prevents automatic starting of the disposer after a power interruption.

ALL SALVAJOR CONTROLS ARE:

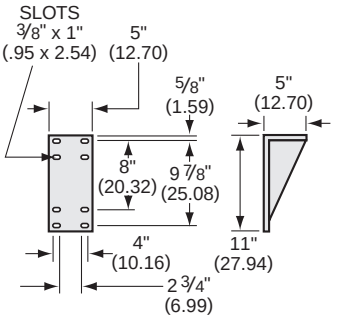
Salvajor Disposer Controls

D E T A I L S A N D D I M E N S I O N S

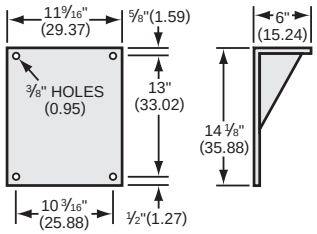
Typical Installation of a Salvajor Disposer with: MSS, MRSS, ARSS-2 or ARSS Control



980104 Optional Mounting Bracket



980105 Optional Mounting Bracket

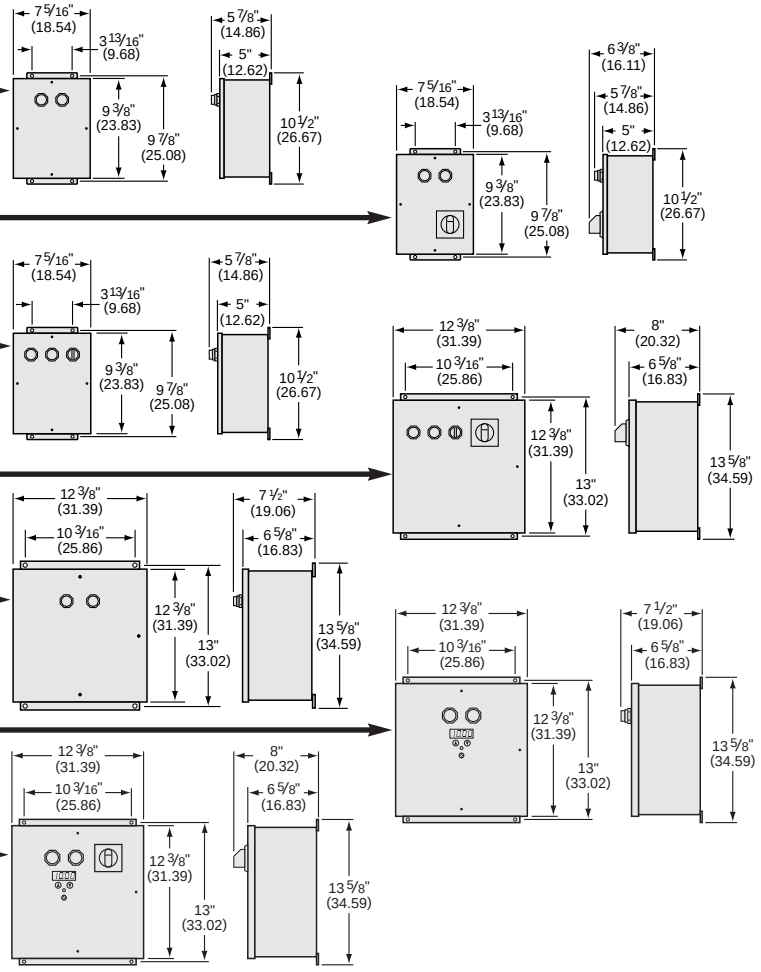


ITEM NUMBERS FOR ORDERING

CONTROL MODEL	VOLTS	PHASE	ITEM NO.
MSS	115	1	MSS4
	208-230	1	MSS5
	208-230	3	MSS7
	460	3	MSS9
MSS-LD	115	1	MSSLD4
	208-230	1	MSSLD5
	208-230	3	MSSLD7
	460	3	MSSLD9
MRSS	115	1	MRSS4
	208-230	1	MRSS5
	208-230	3	MRSS7
	460	3	MRSS9
MRSS-LD	115	1	MRSSLD4
	208-230	1	MRSSLD5
	208-230	3	MRSSLD7
	460	3	MRSSLD9
ARSS-2	115	1	ARSS24
	208-230	1	ARSS25
	208-230	3	ARSS27
	460	3	ARSS29
ARSS	115	1	ARSS4
	208-230	1	ARSS5
	208-230	3	ARSS7
	460	3	ARSS9
ARSS-LD	115	1	ARSSLD4
	208-230	1	ARSSLD5
	208-230	3	ARSSLD7
	460	3	ARSSLD9

◆ SPECIFY EXACT OPERATING VOLTAGE ◆

DIMENSIONS



NOTE: Dimensions in parenthesis are in centimeters

See individual Control Panel Specification sheets for complete Details and Dimensions.

(Specifications subject to change without notice)

Current specification details may be found online at www.salvajor.com

The Salvajor Company 4530 East 75th Terrace Kansas City, Missouri 64132-2081, USA
1-800-SALVAJOR (816) 363-1030 FAX: 1-800-832-9373
www.salvajor.com Email: sales@salvajor.com service@salvajor.com

Manufacturers of Commercial Food Waste Disposing Systems since 1944

Printed in USA
Form No. CCP (01-13)

Since 1953
Hotel & Restaurant Supply
Suppliers/Designers to the Food Service Industry

Submittal Sheet

09/13/2019

ITEM# 12 - HOT FOOD WELL (3 EA REQ'D)

Nemco 6055A

Countertop Warmer, wet operation, accepts a 12" x 20" full size pan or fractional size pans, adjustable thermostat, cycling indicator pilot light, stainless steel construction, 1200 watts, NEMA 5-15P, 120v/60/1ph, 10 amps, cETLus, NSF

ACCESSORIES

Mfr	Qty	Model	Spec
Nemco	3		1 year parts & labor warranty, standard

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1	120	60	1	Cord & Plug		5-15P	10.0	1.2			

NEMCO®
FOOD EQUIPMENT

Item No._____

Quantity_____

AIA File No._____

Model No.
6055A, 6055A-CW, 6055A-220, 6055A-43
Counter Top Warmers

6055A

6055A-43

Add side dishes and entrees to existing lines or create entirely new temporary buffet lines quickly and easily with NEMCO's full-size countertop warmers. You'll enjoy greater menu flexibility and the ability to respond efficiently to changing menu requirements. Plus the reliable adjustable thermostat helps to ensure that food held in serving lines is always within your food safety temperature guidelines. Unique heating system design provides even heat distribution to prevent "hot spots". This design provides exceptional heat transfer, even heat distribution, and lower preheat time. NEMCO's warmers also have lower surface temperatures and longer life components than our competitors. Heavy-duty stainless steel well.

Standard Features:

- Heavy duty stainless steel construction
- Adjustable thermostat 120°F to 212°F
- Heating system design allows for fast preheat and extended life of unit
- Accepts a 12"x20" full size pan or fractional sizes
- Adapter bars and plates available for additional sizes
- Cycling indicator pilot light
- Temperature indicator settings: High, Medium, Low
- cETLus and NSF listing
- *CE* listing on model 6055A-220

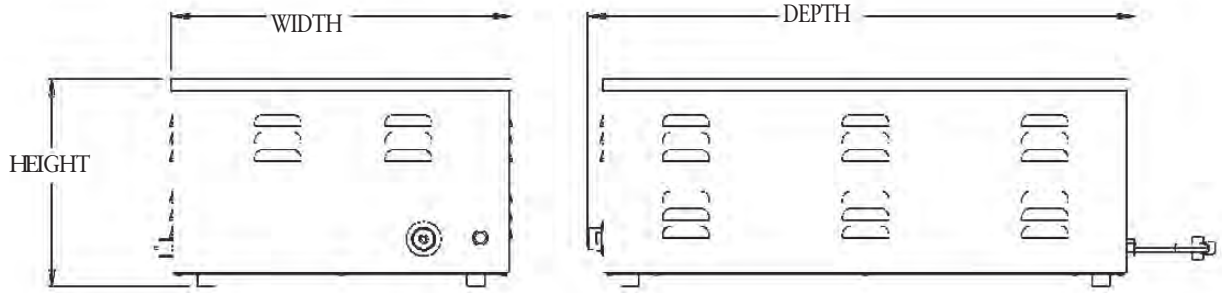
NEMCO Food Equipment, Ltd.
301 Meuse Argonne
P.O. Box 305
Hicksville, OH 43526
Phone (419) 542-7751
FAX (419) 542-6690
www.nemcofoodequip.com

Printed 7/14 Printed in U.S.A.

Model No.
6055A, 6055A-CW, 6055A-43, 6055A-220

AIA File No.

6055A



Specifications:

Model No.	Pre-heat time to 180°f	Width Inches/(cm)	Depth Inches/(cm)	Height Inches/(cm)	Voltage	Rated Wattage	Nominal Amps	Plug Configuration	Unit Weight lbs./(Kg)	Shipping Weight lbs./(Kg)
6055A	12 min.	14 5/8 (37.1)	23 1/2 (59.7)	9 (22.9)	120	1200	10	NEMA 5-15P	18 (8.2)	23 (10.4)
6055A-CW	10 min.	14 5/8 (37.1)	23 1/2 (59.7)	10 1/2 (26.7)	120	1500	12.5	NEMA 5-15P	19.1 (8.6)	23 (10.4)
6055A-220	12 min.	14 5/8 (37.1)	23 1/2 (59.7)	9 (22.9)	220	1200	5.5	CEE -7-7	19 1/2 (8.9)	24 (11)
6055A-43	14 min.	14 5/8 (37.1)	30 5/8 (77.8)	10 1/2 (26.7)	120	1500	12.5	NEMA 5-15P	28 (12.7)	34 (15.4)

Accessories for 6055A	Description
☐ 66092	Two-hole adaptor plates for one 7qt. & one 11qt. inset
☐ 66093	Two-hole adaptor plate for two 7qt. insets
☐ 66095	20" adaptor bar
☐ 66096	12" adaptor bar
☐ 66097	6" adaptor bar
☐ 67860	Three-hole adaptor plate for three 4qt. insets
Accessories for 6055A -43	
☐ 67763	Two-hole adaptor plates for two 11qt. insets
☐ 68591	Three-hole adaptor plate for three 7qt. insets
☐ 68592	Four-hole adaptor plate for four 4qt. insets

AUTOQUOTES

Typical Specifications

NEMCO countertop warmers shall be constructed with 300 series stainless steel wells and 400 series stainless steel cabinets. They shall have tubular heating elements attached to an aluminum heat dissipating plate. All models shall have an adjustable (up to 212° F) conduction thermostat and a pilot light that cycles with the operation of the heating element. 120V models shall have a cord and NEMA 5-15P plug while the 220V model shall have a cord and CEE 7-7 plug. Models 6055A, 6055A-CW, and 6055A-43 shall be cETLus and NSF listed. Model 6055A-220 shall be CE and NSF listed.

NEMCO FOOD EQUIPMENT
NEMCO Food Equipment, Ltd.
301 Meuse Argonne, P.O. Box 305
Hicksville, OH 43526
Phone (419) 542-7751
FAX (419) 542-6690
www.nemcofoodequip.com

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Submittal Sheet

09/13/2019

ITEM# 13 - WORK TABLE (1 EA REQ'D)

Advance Tabco VKS-306

Work Table, 72"W x 30"D, 14 gauge 304 stainless steel top with countertop non drip edge, 10" backsplash, adjustable stainless steel undershelf, stainless steel legs & adjustable bullet feet, NSF

ACCESSORIES

Mfr	Qty	Model	Spec
Advance Tabco	6	TA-3	Upgrade table understructure to stainless steel (per linear foot)
Advance Tabco	2	TA-32	Side Splash, 10" high (each)
Advance Tabco	6	TA-87	Enclose back of splash (per linear foot)
Advance Tabco	1	TA-76	Paint on sound deadening under top (supplements standard sound deadening under support channels) (each)
Advance Tabco	1	TA-93	Wall Clips, (for 5" & 10" splash only) (per table)
Advance Tabco	1	TA-23	Welded Set Up Table/Shell Crating (per table)
Advance Tabco	6	TA-9	Rear splash, 1-1/2" high, for undershelves, (per linear foot)

STAINLESS STEEL

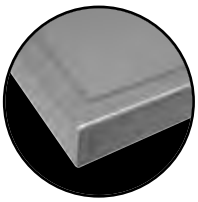
WORK TABLES

SPEC-LINE Series - 10" Backsplash - Undershelf Style

Item #: _____ ***Qty #:*** _____

Model #: _____

Project #: _____



No-Drip DIE FORMED EDGE offers the Ultimate in Design & Function.

Featuring as Standard:
"THE PROVEN"
ORIGINAL ADVANCE TABCO
Adjustable Undershelf with Die Cast Leg Clamp

FEATURES:

Top is furnished with a 2" x 1" square die embossed NO-DRIP countertop edge with a 1/2" return on 3 sides and a 10" splash of with a 2" return on the rear side.

24" wide tables supplied with TWO hat channels stud welded to reinforce and maintain a level working surface. 30" and 36" wide tables supplied with THREE hat channels.

Pre-engineered welded angle adapters insure ease of future drawer installation.

Aluminum die cast "leg-to-shelf" clamp secures shelf to leg eliminating unsightly nuts and bolts. Undershelf is adjustable.

CONSTRUCTION:

All TIG welded. Exposed weld areas polished to match adjacent surfaces.

Entire top mechanically polished to a satin finish. Countertop edge polished to a MIRROR finish.

Top is sound deadened.

Roll formed embossed galvanized hat channels are secured to top by means of structural adhesive and weld studs.

Gussets welded to support hat sections.

MATERIAL:

VKS-SERIES: Stainless Steel Legs & Undershelf

TOP: 14 gauge stainless steel type "304" series.
SHELF: 18 gauge stainless steel.
LEGS: 1 5/8" diameter tubular stainless steel type "304" series.
1" adjustable **stainless steel** bullet feet.
Stainless steel gussets.

VKG-SERIES: Galvanized Legs & Undershelf

TOP: 14 gauge stainless steel type "304" series.
SHELF: 18 gauge galvanized steel.
LEGS: 1 5/8" diameter tubular galvanized steel.
1" adjustable plastic bullet feet.
Galvanized steel gussets.

VKS-Series:
Stainless Steel Legs & Undershelf

L	24" Wide	30" Wide	36" Wide
30"	VKS-240	VKS-300	
24"	VKS-242	VKS-302	
36"	VKS-243	VKS-303	VKS-363
48"	VKS-244	VKS-304	VKS-364
60"	VKS-245	VKS-305	VKS-365
72"	VKS-246	VKS-306	VKS-366
84"	VKS-247	VKS-307	VKS-367
96"	VKS-248	VKS-308	VKS-368
108"	VKS-249	VKS-309	VKS-369
120"	VKS-2410	VKS-3010	VKS-3610
132"	VKS-2411	VKS-3011	VKS-3611
144"	VKS-2412	VKS-3012	VKS-3612

VKG-Series:
Galvanized Steel Legs & Undershelf

L	24" Wide	30" Wide	36" Wide
30"	VKG-240	VKG-300	
24"	VKG-242	VKG-302	
36"	VKG-243	VKG-303	VKG-363
48"	VKG-244	VKG-304	VKG-364
60"	VKG-245	VKG-305	VKG-365
72"	VKG-246	VKG-306	VKG-366
84"	VKG-247	VKG-307	VKG-367
96"	VKG-248	VKG-308	VKG-368
108"	VKG-249	VKG-309	VKG-369
120"	VKG-2410	VKG-3010	VKG-3610
132"	VKG-2411	VKG-3011	VKG-3611
144"	VKG-2412	VKG-3012	VKG-3612

Create Your Own Efficient Workstation with the Available Standard Accessories (Visit Section K)

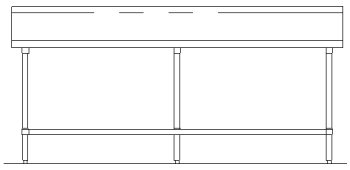
DETAILS and SPECIFICATIONS

ALL DIMENSIONS ARE TYPICAL TOL ± .500”

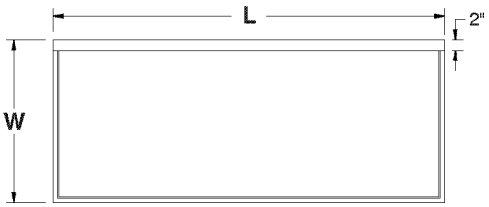
All Units Shipped Unassembled (KD) for Reduced Shipping Costs.

VKS & VKG Series
Undershelf Style
10” Backsplash

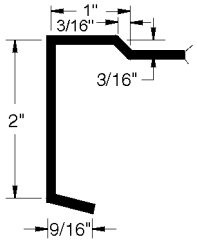
Finished size of undershelf = Length minus 5 3/4”
Width minus 5 3/4”

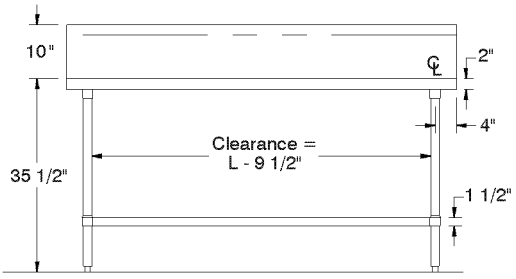


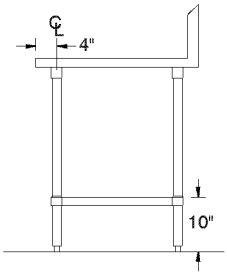
Units 8ft. and larger are furnished with six (6) legs



COUNTERTOP EDGE DETAIL







VKS-Series: Stainless Steel Legs & Undershelf

L	24” Wide	Wt.	30” Wide	Wt.	36” Wide	Wt.
30”	VKS-240	55 lbs.	VKS-300	70 lbs.		
24”	VKS-242	50 lbs.	VKS-302	56 lbs.		
36”	VKS-243	66 lbs.	VKS-303	77 lbs.	VKS-363	92 lbs.
48”	VKS-244	81 lbs.	VKS-304	92 lbs.	VKS-364	101 lbs.
60”	VKS-245	95 lbs.	VKS-305	111 lbs.	VKS-365	121 lbs.
72”	VKS-246	113 lbs.	VKS-306	129 lbs.	VKS-366	142 lbs.
84”	VKS-247	135 lbs.	VKS-307	153 lbs.	VKS-367	169 lbs.
96”	VKS-248	150 lbs.	VKS-308	171 lbs.	VKS-368	189 lbs.
108”	VKS-249	165 lbs.	VKS-309	289 lbs.	VKS-369	260 lbs.
120”	VKS-2410	268 lbs.	VKS-3010	294 lbs.	VKS-3610	315 lbs.
132”	VKS-2411	301 lbs.	VKS-3011	331 lbs.	VKS-3611	358 lbs.
144”	VKS-2412	316 lbs.	VKS-3012	346 lbs.	VKS-3612	373 lbs.

VKG-Series: Galvanized Steel Legs & Undershelf

L	24” Wide	Wt.	30” Wide	Wt.	36” Wide	Wt.
30”	VKG-240	55 lbs.	VKG-300	70 lbs.		
24”	VKG-242	50 lbs.	VKG-302	56 lbs.		
36”	VKG-243	66 lbs.	VKG-303	77 lbs.	VKG-363	92 lbs.
48”	VKG-244	81 lbs.	VKG-304	92 lbs.	VKG-364	101 lbs.
60”	VKG-245	95 lbs.	VKG-305	111 lbs.	VKG-365	121 lbs.
72”	VKG-246	113 lbs.	VKG-306	129 lbs.	VKG-366	142 lbs.
84”	VKG-247	135 lbs.	VKG-307	153 lbs.	VKG-367	169 lbs.
96”	VKG-248	150 lbs.	VKG-308	171 lbs.	VKG-368	189 lbs.
108”	VKG-249	165 lbs.	VKG-309	195 lbs.	VKG-369	260 lbs.
120”	VKG-2410	268 lbs.	VKG-3010	294 lbs.	VKG-3610	315 lbs.
132”	VKG-2411	301 lbs.	VKG-3011	331 lbs.	VKG-3611	358 lbs.
144”	VKG-2412	316 lbs.	VKG-3012	346 lbs.	VKG-3612	373 lbs.

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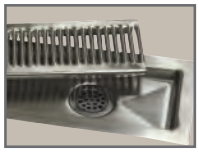
TABLE MODIFICATIONS & ACCESSORIES

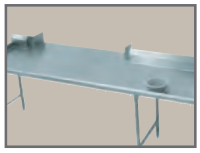
TOP MODIFICATIONS

TA-56
5" NSF Partition



TA-523
Drop-In Urn Trough

CDR-5
Condiment Holder



TA-84
Pass-Thru

TA-108
Grommet For Cords

QTY.		
____	CDR-5	Condiment Holder (Accommodates 5 Bins)
____	TA-1	Notch Backsplash For Roll Up Door w/ Pass-Thru
____	TA-3	Stainless Steel Hat Channel & Gusset Upgrade
____	TA-7	10" Partial Splash
____	TA-8	Column Notch in Rear Splash (Includes Splash)
____	TA-10	5" Partial Splash
____	TA-12	Countertop Edge
____	TA-22	Square Edge Table
____	TA-28	Cut-Out For Cold Well. Incudes Louvered Doors
____	TA-29	16 Ga. 304 Rear Splash Capping Strip w/Adhesive Backing
____	TA-30	1-1/2" Side Splash
____	TA-30A	1-1/2" Turn Up For Table Tops
____	TA-31	5" Side Splash
____	TA-32	10" Side Splash
____	TA-34	Top Cut-Out
____	TA-34A	Top Cut-Out for Undermount Well
____	TA-35	Splash Cut-Out
____	TA-41	Poly-Vance 5/8" Cutting Board
____	TA-56	5" NSF Partition
____	TA-56A	18" NSF Partition
____	TA-57	Prepare Welded Field Joint (Welded in field by others)
____	TA-57A	Bolted Field Joint (Bolted in field by others)
____	TA-57B	Hairline Field Joint
____	TA-58	Stepdown to 24" Working Height
____	TA-64	Urn Trough (Factory installation only)
____	TA-75	Mitered Edge
____	TA-76	Paint on Sound Deadening
____	TA-79	Flour Trough (Factory installation only)
____	TA-82	Scrap Chute (6" dia. opening)
____	TA-84	Simple Pass-Thru
____	TA-87	Enclosed Rear Splash
____	TA-91	Poly Retaining Clips Includes TA-22 (S/S top table)

QTY.		
____	TA-93	Wall Brackets (Includes 2. For 5" & 10 1/2" splash only)
____	TA-96A	Can Opener Provision for Openers with Bolt-on Base (Customer to provide location)
____	TA-96B	Can Opener Surface Mount Provision with 4" S/S Tube for Openers w/o Base (Customer to provide location)
____	TA-96C	Can Opener Spacer Plate Provision for Use on Tables With Countertop Edge & Can Opener Base (Customer to provide location)
____	TA-100	Bull Nose All Sides of Worktable
____	TA-101	Rear Tray Lock
____	TA-106	Mirror HI-LITE Edge
____	TA-107	Vacuum Breaker Holes on Tables (Includes Backsplash with 2" Return)
____	TA-108	2" Hole with Grommet for Appliance Cord
____	TA-112	Hubble Outlet
____	TA-113	Notch Top for Buyout Unit
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-366A	Heavy duty Understructure Top
____	TA-502	Install Advnace Tabco Hot Food Unit In Work Table Top (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)
____	TA-521	Drop-In urn Trough 1'
____	TA-522	Drop-In urn Trough 2'
____	TA-523	Drop-In urn Trough 3'
____	TA-524	Drop-In urn Trough 4'
____	TA-525	Drop-In urn Trough 5'
____	TA-526	Drop-In urn Trough 6'
____	TA-527	Drop-In urn Trough 7'
____	TA-528	Drop-In urn Trough 8'
____	TA-529	Drop-In urn Trough 9'
____	TA-550	Install Customer Supplied Buyout Items (Does not include wiring. Consult factory)
____	TA-551	Installation of Hot Food Wells. (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)

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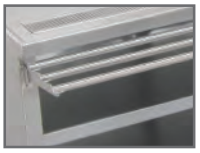
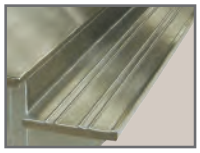
TABLE MODIFICATIONS & ACCESSORIES

BASE MODIFICATIONS

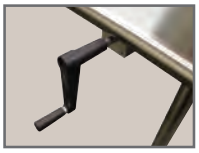
TA-39
Louvered Hinged Doors



TA-73
Drop-Down Tray Slide



TA-74
Solid Tray Slide



TA-900
ADJ. Height Tables

TA-116
Adj. Mid-Shelf

QTY.		
____	TA-4	Removable Access Panel
____	TA-4A	Luvered Panel
____	TA-5	Curb Mounting Provision
____	TA-15	Provision for Built In Drawer Warmer
____	TA-23	Welded Set-Up Table/Crating
____	TA-24	Shell Crating
____	TA-27	Control Panel (Must add TA-34A or TA-34B)
____	TA-36A	Sliding/Hinge Stainless Steel Doors
____	TA-36B	1/2 Height Stainless Steel Hinge Doors
____	TA-36C	Hinged door with Trash Flap
____	TA-37	Stainless Enclosed Base
____	TA-39	24" Louvered Hinged Doors
____	TA-40	Remove Undershelf in Cabinet Base For Slide in Buyout
____	TA-42	Interior Partition (2.5"x30")
____	TA-43	Filler Panel (3"x30" with Flanged Feet)
____	TA-44	K.D. Aluminum Pan Rack Slides (6 slides. Table min. lgth. 30")
____	TA-45	K.D. Aluminum Glass Rack Slides (3 slides. Table min. lgth. 3 feet)
____	TA-46	Door Locks

QTY.		
____	TA-48	12"x12" Cut-Out in Back Panel/Undershelf for Plumbing
____	TA-54	Removable Kick Plate
____	TA-55	Remove Back Panel (on Enclosed Base)
____	TA-63	Removable Shelving (In addition to standard shelf & table width)
____	TA-70	S/S Tubular Tray Divider (12" sections)
____	TA-73	Tubular Tray Slide w/Dropdown (Stationary Tray Slide Available. Factory installation only)
____	TA-74	Solid Tray Slide
____	TA-92	12" Apron (in front of sink)
____	TA-92A	17" Stainless Steel Apron to Cover Sink Bowls and Support Lever Drain Handles
____	TA-116	Adjustable Enclosed Base Cabinet Mid Shelf- Add to Price of Enclosed Base Table with Fixed Mid Shelf **(M)**. Shelves Over 36" In Length Require Multiple Sections With Center Partition. For Partial Shelves Add To Price Of Shelf.
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-205	Connect Cafeteria Items (Per Joint Between 2 Tables. Requires Casters)
____	TA-900	Upgrade Table To be Height Adjustable In Field (Up to 6" Only. Unit Ships Set Up)

ELECTRICAL & DATA PORT OUTLETS

TA-62
Duplex Outlet

TA-62A
GFI Duplex Outlet

TA-62D
GFI Doghouse Outlet

TA-112
Hubble Outlet

QTY.		
____	TA-62	Standard Duplex Electrical Outlet & Cover Plate (Under Flat Top). NEMA 5-15R
____	TA-62A	GFI Duplex Outlet & Cover Plate in a VKS Splash. NEMA 5-20R
____	TA-62C	GFI Duplex Outlet & Cover Plate Below Shelf Top. NEMA 5-20R

QTY.		
____	TA-62D	GFI Duplex Outlet & Cover Plate in a Doghouse. NEMA 5-20R
____	TA-62E	Upgrade Outlet to a NEMA 6-20R or Equiv.
____	TA-112	Hubble Outlet
____	TA-622	CAT-5 Data Port Outlet. Cable Not Included

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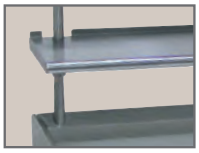
REF-K

TABLE MODIFICATIONS & ACCESSORIES

OVERSHELF & POT RACK MODIFICATIONS

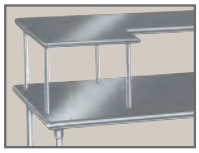


TA-9A
1"Turn Up

TA-22A
Square Edge

TA-71
Heat Lamp Mounting Provision

TA-100A
Bull Nose



TA-102
24" x 24" Extension

QTY.		
____	TA-9A	Partial 1" Turn-Up for all Table Mt. Shelves
____	TA-22A	Square Edge on Overshelf
____	TA-26-10	Welded Wall Shelf Brackets for 10" Wide Shelf
____	TA-26-12	Welded Wall Shelf Brackets for 12" Wide Shelf
____	TA-26-15	Welded Wall Shelf Brackets for 15" Wide Shelf
____	TA-26-18	Welded Wall Shelf Brackets for 18" Wide Shelf
____	TA-47	Shelf Mounting Bracket for Existing Table
____	TA-49	Wall Shelf 2" Offset
____	TA-60	Special Sizing Charge for Shelves (Must Order Larger Unit to be Cut Down to Smaller Size)
____	TA-71	Heat Lamp Mounting Provision
____	TA-71A	Heat Lamp Remote Control Bracket
____	TA-78	Additional Lin. Ft. Past 12' For Table Mt. Shelf (For ODS, OTS, TS, DS & WS Shelving only)
____	TA-77	Check Minder Shelf Provision (Factory install only)
____	TA-83	Spice Bins

QTY.		
____	TA-84A	Knife Rack for Rolled Rim Tables
____	TA-84B	Knife Rack for Poly Top Tables
____	TA-84C	Knife Rack for Square Edge Tables
____	TA-86	Stainless Steel Pot Hooks
____	TA-89	Double Sided Plated Pot Hooks (Package of 4)
____	TA-89A	Single Sided Plated Pot Hooks (Package of 4)
____	TA-98	Stainless Steel Flat Bar in lieu of Chain
____	TA-99	16 Ga. S/S 304 Upgrade for Wall & Over Shelves
____	TA-100A	Bull Nose All Sides of Shelf
____	TA-100R	Bull Nose Three Sides of Shelf w/ Rear Turn Up
____	TA-102	24" x 24" Extension for Microwave or Computer Shelf (Add to OTS and ODS Shelves. See page 65)
____	TA-103	24" Wide PT Shelf (36" Min Length. Mid mount only. PT Series Shelf, See Pg. 73. Add to 18" Wide Shelf)
____	TA-104	Additional Length Over 12' (Add to 18" Shelf. (PA & CU Shelving Only. Max. Length is 14' as Single Piece)

UNDERSHELF MODIFICATIONS

QTY.		
____	TA-9	1-1/2" Turn-Up for Undershelves
____	TA-17	Upgrade Undershelf to a Marine Edge (Must add TA-23)
____	TA-48	12"x12" Cut-Out in Back Panel or Undershelf for Plumbing

QTY.		
____	TA-94	Upgrade 16 Ga. 304 S/S Undershelf
____	TA-94A	Upgrade 14 Ga. 304 S/S Undershelf
____	TA-366	Reinforced Understructure For Undershelves

SIZE MODIFICATIONS

QTY.		
____	TA-33	Special Working Height
____	TA-59	36" Wide Equipment Stand
____	TA-6	Extra Length for Standard Tables Over 12' (Tables Over 14' Require Field Joint TA-57)
____	TA-61	Special Sizing Charge (Larger Unit Cut Down to Smaller Size)
____	TA-61A	Special Modification Charge

QTY.		
____	TA-65	Enclosed Base Units Over 12' (Open Base Table)
____	TA-66	Enclosed Base Units Over 12' (Sliding Door Units)
____	TA-67	Enclosed Base Units Over 12' (Hinged Door Units)
____	TA-105	Modify Enclosed Base Table w/ Drawers to 24" Width
____	TA-110	Modify Enclosed Base Table w/ Drawers to 36" Width

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TABLE MODIFICATIONS & ACCESSORIES

LEG MODIFICATIONS

QTY.		
____	TA-16	1 Galvanized Leg with Plastic Bullet Foot (34 1/2" Total Length)
____	TA-16-4	4 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-16-6	6 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-19	Stainless Steel Flanged Bullet Foot For Work Table
____	TA-19L	S/S Bolt-on Leg w/ Flanged Foot For Enclosed Base Table
____	TA-20	1 Stainless Steel Leg with S/S Bullet Foot (34 1/2" Total Length)
____	TA-20-4	4 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)

QTY.		
____	TA-20-6	6 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)
____	TA-20L	Replacement Bolt-on Leg For Enclosed Base Table
____	TA-21	Stainless Steel Bullet Foot
____	TA-68	Relocate Rear Cross Rail To Center (for Open Base Tables Only)
____	TA-72	Leg to Wall Brace (Set per table)
____	TA-95	Upgrade 16 Ga. 304 S/S Legs Only

WORK TABLE CASTERS

Standard Casters

Maintains the Standard 35-1/2" Working Height

200 lbs. Load Capacity Per Caster

When Used w/ Stainless Steel Legs

TA-25S-4 **Set of 4** (Two with Brakes)
TA-25S-6 **Set of 6** (Two with Brakes)

When Used w/ Galvanized Legs

TA-25G-4 **Set of 4** (Two with Brakes)
TA-25G-6 **Set of 6** (Two with Brakes)

Replacement Casters

For Work Tables

TA-25 **Set of 4** (Two with Brakes)

TA-25A **Set of 6** (Two with Brakes)

200 lbs. Load Capacity Per Caster

Optional Standard Caster Upgrades:

TA-25B Set For brakes on all wheels (Standard Casters) - Add price to the following models: TA-25, TA-25A, TA-25S-4, TA-25S-6, TA-25G-4, TA-25G-6

TA-25C Per Caster Upgrade Standard Caster with Heavy Duty Urethane Wheels (Per Caster)

EQUIPMENT STAND CASTERS

Standard Casters

5" Urethane Wheels.
Maintains the Standard 24" Working Height

200 lbs. Load Capacity Per Caster

w/ Stainless Steel Legs
TA-25ES **Set of 4** (Two with Brakes)

w/ Galvanized Legs
TA-25EG **Set of 4** (Two with Brakes)

HEAVY DUTY Casters

5" Urethane Wheels

400 lbs. Load Capacity Per Caster

TA-255 Super Heavy Duty Set of 4 (Two with Brakes)

TA-256 Super Heavy Duty Set of 6 (Two with Brakes)

Enclosed Base Table Casters

Easy Bolt-On Style

TA-255P **Set of 4** (Two with Brakes)
TA-255AP **Set of 6** (Two with Brakes)

300 lbs. Load Capacity Per Caster

For brakes on all wheels (Enclosed Base Casters) - Add price to models: TA-255P or TA-255AP

TA-255PB

Optional Equipment Stand Caster Upgrade:

TA-255B For brakes on all wheels (Equipment Casters) - Add price to any of the following models: TA-255, TA-256, TA-25ES, TA-25EG

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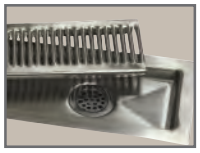
TABLE MODIFICATIONS & ACCESSORIES

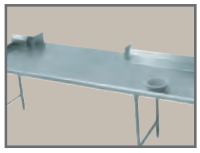
TOP MODIFICATIONS

TA-56
5" NSF Partition



TA-523
Drop-In Urn Trough

CDR-5
Condiment Holder



TA-84
Pass-Thru

TA-108
Grommet For Cords

QTY.		
____	CDR-5	Condiment Holder (Accommodates 5 Bins)
____	TA-1	Notch Backsplash For Roll Up Door w/ Pass-Thru
____	TA-3	Stainless Steel Hat Channel & Gusset Upgrade
____	TA-7	10" Partial Splash
____	TA-8	Column Notch in Rear Splash (Includes Splash)
____	TA-10	5" Partial Splash
____	TA-12	Countertop Edge
____	TA-22	Square Edge Table
____	TA-28	Cut-Out For Cold Well. Incudes Louvered Doors
____	TA-29	16 Ga. 304 Rear Splash Capping Strip w/Adhesive Backing
____	TA-30	1-1/2" Side Splash
____	TA-30A	1-1/2" Turn Up For Table Tops
____	TA-31	5" Side Splash
____	TA-32	10" Side Splash
____	TA-34	Top Cut-Out
____	TA-34A	Top Cut-Out for Undermount Well
____	TA-35	Splash Cut-Out
____	TA-41	Poly-Vance 5/8" Cutting Board
____	TA-56	5" NSF Partition
____	TA-56A	18" NSF Partition
____	TA-57	Prepare Welded Field Joint (Welded in field by others)
____	TA-57A	Bolted Field Joint (Bolted in field by others)
____	TA-57B	Hairline Field Joint
____	TA-58	Stepdown to 24" Working Height
____	TA-64	Urn Trough (Factory installation only)
____	TA-75	Mitered Edge
____	TA-76	Paint on Sound Deadening
____	TA-79	Flour Trough (Factory installation only)
____	TA-82	Scrap Chute (6" dia. opening)
____	TA-84	Simple Pass-Thru
____	TA-87	Enclosed Rear Splash
____	TA-91	Poly Retaining Clips Includes TA-22 (S/S top table)

QTY.		
____	TA-93	Wall Brackets (Includes 2. For 5" & 10 1/2" splash only)
____	TA-96A	Can Opener Provision for Openers with Bolt-on Base (Customer to provide location)
____	TA-96B	Can Opener Surface Mount Provision with 4" S/S Tube for Openers w/o Base (Customer to provide location)
____	TA-96C	Can Opener Spacer Plate Provision for Use on Tables With Countertop Edge & Can Opener Base (Customer to provide location)
____	TA-100	Bull Nose All Sides of Worktable
____	TA-101	Rear Tray Lock
____	TA-106	Mirror HI-LITE Edge
____	TA-107	Vacuum Breaker Holes on Tables (Includes Backsplash with 2" Return)
____	TA-108	2" Hole with Grommet for Appliance Cord
____	TA-112	Hubble Outlet
____	TA-113	Notch Top for Buyout Unit
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-366A	Heavy duty Understructure Top
____	TA-502	Install Advnace Tabco Hot Food Unit In Work Table Top (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)
____	TA-521	Drop-In urn Trough 1'
____	TA-522	Drop-In urn Trough 2'
____	TA-523	Drop-In urn Trough 3'
____	TA-524	Drop-In urn Trough 4'
____	TA-525	Drop-In urn Trough 5'
____	TA-526	Drop-In urn Trough 6'
____	TA-527	Drop-In urn Trough 7'
____	TA-528	Drop-In urn Trough 8'
____	TA-529	Drop-In urn Trough 9'
____	TA-550	Install Customer Supplied Buyout Items (Does not include wiring. Consult factory)
____	TA-551	Installation of Hot Food Wells. (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)

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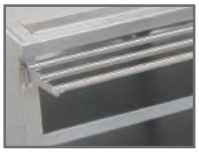
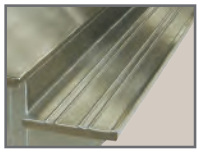
TABLE MODIFICATIONS & ACCESSORIES

BASE MODIFICATIONS

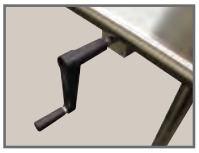
TA-39
Louvered Hinged Doors



TA-73
Drop-Down Tray Slide



TA-74
Solid Tray Slide



TA-900
ADJ. Height Tables

TA-116
Adj. Mid-Shelf

QTY.		
____	TA-4	Removable Access Panel
____	TA-4A	Luvered Panel
____	TA-5	Curb Mounting Provision
____	TA-15	Provision for Built In Drawer Warmer
____	TA-23	Welded Set-Up Table/Crating
____	TA-24	Shell Crating
____	TA-27	Control Panel (Must add TA-34A or TA-34B)
____	TA-36A	Sliding/Hinge Stainless Steel Doors
____	TA-36B	1/2 Height Stainless Steel Hinge Doors
____	TA-36C	Hinged door with Trash Flap
____	TA-37	Stainless Enclosed Base
____	TA-39	24" Louvered Hinged Doors
____	TA-40	Remove Undershelf in Cabinet Base For Slide in Buyout
____	TA-42	Interior Partition (2.5"x30")
____	TA-43	Filler Panel (3"x30" with Flanged Feet)
____	TA-44	K.D. Aluminum Pan Rack Slides (6 slides. Table min. lgth. 30")
____	TA-45	K.D. Aluminum Glass Rack Slides (3 slides. Table min. lgth. 3 feet)
____	TA-46	Door Locks

QTY.		
____	TA-48	12"x12" Cut-Out in Back Panel/Undershelf for Plumbing
____	TA-54	Removable Kick Plate
____	TA-55	Remove Back Panel (on Enclosed Base)
____	TA-63	Removable Shelving (In addition to standard shelf & table width)
____	TA-70	S/S Tubular Tray Divider (12" sections)
____	TA-73	Tubular Tray Slide w/Dropdown (Stationary Tray Slide Available. Factory installation only)
____	TA-74	Solid Tray Slide
____	TA-92	12" Apron (in front of sink)
____	TA-92A	17" Stainless Steel Apron to Cover Sink Bowls and Support Lever Drain Handles
____	TA-116	Adjustable Enclosed Base Cabinet Mid Shelf- Add to Price of Enclosed Base Table with Fixed Mid Shelf **(M)**. Shelves Over 36" In Length Require Multiple Sections With Center Partition. For Partial Shelves Add To Price Of Shelf.
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-205	Connect Cafeteria Items (Per Joint Between 2 Tables. Requires Casters)
____	TA-900	Upgrade Table To be Height Adjustable In Field (Up to 6" Only. Unit Ships Set Up)

ELECTRICAL & DATA PORT OUTLETS

TA-62
Duplex Outlet

TA-62A
GFI Duplex Outlet

TA-62D
GFI Doghouse Outlet

TA-112
Hubble Outlet

QTY.		
____	TA-62	Standard Duplex Electrical Outlet & Cover Plate (Under Flat Top). NEMA 5-15R
____	TA-62A	GFI Duplex Outlet & Cover Plate in a VKS Splash. NEMA 5-20R
____	TA-62C	GFI Duplex Outlet & Cover Plate Below Shelf Top. NEMA 5-20R

QTY.		
____	TA-62D	GFI Duplex Outlet & Cover Plate in a Doghouse. NEMA 5-20R
____	TA-62E	Upgrade Outlet to a NEMA 6-20R or Equiv.
____	TA-112	Hubble Outlet
____	TA-622	CAT-5 Data Port Outlet. Cable Not Included

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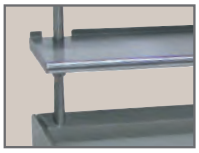
OVERSHELF & POT RACK MODIFICATIONS

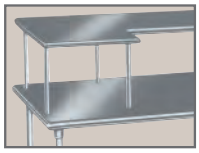


TA-9A
1"Turn Up

TA-22A
Square Edge

TA-71
Heat Lamp Mounting Provision

TA-100A
Bull Nose



TA-102
24" x 24" Extension

QTY.		
____	TA-9A	Partial 1" Turn-Up for all Table Mt. Shelves
____	TA-22A	Square Edge on Overshelf
____	TA-26-10	Welded Wall Shelf Brackets for 10" Wide Shelf
____	TA-26-12	Welded Wall Shelf Brackets for 12" Wide Shelf
____	TA-26-15	Welded Wall Shelf Brackets for 15" Wide Shelf
____	TA-26-18	Welded Wall Shelf Brackets for 18" Wide Shelf
____	TA-47	Shelf Mounting Bracket for Existing Table
____	TA-49	Wall Shelf 2" Offset
____	TA-60	Special Sizing Charge for Shelves (Must Order Larger Unit to be Cut Down to Smaller Size)
____	TA-71	Heat Lamp Mounting Provision
____	TA-71A	Heat Lamp Remote Control Bracket
____	TA-78	Additional Lin. Ft. Past 12' For Table Mt. Shelf (For ODS, OTS, TS, DS & WS Shelving only)
____	TA-77	Check Minder Shelf Provision (Factory install only)
____	TA-83	Spice Bins

QTY.		
____	TA-84A	Knife Rack for Rolled Rim Tables
____	TA-84B	Knife Rack for Poly Top Tables
____	TA-84C	Knife Rack for Square Edge Tables
____	TA-86	Stainless Steel Pot Hooks
____	TA-89	Double Sided Plated Pot Hooks (Package of 4)
____	TA-89A	Single Sided Plated Pot Hooks (Package of 4)
____	TA-98	Stainless Steel Flat Bar in lieu of Chain
____	TA-99	16 Ga. S/S 304 Upgrade for Wall & Over Shelves
____	TA-100A	Bull Nose All Sides of Shelf
____	TA-100R	Bull Nose Three Sides of Shelf w/ Rear Turn Up
____	TA-102	24" x 24" Extension for Microwave or Computer Shelf (Add to OTS and ODS Shelves. See page 65)
____	TA-103	24" Wide PT Shelf (36" Min Length. Mid mount only. PT Series Shelf, See Pg. 73. Add to 18" Wide Shelf)
____	TA-104	Additional Length Over 12' (Add to 18" Shelf. (PA & CU Shelving Only. Max. Length is 14' as Single Piece)

UNDERSHELF MODIFICATIONS

QTY.		
____	TA-9	1-1/2" Turn-Up for Undershelves
____	TA-17	Upgrade Undershelf to a Marine Edge (Must add TA-23)
____	TA-48	12"x12" Cut-Out in Back Panel or Undershelf for Plumbing

QTY.		
____	TA-94	Upgrade 16 Ga. 304 S/S Undershelf
____	TA-94A	Upgrade 14 Ga. 304 S/S Undershelf
____	TA-366	Reinforced Understructure For Undershelves

SIZE MODIFICATIONS

QTY.		
____	TA-33	Special Working Height
____	TA-59	36" Wide Equipment Stand
____	TA-6	Extra Length for Standard Tables Over 12' (Tables Over 14' Require Field Joint TA-57)
____	TA-61	Special Sizing Charge (Larger Unit Cut Down to Smaller Size)
____	TA-61A	Special Modification Charge

QTY.		
____	TA-65	Enclosed Base Units Over 12' (Open Base Table)
____	TA-66	Enclosed Base Units Over 12' (Sliding Door Units)
____	TA-67	Enclosed Base Units Over 12' (Hinged Door Units)
____	TA-105	Modify Enclosed Base Table w/ Drawers to 24" Width
____	TA-110	Modify Enclosed Base Table w/ Drawers to 36" Width

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TABLE MODIFICATIONS & ACCESSORIES

LEG MODIFICATIONS

QTY.		
____	TA-16	1 Galvanized Leg with Plastic Bullet Foot (34 1/2" Total Length)
____	TA-16-4	4 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-16-6	6 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-19	Stainless Steel Flanged Bullet Foot For Work Table
____	TA-19L	S/S Bolt-on Leg w/ Flanged Foot For Enclosed Base Table
____	TA-20	1 Stainless Steel Leg with S/S Bullet Foot (34 1/2" Total Length)
____	TA-20-4	4 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)

QTY.		
____	TA-20-6	6 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)
____	TA-20L	Replacement Bolt-on Leg For Enclosed Base Table
____	TA-21	Stainless Steel Bullet Foot
____	TA-68	Relocate Rear Cross Rail To Center (for Open Base Tables Only)
____	TA-72	Leg to Wall Brace (Set per table)
____	TA-95	Upgrade 16 Ga. 304 S/S Legs Only

WORK TABLE CASTERS

Standard Casters

Maintains the Standard 35-1/2" Working Height

200 lbs. Load Capacity Per Caster

When Used w/ Stainless Steel Legs

TA-25S-4 **Set of 4** (Two with Brakes)
TA-25S-6 **Set of 6** (Two with Brakes)

When Used w/ Galvanized Legs

TA-25G-4 **Set of 4** (Two with Brakes)
TA-25G-6 **Set of 6** (Two with Brakes)

Replacement Casters

For Work Tables

TA-25 **Set of 4** (Two with Brakes)

TA-25A **Set of 6** (Two with Brakes)

200 lbs. Load Capacity Per Caster

Optional Standard Caster Upgrades:

TA-25B Set For brakes on all wheels (Standard Casters) - Add price to the following models: TA-25, TA-25A, TA-25S-4, TA-25S-6, TA-25G-4, TA-25G-6

TA-25C Per Caster Upgrade Standard Caster with Heavy Duty Urethane Wheels (Per Caster)

EQUIPMENT STAND CASTERS

Standard Casters

5" Urethane Wheels.
Maintains the Standard 24" Working Height

200 lbs. Load Capacity Per Caster

w/ Stainless Steel Legs
TA-25ES **Set of 4** (Two with Brakes)

w/ Galvanized Legs
TA-25EG **Set of 4** (Two with Brakes)

HEAVY DUTY Casters

5" Urethane Wheels

400 lbs. Load Capacity Per Caster

TA-255 Super Heavy Duty Set of 4 (Two with Brakes)

TA-256 Super Heavy Duty Set of 6 (Two with Brakes)

Enclosed Base Table Casters

Easy Bolt-On Style

TA-255P **Set of 4** (Two with Brakes)
TA-255AP **Set of 6** (Two with Brakes)

300 lbs. Load Capacity Per Caster

For brakes on all wheels (Enclosed Base Casters) - Add price to models: TA-255P or TA-255AP

TA-255PB

Optional Equipment Stand Caster Upgrade:

TA-255B For brakes on all wheels (Equipment Casters) - Add price to any of the following models: TA-255, TA-256, TA-25ES, TA-25EG

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ADVANCE TABCO is constantly engaged in a program of improving our products. Therefore, we reserve the right to change specifications without prior notice.

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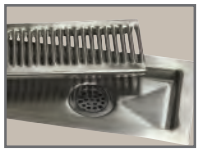
TABLE MODIFICATIONS & ACCESSORIES

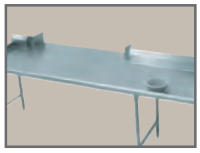
TOP MODIFICATIONS

TA-56
5" NSF Partition



TA-523
Drop-In Urn Trough

CDR-5
Condiment Holder



TA-84
Pass-Thru

TA-108
Grommet For Cords

QTY.		
____	CDR-5	Condiment Holder (Accommodates 5 Bins)
____	TA-1	Notch Backsplash For Roll Up Door w/ Pass-Thru
____	TA-3	Stainless Steel Hat Channel & Gusset Upgrade
____	TA-7	10" Partial Splash
____	TA-8	Column Notch in Rear Splash (Includes Splash)
____	TA-10	5" Partial Splash
____	TA-12	Countertop Edge
____	TA-22	Square Edge Table
____	TA-28	Cut-Out For Cold Well. Incudes Louvered Doors
____	TA-29	16 Ga. 304 Rear Splash Capping Strip w/Adhesive Backing
____	TA-30	1-1/2" Side Splash
____	TA-30A	1-1/2" Turn Up For Table Tops
____	TA-31	5" Side Splash
____	TA-32	10" Side Splash
____	TA-34	Top Cut-Out
____	TA-34A	Top Cut-Out for Undermount Well
____	TA-35	Splash Cut-Out
____	TA-41	Poly-Vance 5/8" Cutting Board
____	TA-56	5" NSF Partition
____	TA-56A	18" NSF Partition
____	TA-57	Prepare Welded Field Joint (Welded in field by others)
____	TA-57A	Bolted Field Joint (Bolted in field by others)
____	TA-57B	Hairline Field Joint
____	TA-58	Stepdown to 24" Working Height
____	TA-64	Urn Trough (Factory installation only)
____	TA-75	Mitered Edge
____	TA-76	Paint on Sound Deadening
____	TA-79	Flour Trough (Factory installation only)
____	TA-82	Scrap Chute (6" dia. opening)
____	TA-84	Simple Pass-Thru
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QTY.		
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____	TA-96C	Can Opener Spacer Plate Provision for Use on Tables With Countertop Edge & Can Opener Base (Customer to provide location)
____	TA-100	Bull Nose All Sides of Worktable
____	TA-101	Rear Tray Lock
____	TA-106	Mirror HI-LITE Edge
____	TA-107	Vacuum Breaker Holes on Tables (Includes Backsplash with 2" Return)
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____	TA-502	Install Advnace Tabco Hot Food Unit In Work Table Top (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)
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____	TA-526	Drop-In urn Trough 6'
____	TA-527	Drop-In urn Trough 7'
____	TA-528	Drop-In urn Trough 8'
____	TA-529	Drop-In urn Trough 9'
____	TA-550	Install Customer Supplied Buyout Items (Does not include wiring. Consult factory)
____	TA-551	Installation of Hot Food Wells. (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)

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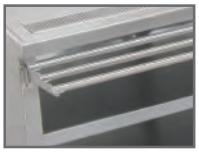
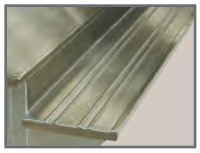
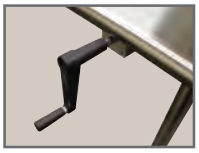
Louvered Hinged Doors



TA-73
Drop-Down Tray Slide



TA-74
Solid Tray Slide



TA-900
ADJ. Height Tables

TA-116
Adj. Mid-Shelf

QTY.		
____	TA-4	Removable Access Panel
____	TA-4A	Luvered Panel
____	TA-5	Curb Mounting Provision
____	TA-15	Provision for Built In Drawer Warmer
____	TA-23	Welded Set-Up Table/Crating
____	TA-24	Shell Crating
____	TA-27	Control Panel (Must add TA-34A or TA-34B)
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____	TA-36B	1/2 Height Stainless Steel Hinge Doors
____	TA-36C	Hinged door with Trash Flap
____	TA-37	Stainless Enclosed Base
____	TA-39	24" Louvered Hinged Doors
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____	TA-43	Filler Panel (3"x30" with Flanged Feet)
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____	TA-45	K.D. Aluminum Glass Rack Slides (3 slides. Table min. lgth. 3 feet)
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QTY.		
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____	TA-54	Removable Kick Plate
____	TA-55	Remove Back Panel (on Enclosed Base)
____	TA-63	Removable Shelving (In addition to standard shelf & table width)
____	TA-70	S/S Tubular Tray Divider (12" sections)
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____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-205	Connect Cafeteria Items (Per Joint Between 2 Tables. Requires Casters)
____	TA-900	Upgrade Table To be Height Adjustable In Field (Up to 6" Only. Unit Ships Set Up)

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Duplex Outlet

TA-62A
GFI Duplex Outlet

TA-62D
GFI Doghouse Outlet

TA-112
Hubble Outlet

QTY.		
____	TA-62	Standard Duplex Electrical Outlet & Cover Plate (Under Flat Top). NEMA 5-15R
____	TA-62A	GFI Duplex Outlet & Cover Plate in a VKS Splash. NEMA 5-20R
____	TA-62C	GFI Duplex Outlet & Cover Plate Below Shelf Top. NEMA 5-20R

QTY.		
____	TA-62D	GFI Duplex Outlet & Cover Plate in a Doghouse. NEMA 5-20R
____	TA-62E	Upgrade Outlet to a NEMA 6-20R or Equiv.
____	TA-112	Hubble Outlet
____	TA-622	CAT-5 Data Port Outlet. Cable Not Included

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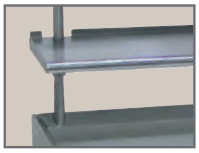
TABLE MODIFICATIONS & ACCESSORIES

OVERSHELF & POT RACK MODIFICATIONS

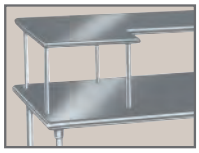


TA-9A
1"Turn Up

TA-22A
Square Edge

TA-71
Heat Lamp Mounting Provision

TA-100A
Bull Nose



TA-102
24" x 24" Extension

QTY.		
____	TA-9A	Partial 1" Turn-Up for all Table Mt. Shelves
____	TA-22A	Square Edge on Overshelf
____	TA-26-10	Welded Wall Shelf Brackets for 10" Wide Shelf
____	TA-26-12	Welded Wall Shelf Brackets for 12" Wide Shelf
____	TA-26-15	Welded Wall Shelf Brackets for 15" Wide Shelf
____	TA-26-18	Welded Wall Shelf Brackets for 18" Wide Shelf
____	TA-47	Shelf Mounting Bracket for Existing Table
____	TA-49	Wall Shelf 2" Offset
____	TA-60	Special Sizing Charge for Shelves (Must Order Larger Unit to be Cut Down to Smaller Size)
____	TA-71	Heat Lamp Mounting Provision
____	TA-71A	Heat Lamp Remote Control Bracket
____	TA-78	Additional Lin. Ft. Past 12' For Table Mt. Shelf (For ODS, OTS, TS, DS & WS Shelving only)
____	TA-77	Check Minder Shelf Provision (Factory install only)
____	TA-83	Spice Bins

QTY.		
____	TA-84A	Knife Rack for Rolled Rim Tables
____	TA-84B	Knife Rack for Poly Top Tables
____	TA-84C	Knife Rack for Square Edge Tables
____	TA-86	Stainless Steel Pot Hooks
____	TA-89	Double Sided Plated Pot Hooks (Package of 4)
____	TA-89A	Single Sided Plated Pot Hooks (Package of 4)
____	TA-98	Stainless Steel Flat Bar in lieu of Chain
____	TA-99	16 Ga. S/S 304 Upgrade for Wall & Over Shelves
____	TA-100A	Bull Nose All Sides of Shelf
____	TA-100R	Bull Nose Three Sides of Shelf w/ Rear Turn Up
____	TA-102	24" x 24" Extension for Microwave or Computer Shelf (Add to OTS and ODS Shelves. See page 65)
____	TA-103	24" Wide PT Shelf (36" Min Length. Mid mount only. PT Series Shelf, See Pg. 73. Add to 18" Wide Shelf)
____	TA-104	Additional Length Over 12' (Add to 18" Shelf. (PA & CU Shelving Only. Max. Length is 14' as Single Piece)

UNDERSHELF MODIFICATIONS

QTY.		
____	TA-9	1-1/2" Turn-Up for Undershelves
____	TA-17	Upgrade Undershelf to a Marine Edge (Must add TA-23)
____	TA-48	12"x12" Cut-Out in Back Panel or Undershelf for Plumbing

QTY.		
____	TA-94	Upgrade 16 Ga. 304 S/S Undershelf
____	TA-94A	Upgrade 14 Ga. 304 S/S Undershelf
____	TA-366	Reinforced Understructure For Undershelves

SIZE MODIFICATIONS

QTY.		
____	TA-33	Special Working Height
____	TA-59	36" Wide Equipment Stand
____	TA-6	Extra Length for Standard Tables Over 12' (Tables Over 14' Require Field Joint TA-57)
____	TA-61	Special Sizing Charge (Larger Unit Cut Down to Smaller Size)
____	TA-61A	Special Modification Charge

QTY.		
____	TA-65	Enclosed Base Units Over 12' (Open Base Table)
____	TA-66	Enclosed Base Units Over 12' (Sliding Door Units)
____	TA-67	Enclosed Base Units Over 12' (Hinged Door Units)
____	TA-105	Modify Enclosed Base Table w/ Drawers to 24" Width
____	TA-110	Modify Enclosed Base Table w/ Drawers to 36" Width

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TABLE MODIFICATIONS & ACCESSORIES

LEG MODIFICATIONS

QTY.		
____	TA-16	1 Galvanized Leg with Plastic Bullet Foot (34 1/2" Total Length)
____	TA-16-4	4 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-16-6	6 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-19	Stainless Steel Flanged Bullet Foot For Work Table
____	TA-19L	S/S Bolt-on Leg w/ Flanged Foot For Enclosed Base Table
____	TA-20	1 Stainless Steel Leg with S/S Bullet Foot (34 1/2" Total Length)
____	TA-20-4	4 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)

QTY.		
____	TA-20-6	6 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)
____	TA-20L	Replacement Bolt-on Leg For Enclosed Base Table
____	TA-21	Stainless Steel Bullet Foot
____	TA-68	Relocate Rear Cross Rail To Center (for Open Base Tables Only)
____	TA-72	Leg to Wall Brace (Set per table)
____	TA-95	Upgrade 16 Ga. 304 S/S Legs Only

WORK TABLE CASTERS

Standard Casters

Maintains the Standard 35-1/2" Working Height

200 lbs. Load Capacity Per Caster

When Used w/ Stainless Steel Legs

TA-25S-4 **Set of 4** (Two with Brakes)
TA-25S-6 **Set of 6** (Two with Brakes)

When Used w/ Galvanized Legs

TA-25G-4 **Set of 4** (Two with Brakes)
TA-25G-6 **Set of 6** (Two with Brakes)

Replacement Casters

For Work Tables

TA-25 **Set of 4** (Two with Brakes)

TA-25A **Set of 6** (Two with Brakes)

200 lbs. Load Capacity Per Caster

Optional Standard Caster Upgrades:

TA-25B **Set** — For brakes on all wheels (Standard Casters) - Add price to the following models: TA-25, TA-25A, TA-25S-4, TA-25S-6, TA-25G-4, TA-25G-6

TA-25C **Per Caster** — Upgrade Standard Caster with Heavy Duty Urethane Wheels (Per Caster)

EQUIPMENT STAND CASTERS

Standard Casters

5" Urethane Wheels.
Maintains the Standard 24" Working Height

200 lbs. Load Capacity Per Caster

w/ Stainless Steel Legs
TA-25ES **Set of 4** (Two with Brakes)

w/ Galvanized Legs
TA-25EG **Set of 4** (Two with Brakes)

HEAVY DUTY Casters

5" Urethane Wheels

400 lbs. Load Capacity Per Caster

TA-255 Super Heavy Duty Set of 4 (Two with Brakes)

TA-256 Super Heavy Duty Set of 6 (Two with Brakes)

Enclosed Base Table Casters

Easy Bolt-On Style

TA-255P **Set of 4** (Two with Brakes)
TA-255AP **Set of 6** (Two with Brakes)

300 lbs. Load Capacity Per Caster

For brakes on all wheels (Enclosed Base Casters) - Add price to models: TA-255P or TA-255AP

TA-255PB

Optional Equipment Stand Caster Upgrade:

TA-255B For brakes on all wheels (Equipment Casters) - Add price to any of the following models: TA-255, TA-256, TA-25ES, TA-25EG

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ADVANCE TABCO is constantly engaged in a program of improving our products. Therefore, we reserve the right to change specifications without prior notice.

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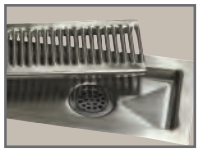
ADVANCE TABCO® SMART FABRICATION™

TABLE MODIFICATIONS & ACCESSORIES

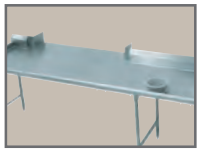
TOP MODIFICATIONS

TA-56
5" NSF Partition



TA-523
Drop-In Urn Trough

CDR-5
Condiment Holder



TA-84
Pass-Thru

TA-108
Grommet For Cords

QTY.		
____	CDR-5	Condiment Holder (Accommodates 5 Bins)
____	TA-1	Notch Backsplash For Roll Up Door w/ Pass-Thru
____	TA-3	Stainless Steel Hat Channel & Gusset Upgrade
____	TA-7	10" Partial Splash
____	TA-8	Column Notch in Rear Splash (Includes Splash)
____	TA-10	5" Partial Splash
____	TA-12	Countertop Edge
____	TA-22	Square Edge Table
____	TA-28	Cut-Out For Cold Well. Incudes Louvered Doors
____	TA-29	16 Ga. 304 Rear Splash Capping Strip w/Adhesive Backing
____	TA-30	1-1/2" Side Splash
____	TA-30A	1-1/2" Turn Up For Table Tops
____	TA-31	5" Side Splash
____	TA-32	10" Side Splash
____	TA-34	Top Cut-Out
____	TA-34A	Top Cut-Out for Undermount Well
____	TA-35	Splash Cut-Out
____	TA-41	Poly-Vance 5/8" Cutting Board
____	TA-56	5" NSF Partition
____	TA-56A	18" NSF Partition
____	TA-57	Prepare Welded Field Joint (Welded in field by others)
____	TA-57A	Bolted Field Joint (Bolted in field by others)
____	TA-57B	Hairline Field Joint
____	TA-58	Stepdown to 24" Working Height
____	TA-64	Urn Trough (Factory installation only)
____	TA-75	Mitered Edge
____	TA-76	Paint on Sound Deadening
____	TA-79	Flour Trough (Factory installation only)
____	TA-82	Scrap Chute (6" dia. opening)
____	TA-84	Simple Pass-Thru
____	TA-87	Enclosed Rear Splash
____	TA-91	Poly Retaining Clips Includes TA-22 (S/S top table)

QTY.		
____	TA-93	Wall Brackets (Includes 2. For 5" & 10 1/2" splash only)
____	TA-96A	Can Opener Provision for Openers with Bolt-on Base (Customer to provide location)
____	TA-96B	Can Opener Surface Mount Provision with 4" S/S Tube for Openers w/o Base (Customer to provide location)
____	TA-96C	Can Opener Spacer Plate Provision for Use on Tables With Countertop Edge & Can Opener Base (Customer to provide location)
____	TA-100	Bull Nose All Sides of Worktable
____	TA-101	Rear Tray Lock
____	TA-106	Mirror HI-LITE Edge
____	TA-107	Vacuum Breaker Holes on Tables (Includes Backsplash with 2" Return)
____	TA-108	2" Hole with Grommet for Appliance Cord
____	TA-112	Hubble Outlet
____	TA-113	Notch Top for Buyout Unit
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-366A	Heavy duty Understructure Top
____	TA-502	Install Advnace Tabco Hot Food Unit In Work Table Top (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)
____	TA-521	Drop-In urn Trough 1'
____	TA-522	Drop-In urn Trough 2'
____	TA-523	Drop-In urn Trough 3'
____	TA-524	Drop-In urn Trough 4'
____	TA-525	Drop-In urn Trough 5'
____	TA-526	Drop-In urn Trough 6'
____	TA-527	Drop-In urn Trough 7'
____	TA-528	Drop-In urn Trough 8'
____	TA-529	Drop-In urn Trough 9'
____	TA-550	Install Customer Supplied Buyout Items (Does not include wiring. Consult factory)
____	TA-551	Installation of Hot Food Wells. (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)

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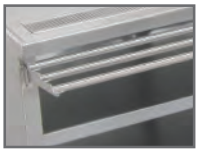
REF-K

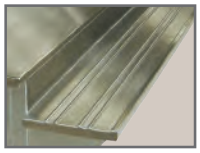
TABLE MODIFICATIONS & ACCESSORIES

BASE MODIFICATIONS

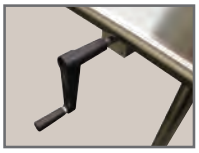
TA-39
Louvered Hinged Doors



TA-73
Drop-Down Tray Slide



TA-74
Solid Tray Slide



TA-900
ADJ. Height Tables

TA-116
Adj. Mid-Shelf

QTY.		
____	TA-4	Removable Access Panel
____	TA-4A	Luvered Panel
____	TA-5	Curb Mounting Provision
____	TA-15	Provision for Built In Drawer Warmer
____	TA-23	Welded Set-Up Table/Crating
____	TA-24	Shell Crating
____	TA-27	Control Panel (Must add TA-34A or TA-34B)
____	TA-36A	Sliding/Hinge Stainless Steel Doors
____	TA-36B	1/2 Height Stainless Steel Hinge Doors
____	TA-36C	Hinged door with Trash Flap
____	TA-37	Stainless Enclosed Base
____	TA-39	24" Louvered Hinged Doors
____	TA-40	Remove Undershelf in Cabinet Base For Slide in Buyout
____	TA-42	Interior Partition (2.5"x30")
____	TA-43	Filler Panel (3"x30" with Flanged Feet)
____	TA-44	K.D. Aluminum Pan Rack Slides (6 slides. Table min. lgth. 30")
____	TA-45	K.D. Aluminum Glass Rack Slides (3 slides. Table min. lgth. 3 feet)
____	TA-46	Door Locks

QTY.		
____	TA-48	12"x12" Cut-Out in Back Panel/Undershelf for Plumbing
____	TA-54	Removable Kick Plate
____	TA-55	Remove Back Panel (on Enclosed Base)
____	TA-63	Removable Shelving (In addition to standard shelf & table width)
____	TA-70	S/S Tubular Tray Divider (12" sections)
____	TA-73	Tubular Tray Slide w/Dropdown (Stationary Tray Slide Available. Factory installation only)
____	TA-74	Solid Tray Slide
____	TA-92	12" Apron (in front of sink)
____	TA-92A	17" Stainless Steel Apron to Cover Sink Bowls and Support Lever Drain Handles
____	TA-116	Adjustable Enclosed Base Cabinet Mid Shelf- Add to Price of Enclosed Base Table with Fixed Mid Shelf **(M)**. Shelves Over 36" In Length Require Multiple Sections With Center Partition. For Partial Shelves Add To Price Of Shelf.
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-205	Connect Cafeteria Items (Per Joint Between 2 Tables. Requires Casters)
____	TA-900	Upgrade Table To be Height Adjustable In Field (Up to 6" Only. Unit Ships Set Up)

ELECTRICAL & DATA PORT OUTLETS

TA-62
Duplex Outlet

TA-62A
GFI Duplex Outlet

TA-62D
GFI Doghouse Outlet

TA-112
Hubble Outlet

QTY.		
____	TA-62	Standard Duplex Electrical Outlet & Cover Plate (Under Flat Top). NEMA 5-15R
____	TA-62A	GFI Duplex Outlet & Cover Plate in a VKS Splash. NEMA 5-20R
____	TA-62C	GFI Duplex Outlet & Cover Plate Below Shelf Top. NEMA 5-20R

QTY.		
____	TA-62D	GFI Duplex Outlet & Cover Plate in a Doghouse. NEMA 5-20R
____	TA-62E	Upgrade Outlet to a NEMA 6-20R or Equiv.
____	TA-112	Hubble Outlet
____	TA-622	CAT-5 Data Port Outlet. Cable Not Included

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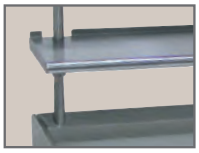
TABLE MODIFICATIONS & ACCESSORIES

OVERSHELF & POT RACK MODIFICATIONS

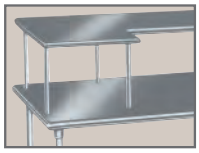


TA-9A
1"Turn Up

TA-22A
Square Edge

TA-71
Heat Lamp Mounting Provision

TA-100A
Bull Nose



TA-102
24" x 24" Extension

QTY.		
____	TA-9A	Partial 1" Turn-Up for all Table Mt. Shelves
____	TA-22A	Square Edge on Overshelf
____	TA-26-10	Welded Wall Shelf Brackets for 10" Wide Shelf
____	TA-26-12	Welded Wall Shelf Brackets for 12" Wide Shelf
____	TA-26-15	Welded Wall Shelf Brackets for 15" Wide Shelf
____	TA-26-18	Welded Wall Shelf Brackets for 18" Wide Shelf
____	TA-47	Shelf Mounting Bracket for Existing Table
____	TA-49	Wall Shelf 2" Offset
____	TA-60	Special Sizing Charge for Shelves (Must Order Larger Unit to be Cut Down to Smaller Size)
____	TA-71	Heat Lamp Mounting Provision
____	TA-71A	Heat Lamp Remote Control Bracket
____	TA-78	Additional Lin. Ft. Past 12' For Table Mt. Shelf (For ODS, OTS, TS, DS & WS Shelving only)
____	TA-77	Check Minder Shelf Provision (Factory install only)
____	TA-83	Spice Bins

QTY.		
____	TA-84A	Knife Rack for Rolled Rim Tables
____	TA-84B	Knife Rack for Poly Top Tables
____	TA-84C	Knife Rack for Square Edge Tables
____	TA-86	Stainless Steel Pot Hooks
____	TA-89	Double Sided Plated Pot Hooks (Package of 4)
____	TA-89A	Single Sided Plated Pot Hooks (Package of 4)
____	TA-98	Stainless Steel Flat Bar in lieu of Chain
____	TA-99	16 Ga. S/S 304 Upgrade for Wall & Over Shelves
____	TA-100A	Bull Nose All Sides of Shelf
____	TA-100R	Bull Nose Three Sides of Shelf w/ Rear Turn Up
____	TA-102	24" x 24" Extension for Microwave or Computer Shelf (Add to OTS and ODS Shelves. See page 65)
____	TA-103	24" Wide PT Shelf (36" Min Length. Mid mount only. PT Series Shelf, See Pg. 73. Add to 18" Wide Shelf)
____	TA-104	Additional Length Over 12' (Add to 18" Shelf. (PA & CU Shelving Only. Max. Length is 14' as Single Piece)

UNDERSHELF MODIFICATIONS

QTY.		
____	TA-9	1-1/2" Turn-Up for Undershelves
____	TA-17	Upgrade Undershelf to a Marine Edge (Must add TA-23)
____	TA-48	12"x12" Cut-Out in Back Panel or Undershelf for Plumbing

QTY.		
____	TA-94	Upgrade 16 Ga. 304 S/S Undershelf
____	TA-94A	Upgrade 14 Ga. 304 S/S Undershelf
____	TA-366	Reinforced Understructure For Undershelves

SIZE MODIFICATIONS

QTY.		
____	TA-33	Special Working Height
____	TA-59	36" Wide Equipment Stand
____	TA-6	Extra Length for Standard Tables Over 12' (Tables Over 14' Require Field Joint TA-57)
____	TA-61	Special Sizing Charge (Larger Unit Cut Down to Smaller Size)
____	TA-61A	Special Modification Charge

QTY.		
____	TA-65	Enclosed Base Units Over 12' (Open Base Table)
____	TA-66	Enclosed Base Units Over 12' (Sliding Door Units)
____	TA-67	Enclosed Base Units Over 12' (Hinged Door Units)
____	TA-105	Modify Enclosed Base Table w/ Drawers to 24" Width
____	TA-110	Modify Enclosed Base Table w/ Drawers to 36" Width

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TABLE MODIFICATIONS & ACCESSORIES

LEG MODIFICATIONS

QTY.		
____	TA-16	1 Galvanized Leg with Plastic Bullet Foot (34 1/2" Total Length)
____	TA-16-4	4 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-16-6	6 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-19	Stainless Steel Flanged Bullet Foot For Work Table
____	TA-19L	S/S Bolt-on Leg w/ Flanged Foot For Enclosed Base Table
____	TA-20	1 Stainless Steel Leg with S/S Bullet Foot (34 1/2" Total Length)
____	TA-20-4	4 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)

QTY.		
____	TA-20-6	6 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)
____	TA-20L	Replacement Bolt-on Leg For Enclosed Base Table
____	TA-21	Stainless Steel Bullet Foot
____	TA-68	Relocate Rear Cross Rail To Center (for Open Base Tables Only)
____	TA-72	Leg to Wall Brace (Set per table)
____	TA-95	Upgrade 16 Ga. 304 S/S Legs Only

WORK TABLE CASTERS

Standard Casters

Maintains the Standard 35-1/2" Working Height

200 lbs. Load Capacity Per Caster

When Used w/ Stainless Steel Legs

TA-25S-4 **Set of 4** (Two with Brakes)
TA-25S-6 **Set of 6** (Two with Brakes)

When Used w/ Galvanized Legs

TA-25G-4 **Set of 4** (Two with Brakes)
TA-25G-6 **Set of 6** (Two with Brakes)

Replacement Casters

For Work Tables

TA-25 **Set of 4** (Two with Brakes)
TA-25A **Set of 6** (Two with Brakes)

200 lbs. Load Capacity Per Caster

Optional Standard Caster Upgrades:

TA-25B **Set** — For brakes on all wheels (Standard Casters) - Add price to the following models: TA-25, TA-25A, TA-25S-4, TA-25S-6, TA-25G-4, TA-25G-6

TA-25C **Per Caster** — Upgrade Standard Caster with Heavy Duty Urethane Wheels (Per Caster)

EQUIPMENT STAND CASTERS

Standard Casters

5" Urethane Wheels.
Maintains the Standard 24" Working Height

200 lbs. Load Capacity Per Caster

w/ Stainless Steel Legs
TA-25ES **Set of 4** (Two with Brakes)

w/ Galvanized Legs
TA-25EG **Set of 4** (Two with Brakes)

HEAVY DUTY Casters

5" Urethane Wheels

400 lbs. Load Capacity Per Caster

TA-255 Super Heavy Duty Set of 4 (Two with Brakes)
TA-256 Super Heavy Duty Set of 6 (Two with Brakes)

Enclosed Base Table Casters

Easy Bolt-On Style

TA-255P **Set of 4** (Two with Brakes)
TA-255AP **Set of 6** (Two with Brakes)

300 lbs. Load Capacity Per Caster

For brakes on all wheels (Enclosed Base Casters) - Add price to models: TA-255P or TA-255AP

TA-255PB

Optional Equipment Stand Caster Upgrade:

TA-255B For brakes on all wheels (Equipment Casters) - Add price to any of the following models: TA-255, TA-256, TA-25ES, TA-25EG

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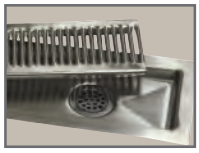
TABLE MODIFICATIONS & ACCESSORIES

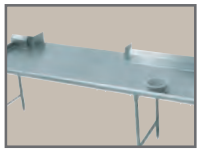
TOP MODIFICATIONS

TA-56
5" NSF Partition



TA-523
Drop-In Urn Trough

CDR-5
Condiment Holder



TA-84
Pass-Thru

TA-108
Grommet For Cords

QTY.		
____	CDR-5	Condiment Holder (Accommodates 5 Bins)
____	TA-1	Notch Backsplash For Roll Up Door w/ Pass-Thru
____	TA-3	Stainless Steel Hat Channel & Gusset Upgrade
____	TA-7	10" Partial Splash
____	TA-8	Column Notch in Rear Splash (Includes Splash)
____	TA-10	5" Partial Splash
____	TA-12	Countertop Edge
____	TA-22	Square Edge Table
____	TA-28	Cut-Out For Cold Well. Incudes Louvered Doors
____	TA-29	16 Ga. 304 Rear Splash Capping Strip w/Adhesive Backing
____	TA-30	1-1/2" Side Splash
____	TA-30A	1-1/2" Turn Up For Table Tops
____	TA-31	5" Side Splash
____	TA-32	10" Side Splash
____	TA-34	Top Cut-Out
____	TA-34A	Top Cut-Out for Undermount Well
____	TA-35	Splash Cut-Out
____	TA-41	Poly-Vance 5/8" Cutting Board
____	TA-56	5" NSF Partition
____	TA-56A	18" NSF Partition
____	TA-57	Prepare Welded Field Joint (Welded in field by others)
____	TA-57A	Bolted Field Joint (Bolted in field by others)
____	TA-57B	Hairline Field Joint
____	TA-58	Stepdown to 24" Working Height
____	TA-64	Urn Trough (Factory installation only)
____	TA-75	Mitered Edge
____	TA-76	Paint on Sound Deadening
____	TA-79	Flour Trough (Factory installation only)
____	TA-82	Scrap Chute (6" dia. opening)
____	TA-84	Simple Pass-Thru
____	TA-87	Enclosed Rear Splash
____	TA-91	Poly Retaining Clips Includes TA-22 (S/S top table)

QTY.		
____	TA-93	Wall Brackets (Includes 2. For 5" & 10 1/2" splash only)
____	TA-96A	Can Opener Provision for Openers with Bolt-on Base (Customer to provide location)
____	TA-96B	Can Opener Surface Mount Provision with 4" S/S Tube for Openers w/o Base (Customer to provide location)
____	TA-96C	Can Opener Spacer Plate Provision for Use on Tables With Countertop Edge & Can Opener Base (Customer to provide location)
____	TA-100	Bull Nose All Sides of Worktable
____	TA-101	Rear Tray Lock
____	TA-106	Mirror HI-LITE Edge
____	TA-107	Vacuum Breaker Holes on Tables (Includes Backsplash with 2" Return)
____	TA-108	2" Hole with Grommet for Appliance Cord
____	TA-112	Hubble Outlet
____	TA-113	Notch Top for Buyout Unit
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-366A	Heavy duty Understructure Top
____	TA-502	Install Advnace Tabco Hot Food Unit In Work Table Top (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)
____	TA-521	Drop-In urn Trough 1'
____	TA-522	Drop-In urn Trough 2'
____	TA-523	Drop-In urn Trough 3'
____	TA-524	Drop-In urn Trough 4'
____	TA-525	Drop-In urn Trough 5'
____	TA-526	Drop-In urn Trough 6'
____	TA-527	Drop-In urn Trough 7'
____	TA-528	Drop-In urn Trough 8'
____	TA-529	Drop-In urn Trough 9'
____	TA-550	Install Customer Supplied Buyout Items (Does not include wiring. Consult factory)
____	TA-551	Installation of Hot Food Wells. (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)

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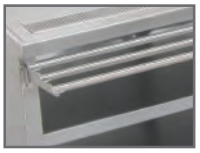
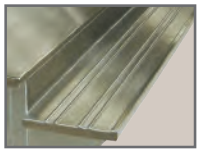
TABLE MODIFICATIONS & ACCESSORIES

BASE MODIFICATIONS

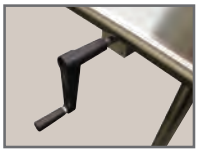
TA-39
Louvered Hinged Doors



TA-73
Drop-Down Tray Slide



TA-74
Solid Tray Slide



TA-900
ADJ. Height Tables

TA-116
Adj. Mid-Shelf

QTY.		
____	TA-4	Removable Access Panel
____	TA-4A	Luvered Panel
____	TA-5	Curb Mounting Provision
____	TA-15	Provision for Built In Drawer Warmer
____	TA-23	Welded Set-Up Table/Crating
____	TA-24	Shell Crating
____	TA-27	Control Panel (Must add TA-34A or TA-34B)
____	TA-36A	Sliding/Hinge Stainless Steel Doors
____	TA-36B	1/2 Height Stainless Steel Hinge Doors
____	TA-36C	Hinged door with Trash Flap
____	TA-37	Stainless Enclosed Base
____	TA-39	24" Louvered Hinged Doors
____	TA-40	Remove Undershelf in Cabinet Base For Slide in Buyout
____	TA-42	Interior Partition (2.5"x30")
____	TA-43	Filler Panel (3"x30" with Flanged Feet)
____	TA-44	K.D. Aluminum Pan Rack Slides (6 slides. Table min. lgth. 30")
____	TA-45	K.D. Aluminum Glass Rack Slides (3 slides. Table min. lgth. 3 feet)
____	TA-46	Door Locks

QTY.		
____	TA-48	12"x12" Cut-Out in Back Panel/Undershelf for Plumbing
____	TA-54	Removable Kick Plate
____	TA-55	Remove Back Panel (on Enclosed Base)
____	TA-63	Removable Shelving (In addition to standard shelf & table width)
____	TA-70	S/S Tubular Tray Divider (12" sections)
____	TA-73	Tubular Tray Slide w/Dropdown (Stationary Tray Slide Available. Factory installation only)
____	TA-74	Solid Tray Slide
____	TA-92	12" Apron (in front of sink)
____	TA-92A	17" Stainless Steel Apron to Cover Sink Bowls and Support Lever Drain Handles
____	TA-116	Adjustable Enclosed Base Cabinet Mid Shelf- Add to Price of Enclosed Base Table with Fixed Mid Shelf **(M)**. Shelves Over 36" In Length Require Multiple Sections With Center Partition. For Partial Shelves Add To Price Of Shelf.
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-205	Connect Cafeteria Items (Per Joint Between 2 Tables. Requires Casters)
____	TA-900	Upgrade Table To be Height Adjustable In Field (Up to 6" Only. Unit Ships Set Up)

ELECTRICAL & DATA PORT OUTLETS

TA-62
Duplex Outlet

TA-62A
GFI Duplex Outlet

TA-62D
GFI Doghouse Outlet

TA-112
Hubble Outlet

QTY.		
____	TA-62	Standard Duplex Electrical Outlet & Cover Plate (Under Flat Top). NEMA 5-15R
____	TA-62A	GFI Duplex Outlet & Cover Plate in a VKS Splash. NEMA 5-20R
____	TA-62C	GFI Duplex Outlet & Cover Plate Below Shelf Top. NEMA 5-20R

QTY.		
____	TA-62D	GFI Duplex Outlet & Cover Plate in a Doghouse. NEMA 5-20R
____	TA-62E	Upgrade Outlet to a NEMA 6-20R or Equiv.
____	TA-112	Hubble Outlet
____	TA-622	CAT-5 Data Port Outlet. Cable Not Included

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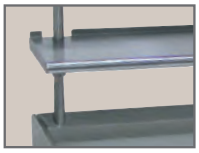
TABLE MODIFICATIONS & ACCESSORIES

OVERSHELF & POT RACK MODIFICATIONS

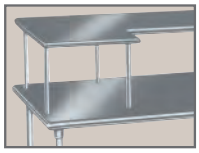


TA-9A
1"Turn Up

TA-22A
Square Edge

TA-71
Heat Lamp Mounting Provision

TA-100A
Bull Nose



TA-102
24" x 24" Extension

QTY.		
____	TA-9A	Partial 1" Turn-Up for all Table Mt. Shelves
____	TA-22A	Square Edge on Overshelf
____	TA-26-10	Welded Wall Shelf Brackets for 10" Wide Shelf
____	TA-26-12	Welded Wall Shelf Brackets for 12" Wide Shelf
____	TA-26-15	Welded Wall Shelf Brackets for 15" Wide Shelf
____	TA-26-18	Welded Wall Shelf Brackets for 18" Wide Shelf
____	TA-47	Shelf Mounting Bracket for Existing Table
____	TA-49	Wall Shelf 2" Offset
____	TA-60	Special Sizing Charge for Shelves (Must Order Larger Unit to be Cut Down to Smaller Size)
____	TA-71	Heat Lamp Mounting Provision
____	TA-71A	Heat Lamp Remote Control Bracket
____	TA-78	Additional Lin. Ft. Past 12' For Table Mt. Shelf (For ODS, OTS, TS, DS & WS Shelving only)
____	TA-77	Check Minder Shelf Provision (Factory install only)
____	TA-83	Spice Bins

QTY.		
____	TA-84A	Knife Rack for Rolled Rim Tables
____	TA-84B	Knife Rack for Poly Top Tables
____	TA-84C	Knife Rack for Square Edge Tables
____	TA-86	Stainless Steel Pot Hooks
____	TA-89	Double Sided Plated Pot Hooks (Package of 4)
____	TA-89A	Single Sided Plated Pot Hooks (Package of 4)
____	TA-98	Stainless Steel Flat Bar in lieu of Chain
____	TA-99	16 Ga. S/S 304 Upgrade for Wall & Over Shelves
____	TA-100A	Bull Nose All Sides of Shelf
____	TA-100R	Bull Nose Three Sides of Shelf w/ Rear Turn Up
____	TA-102	24" x 24" Extension for Microwave or Computer Shelf (Add to OTS and ODS Shelves. See page 65)
____	TA-103	24" Wide PT Shelf (36" Min Length. Mid mount only. PT Series Shelf, See Pg. 73. Add to 18" Wide Shelf)
____	TA-104	Additional Length Over 12' (Add to 18" Shelf. (PA & CU Shelving Only. Max. Length is 14' as Single Piece)

UNDERSHELF MODIFICATIONS

QTY.		
____	TA-9	1-1/2" Turn-Up for Undershelves
____	TA-17	Upgrade Undershelf to a Marine Edge (Must add TA-23)
____	TA-48	12"x12" Cut-Out in Back Panel or Undershelf for Plumbing

QTY.		
____	TA-94	Upgrade 16 Ga. 304 S/S Undershelf
____	TA-94A	Upgrade 14 Ga. 304 S/S Undershelf
____	TA-366	Reinforced Understructure For Undershelves

SIZE MODIFICATIONS

QTY.		
____	TA-33	Special Working Height
____	TA-59	36" Wide Equipment Stand
____	TA-6	Extra Length for Standard Tables Over 12' (Tables Over 14' Require Field Joint TA-57)
____	TA-61	Special Sizing Charge (Larger Unit Cut Down to Smaller Size)
____	TA-61A	Special Modification Charge

QTY.		
____	TA-65	Enclosed Base Units Over 12' (Open Base Table)
____	TA-66	Enclosed Base Units Over 12' (Sliding Door Units)
____	TA-67	Enclosed Base Units Over 12' (Hinged Door Units)
____	TA-105	Modify Enclosed Base Table w/ Drawers to 24" Width
____	TA-110	Modify Enclosed Base Table w/ Drawers to 36" Width

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TABLE MODIFICATIONS & ACCESSORIES

LEG MODIFICATIONS

QTY.		
____	TA-16	1 Galvanized Leg with Plastic Bullet Foot (34 1/2" Total Length)
____	TA-16-4	4 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-16-6	6 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-19	Stainless Steel Flanged Bullet Foot For Work Table
____	TA-19L	S/S Bolt-on Leg w/ Flanged Foot For Enclosed Base Table
____	TA-20	1 Stainless Steel Leg with S/S Bullet Foot (34 1/2" Total Length)
____	TA-20-4	4 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)

QTY.		
____	TA-20-6	6 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)
____	TA-20L	Replacement Bolt-on Leg For Enclosed Base Table
____	TA-21	Stainless Steel Bullet Foot
____	TA-68	Relocate Rear Cross Rail To Center (for Open Base Tables Only)
____	TA-72	Leg to Wall Brace (Set per table)
____	TA-95	Upgrade 16 Ga. 304 S/S Legs Only

WORK TABLE CASTERS

Standard Casters

Maintains the Standard 35-1/2" Working Height

200 lbs. Load Capacity Per Caster

When Used w/ Stainless Steel Legs

TA-25S-4 **Set of 4** (Two with Brakes)
TA-25S-6 **Set of 6** (Two with Brakes)

When Used w/ Galvanized Legs

TA-25G-4 **Set of 4** (Two with Brakes)
TA-25G-6 **Set of 6** (Two with Brakes)

Replacement Casters

For Work Tables

TA-25 **Set of 4** (Two with Brakes)
TA-25A **Set of 6** (Two with Brakes)

200 lbs. Load Capacity Per Caster

Optional Standard Caster Upgrades:

TA-25B **Set** — For brakes on all wheels (Standard Casters) - Add price to the following models: TA-25, TA-25A, TA-25S-4, TA-25S-6, TA-25G-4, TA-25G-6

TA-25C **Per Caster** — Upgrade Standard Caster with Heavy Duty Urethane Wheels (Per Caster)

EQUIPMENT STAND CASTERS

Standard Casters

5" Urethane Wheels.
Maintains the Standard 24" Working Height

200 lbs. Load Capacity Per Caster

w/ Stainless Steel Legs
TA-25ES **Set of 4** (Two with Brakes)

w/ Galvanized Legs
TA-25EG **Set of 4** (Two with Brakes)

HEAVY DUTY Casters

5" Urethane Wheels

400 lbs. Load Capacity Per Caster

TA-255 Super Heavy Duty Set of 4 (Two with Brakes)
TA-256 Super Heavy Duty Set of 6 (Two with Brakes)

Enclosed Base Table Casters

Easy Bolt-On Style

TA-255P **Set of 4** (Two with Brakes)
TA-255AP **Set of 6** (Two with Brakes)

300 lbs. Load Capacity Per Caster

For brakes on all wheels (Enclosed Base Casters) - Add price to models: TA-255P or TA-255AP

TA-255PB

Optional Equipment Stand Caster Upgrade:

TA-255B For brakes on all wheels (Equipment Casters) - Add price to any of the following models: TA-255, TA-256, TA-25ES, TA-25EG

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TABLE MODIFICATIONS & ACCESSORIES

TOP MODIFICATIONS

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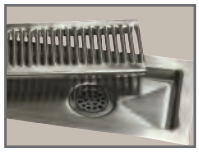
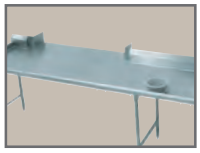
5" NSF Partition



TA-523
Drop-In Urn Trough

CDR-5
Condiment Holder



TA-84
Pass-Thru

TA-108
Grommet For Cords

QTY.		
____	CDR-5	Condiment Holder (Accommodates 5 Bins)
____	TA-1	Notch Backsplash For Roll Up Door w/ Pass-Thru
____	TA-3	Stainless Steel Hat Channel & Gusset Upgrade
____	TA-7	10" Partial Splash
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____	TA-34A	Top Cut-Out for Undermount Well
____	TA-35	Splash Cut-Out
____	TA-41	Poly-Vance 5/8" Cutting Board
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____	TA-76	Paint on Sound Deadening
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____	TA-87	Enclosed Rear Splash
____	TA-91	Poly Retaining Clips Includes TA-22 (S/S top table)

QTY.		
____	TA-93	Wall Brackets (Includes 2. For 5" & 10 1/2" splash only)
____	TA-96A	Can Opener Provision for Openers with Bolt-on Base (Customer to provide location)
____	TA-96B	Can Opener Surface Mount Provision with 4" S/S Tube for Openers w/o Base (Customer to provide location)
____	TA-96C	Can Opener Spacer Plate Provision for Use on Tables With Countertop Edge & Can Opener Base (Customer to provide location)
____	TA-100	Bull Nose All Sides of Worktable
____	TA-101	Rear Tray Lock
____	TA-106	Mirror HI-LITE Edge
____	TA-107	Vacuum Breaker Holes on Tables (Includes Backsplash with 2" Return)
____	TA-108	2" Hole with Grommet for Appliance Cord
____	TA-112	Hubble Outlet
____	TA-113	Notch Top for Buyout Unit
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-366A	Heavy duty Understructure Top
____	TA-502	Install Advnace Tabco Hot Food Unit In Work Table Top (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)
____	TA-521	Drop-In urn Trough 1'
____	TA-522	Drop-In urn Trough 2'
____	TA-523	Drop-In urn Trough 3'
____	TA-524	Drop-In urn Trough 4'
____	TA-525	Drop-In urn Trough 5'
____	TA-526	Drop-In urn Trough 6'
____	TA-527	Drop-In urn Trough 7'
____	TA-528	Drop-In urn Trough 8'
____	TA-529	Drop-In urn Trough 9'
____	TA-550	Install Customer Supplied Buyout Items (Does not include wiring. Consult factory)
____	TA-551	Installation of Hot Food Wells. (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)

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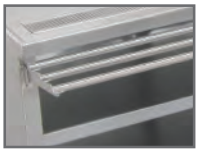
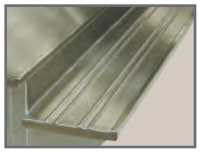
BASE MODIFICATIONS

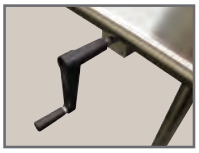
TA-39
Louvered Hinged Doors



TA-73
Drop-Down Tray Slide



TA-74
Solid Tray Slide



TA-900
ADJ. Height Tables

TA-116
Adj. Mid-Shelf

QTY.		
____	TA-4	Removable Access Panel
____	TA-4A	Luvered Panel
____	TA-5	Curb Mounting Provision
____	TA-15	Provision for Built In Drawer Warmer
____	TA-23	Welded Set-Up Table/Crating
____	TA-24	Shell Crating
____	TA-27	Control Panel (Must add TA-34A or TA-34B)
____	TA-36A	Sliding/Hinge Stainless Steel Doors
____	TA-36B	1/2 Height Stainless Steel Hinge Doors
____	TA-36C	Hinged door with Trash Flap
____	TA-37	Stainless Enclosed Base
____	TA-39	24" Louvered Hinged Doors
____	TA-40	Remove Undershelf in Cabinet Base For Slide in Buyout
____	TA-42	Interior Partition (2.5"x30")
____	TA-43	Filler Panel (3"x30" with Flanged Feet)
____	TA-44	K.D. Aluminum Pan Rack Slides (6 slides. Table min. lgth. 30")
____	TA-45	K.D. Aluminum Glass Rack Slides (3 slides. Table min. lgth. 3 feet)
____	TA-46	Door Locks

QTY.		
____	TA-48	12"x12" Cut-Out in Back Panel/Undershelf for Plumbing
____	TA-54	Removable Kick Plate
____	TA-55	Remove Back Panel (on Enclosed Base)
____	TA-63	Removable Shelving (In addition to standard shelf & table width)
____	TA-70	S/S Tubular Tray Divider (12" sections)
____	TA-73	Tubular Tray Slide w/Dropdown (Stationary Tray Slide Available. Factory installation only)
____	TA-74	Solid Tray Slide
____	TA-92	12" Apron (in front of sink)
____	TA-92A	17" Stainless Steel Apron to Cover Sink Bowls and Support Lever Drain Handles
____	TA-116	Adjustable Enclosed Base Cabinet Mid Shelf- Add to Price of Enclosed Base Table with Fixed Mid Shelf **(M)**. Shelves Over 36" In Length Require Multiple Sections With Center Partition. For Partial Shelves Add To Price Of Shelf.
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-205	Connect Cafeteria Items (Per Joint Between 2 Tables. Requires Casters)
____	TA-900	Upgrade Table To be Height Adjustable In Field (Up to 6" Only. Unit Ships Set Up)

ELECTRICAL & DATA PORT OUTLETS

TA-62
Duplex Outlet

TA-62A
GFI Duplex Outlet

TA-62D
GFI Doghouse Outlet

TA-112
Hubble Outlet

QTY.		
____	TA-62	Standard Duplex Electrical Outlet & Cover Plate (Under Flat Top). NEMA 5-15R
____	TA-62A	GFI Duplex Outlet & Cover Plate in a VKS Splash. NEMA 5-20R
____	TA-62C	GFI Duplex Outlet & Cover Plate Below Shelf Top. NEMA 5-20R

QTY.		
____	TA-62D	GFI Duplex Outlet & Cover Plate in a Doghouse. NEMA 5-20R
____	TA-62E	Upgrade Outlet to a NEMA 6-20R or Equiv.
____	TA-112	Hubble Outlet
____	TA-622	CAT-5 Data Port Outlet. Cable Not Included

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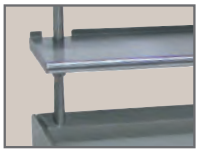
TABLE MODIFICATIONS & ACCESSORIES

OVERSHELF & POT RACK MODIFICATIONS

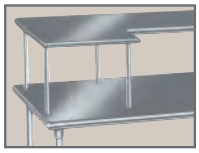


TA-9A
1" Turn Up

TA-22A
Square Edge

TA-71
Heat Lamp Mounting Provision

TA-100A
Bull Nose



TA-102
24" x 24" Extension

QTY.		
____	TA-9A	Partial 1" Turn-Up for all Table Mt. Shelves
____	TA-22A	Square Edge on Overshelf
____	TA-26-10	Welded Wall Shelf Brackets for 10" Wide Shelf
____	TA-26-12	Welded Wall Shelf Brackets for 12" Wide Shelf
____	TA-26-15	Welded Wall Shelf Brackets for 15" Wide Shelf
____	TA-26-18	Welded Wall Shelf Brackets for 18" Wide Shelf
____	TA-47	Shelf Mounting Bracket for Existing Table
____	TA-49	Wall Shelf 2" Offset
____	TA-60	Special Sizing Charge for Shelves (Must Order Larger Unit to be Cut Down to Smaller Size)
____	TA-71	Heat Lamp Mounting Provision
____	TA-71A	Heat Lamp Remote Control Bracket
____	TA-78	Additional Lin. Ft. Past 12' For Table Mt. Shelf (For ODS, OTS, TS, DS & WS Shelving only)
____	TA-77	Check Minder Shelf Provision (Factory install only)
____	TA-83	Spice Bins

QTY.		
____	TA-84A	Knife Rack for Rolled Rim Tables
____	TA-84B	Knife Rack for Poly Top Tables
____	TA-84C	Knife Rack for Square Edge Tables
____	TA-86	Stainless Steel Pot Hooks
____	TA-89	Double Sided Plated Pot Hooks (Package of 4)
____	TA-89A	Single Sided Plated Pot Hooks (Package of 4)
____	TA-98	Stainless Steel Flat Bar in lieu of Chain
____	TA-99	16 Ga. S/S 304 Upgrade for Wall & Over Shelves
____	TA-100A	Bull Nose All Sides of Shelf
____	TA-100R	Bull Nose Three Sides of Shelf w/ Rear Turn Up
____	TA-102	24" x 24" Extension for Microwave or Computer Shelf (Add to OTS and ODS Shelves. See page 65)
____	TA-103	24" Wide PT Shelf (36" Min Length. Mid mount only. PT Series Shelf, See Pg. 73. Add to 18" Wide Shelf)
____	TA-104	Additional Length Over 12' (Add to 18" Shelf. (PA & CU Shelving Only. Max. Length is 14' as Single Piece)

UNDERSHELF MODIFICATIONS

QTY.		
____	TA-9	1-1/2" Turn-Up for Undershelves
____	TA-17	Upgrade Undershelf to a Marine Edge (Must add TA-23)
____	TA-48	12"x12" Cut-Out in Back Panel or Undershelf for Plumbing

QTY.		
____	TA-94	Upgrade 16 Ga. 304 S/S Undershelf
____	TA-94A	Upgrade 14 Ga. 304 S/S Undershelf
____	TA-366	Reinforced Understructure For Undershelves

SIZE MODIFICATIONS

QTY.		
____	TA-33	Special Working Height
____	TA-59	36" Wide Equipment Stand
____	TA-6	Extra Length for Standard Tables Over 12' (Tables Over 14' Require Field Joint TA-57)
____	TA-61	Special Sizing Charge (Larger Unit Cut Down to Smaller Size)
____	TA-61A	Special Modification Charge

QTY.		
____	TA-65	Enclosed Base Units Over 12' (Open Base Table)
____	TA-66	Enclosed Base Units Over 12' (Sliding Door Units)
____	TA-67	Enclosed Base Units Over 12' (Hinged Door Units)
____	TA-105	Modify Enclosed Base Table w/ Drawers to 24" Width
____	TA-110	Modify Enclosed Base Table w/ Drawers to 36" Width

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TABLE MODIFICATIONS & ACCESSORIES

LEG MODIFICATIONS

QTY.		
____	TA-16	1 Galvanized Leg with Plastic Bullet Foot (34 1/2" Total Length)
____	TA-16-4	4 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-16-6	6 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-19	Stainless Steel Flanged Bullet Foot For Work Table
____	TA-19L	S/S Bolt-on Leg w/ Flanged Foot For Enclosed Base Table
____	TA-20	1 Stainless Steel Leg with S/S Bullet Foot (34 1/2" Total Length)
____	TA-20-4	4 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)

QTY.		
____	TA-20-6	6 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)
____	TA-20L	Replacement Bolt-on Leg For Enclosed Base Table
____	TA-21	Stainless Steel Bullet Foot
____	TA-68	Relocate Rear Cross Rail To Center (for Open Base Tables Only)
____	TA-72	Leg to Wall Brace (Set per table)
____	TA-95	Upgrade 16 Ga. 304 S/S Legs Only

WORK TABLE CASTERS

Standard Casters

Maintains the Standard 35-1/2" Working Height

200 lbs. Load Capacity Per Caster

When Used w/ Stainless Steel Legs

TA-25S-4 **Set of 4** (Two with Brakes)
TA-25S-6 **Set of 6** (Two with Brakes)

When Used w/ Galvanized Legs

TA-25G-4 **Set of 4** (Two with Brakes)
TA-25G-6 **Set of 6** (Two with Brakes)

Replacement Casters

For Work Tables

TA-25 **Set of 4** (Two with Brakes)
TA-25A **Set of 6** (Two with Brakes)

200 lbs. Load Capacity Per Caster

Optional Standard Caster Upgrades:

TA-25B **Set** — For brakes on all wheels (Standard Casters) - Add price to the following models: TA-25, TA-25A, TA-25S-4, TA-25S-6, TA-25G-4, TA-25G-6

TA-25C **Per Caster** — Upgrade Standard Caster with Heavy Duty Urethane Wheels (Per Caster)

EQUIPMENT STAND CASTERS

Standard Casters

5" Urethane Wheels.
Maintains the Standard 24" Working Height

200 lbs. Load Capacity Per Caster

w/ Stainless Steel Legs
TA-25ES **Set of 4** (Two with Brakes)

w/ Galvanized Legs
TA-25EG **Set of 4** (Two with Brakes)

HEAVY DUTY Casters

5" Urethane Wheels

400 lbs. Load Capacity Per Caster

TA-255 Super Heavy Duty Set of 4 (Two with Brakes)
TA-256 Super Heavy Duty Set of 6 (Two with Brakes)

Enclosed Base Table Casters

Easy Bolt-On Style

TA-255P **Set of 4** (Two with Brakes)
TA-255AP **Set of 6** (Two with Brakes)

300 lbs. Load Capacity Per Caster

For brakes on all wheels (Enclosed Base Casters) - Add price to models: TA-255P or TA-255AP

TA-255PB

Optional Equipment Stand Caster Upgrade:

TA-255B For brakes on all wheels (Equipment Casters) - Add price to any of the following models: TA-255, TA-256, TA-25ES, TA-25EG

Contact Our SMART FABRICATION™ Department for more information at 800-645-3166 or email in your specifications to smartfab@advancetabco.com

ADVANCE TABCO is constantly engaged in a program of improving our products. Therefore, we reserve the right to change specifications without prior notice.

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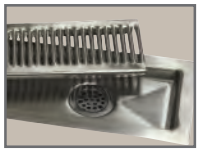
TABLE MODIFICATIONS & ACCESSORIES

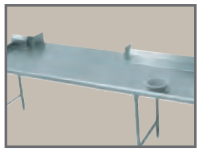
TOP MODIFICATIONS

TA-56
5" NSF Partition



TA-523
Drop-In Urn Trough

CDR-5
Condiment Holder



TA-84
Pass-Thru

TA-108
Grommet For Cords

QTY.		
____	CDR-5	Condiment Holder (Accommodates 5 Bins)
____	TA-1	Notch Backsplash For Roll Up Door w/ Pass-Thru
____	TA-3	Stainless Steel Hat Channel & Gusset Upgrade
____	TA-7	10" Partial Splash
____	TA-8	Column Notch in Rear Splash (Includes Splash)
____	TA-10	5" Partial Splash
____	TA-12	Countertop Edge
____	TA-22	Square Edge Table
____	TA-28	Cut-Out For Cold Well. Incudes Louvered Doors
____	TA-29	16 Ga. 304 Rear Splash Capping Strip w/Adhesive Backing
____	TA-30	1-1/2" Side Splash
____	TA-30A	1-1/2" Turn Up For Table Tops
____	TA-31	5" Side Splash
____	TA-32	10" Side Splash
____	TA-34	Top Cut-Out
____	TA-34A	Top Cut-Out for Undermount Well
____	TA-35	Splash Cut-Out
____	TA-41	Poly-Vance 5/8" Cutting Board
____	TA-56	5" NSF Partition
____	TA-56A	18" NSF Partition
____	TA-57	Prepare Welded Field Joint (Welded in field by others)
____	TA-57A	Bolted Field Joint (Bolted in field by others)
____	TA-57B	Hairline Field Joint
____	TA-58	Stepdown to 24" Working Height
____	TA-64	Urn Trough (Factory installation only)
____	TA-75	Mitered Edge
____	TA-76	Paint on Sound Deadening
____	TA-79	Flour Trough (Factory installation only)
____	TA-82	Scrap Chute (6" dia. opening)
____	TA-84	Simple Pass-Thru
____	TA-87	Enclosed Rear Splash
____	TA-91	Poly Retaining Clips Includes TA-22 (S/S top table)

QTY.		
____	TA-93	Wall Brackets (Includes 2. For 5" & 10 1/2" splash only)
____	TA-96A	Can Opener Provision for Openers with Bolt-on Base (Customer to provide location)
____	TA-96B	Can Opener Surface Mount Provision with 4" S/S Tube for Openers w/o Base (Customer to provide location)
____	TA-96C	Can Opener Spacer Plate Provision for Use on Tables With Countertop Edge & Can Opener Base (Customer to provide location)
____	TA-100	Bull Nose All Sides of Worktable
____	TA-101	Rear Tray Lock
____	TA-106	Mirror HI-LITE Edge
____	TA-107	Vacuum Breaker Holes on Tables (Includes Backsplash with 2" Return)
____	TA-108	2" Hole with Grommet for Appliance Cord
____	TA-112	Hubble Outlet
____	TA-113	Notch Top for Buyout Unit
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-366A	Heavy duty Understructure Top
____	TA-502	Install Advnace Tabco Hot Food Unit In Work Table Top (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)
____	TA-521	Drop-In urn Trough 1'
____	TA-522	Drop-In urn Trough 2'
____	TA-523	Drop-In urn Trough 3'
____	TA-524	Drop-In urn Trough 4'
____	TA-525	Drop-In urn Trough 5'
____	TA-526	Drop-In urn Trough 6'
____	TA-527	Drop-In urn Trough 7'
____	TA-528	Drop-In urn Trough 8'
____	TA-529	Drop-In urn Trough 9'
____	TA-550	Install Customer Supplied Buyout Items (Does not include wiring. Consult factory)
____	TA-551	Installation of Hot Food Wells. (Requires TA-34 Top Cut-Out & TA-27 Control Panel. Does not include wiring. Consult factory)

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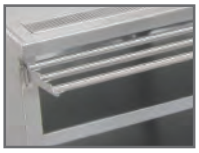
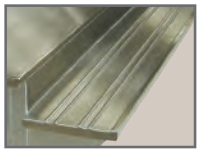
TABLE MODIFICATIONS & ACCESSORIES

BASE MODIFICATIONS

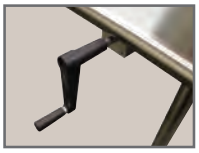
TA-39
Louvered Hinged Doors



TA-73
Drop-Down Tray Slide



TA-74
Solid Tray Slide



TA-900
ADJ. Height Tables

TA-116
Adj. Mid-Shelf

QTY.		
____	TA-4	Removable Access Panel
____	TA-4A	Luvered Panel
____	TA-5	Curb Mounting Provision
____	TA-15	Provision for Built In Drawer Warmer
____	TA-23	Welded Set-Up Table/Crating
____	TA-24	Shell Crating
____	TA-27	Control Panel (Must add TA-34A or TA-34B)
____	TA-36A	Sliding/Hinge Stainless Steel Doors
____	TA-36B	1/2 Height Stainless Steel Hinge Doors
____	TA-36C	Hinged door with Trash Flap
____	TA-37	Stainless Enclosed Base
____	TA-39	24" Louvered Hinged Doors
____	TA-40	Remove Undershelf in Cabinet Base For Slide in Buyout
____	TA-42	Interior Partition (2.5"x30")
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QTY.		
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____	TA-92	12" Apron (in front of sink)
____	TA-92A	17" Stainless Steel Apron to Cover Sink Bowls and Support Lever Drain Handles
____	TA-116	Adjustable Enclosed Base Cabinet Mid Shelf- Add to Price of Enclosed Base Table with Fixed Mid Shelf **(M)**. Shelves Over 36" In Length Require Multiple Sections With Center Partition. For Partial Shelves Add To Price Of Shelf.
____	TA-130	Cutlery Dispenser Holder (Undercounter Mounted)
____	TA-135	Plate Shelf (Undercounter Mounted)
____	TA-205	Connect Cafeteria Items (Per Joint Between 2 Tables. Requires Casters)
____	TA-900	Upgrade Table To be Height Adjustable In Field (Up to 6" Only. Unit Ships Set Up)

ELECTRICAL & DATA PORT OUTLETS

TA-62
Duplex Outlet

TA-62A
GFI Duplex Outlet

TA-62D
GFI Doghouse Outlet

TA-112
Hubble Outlet

QTY.		
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____	TA-62A	GFI Duplex Outlet & Cover Plate in a VKS Splash. NEMA 5-20R
____	TA-62C	GFI Duplex Outlet & Cover Plate Below Shelf Top. NEMA 5-20R

QTY.		
____	TA-62D	GFI Duplex Outlet & Cover Plate in a Doghouse. NEMA 5-20R
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____	TA-112	Hubble Outlet
____	TA-622	CAT-5 Data Port Outlet. Cable Not Included

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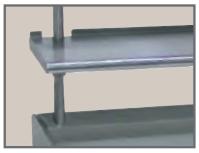
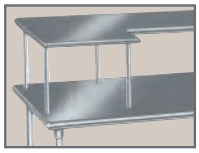


TA-9A
1"Turn Up

TA-22A
Square Edge

TA-71
Heat Lamp Mounting Provision

TA-100A
Bull Nose



TA-102
24" x 24" Extension

QTY.		
____	TA-9A	Partial 1" Turn-Up for all Table Mt. Shelves
____	TA-22A	Square Edge on Overshelf
____	TA-26-10	Welded Wall Shelf Brackets for 10" Wide Shelf
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QTY.		
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____	TA-84B	Knife Rack for Poly Top Tables
____	TA-84C	Knife Rack for Square Edge Tables
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____	TA-99	16 Ga. S/S 304 Upgrade for Wall & Over Shelves
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UNDERSHELF MODIFICATIONS

QTY.		
____	TA-9	1-1/2" Turn-Up for Undershelves
____	TA-17	Upgrade Undershelf to a Marine Edge (Must add TA-23)
____	TA-48	12"x12" Cut-Out in Back Panel or Undershelf for Plumbing

QTY.		
____	TA-94	Upgrade 16 Ga. 304 S/S Undershelf
____	TA-94A	Upgrade 14 Ga. 304 S/S Undershelf
____	TA-366	Reinforced Understructure For Undershelves

SIZE MODIFICATIONS

QTY.		
____	TA-33	Special Working Height
____	TA-59	36" Wide Equipment Stand
____	TA-6	Extra Length for Standard Tables Over 12' (Tables Over 14' Require Field Joint TA-57)
____	TA-61	Special Sizing Charge (Larger Unit Cut Down to Smaller Size)
____	TA-61A	Special Modification Charge

QTY.		
____	TA-65	Enclosed Base Units Over 12' (Open Base Table)
____	TA-66	Enclosed Base Units Over 12' (Sliding Door Units)
____	TA-67	Enclosed Base Units Over 12' (Hinged Door Units)
____	TA-105	Modify Enclosed Base Table w/ Drawers to 24" Width
____	TA-110	Modify Enclosed Base Table w/ Drawers to 36" Width

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LEG MODIFICATIONS

QTY.		
____	TA-16	1 Galvanized Leg with Plastic Bullet Foot (34 1/2" Total Length)
____	TA-16-4	4 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-16-6	6 Galvanized Legs with Plastic Bullet Feet (34 1/2" Total Length)
____	TA-19	Stainless Steel Flanged Bullet Foot For Work Table
____	TA-19L	S/S Bolt-on Leg w/ Flanged Foot For Enclosed Base Table
____	TA-20	1 Stainless Steel Leg with S/S Bullet Foot (34 1/2" Total Length)
____	TA-20-4	4 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)

QTY.		
____	TA-20-6	6 Stainless Steel Leg with S/S Bullet Feet (34 1/2" Total Length)
____	TA-20L	Replacement Bolt-on Leg For Enclosed Base Table
____	TA-21	Stainless Steel Bullet Foot
____	TA-68	Relocate Rear Cross Rail To Center (for Open Base Tables Only)
____	TA-72	Leg to Wall Brace (Set per table)
____	TA-95	Upgrade 16 Ga. 304 S/S Legs Only

WORK TABLE CASTERS

Standard Casters

Maintains the Standard 35-1/2" Working Height

200 lbs. Load Capacity Per Caster

When Used w/ Stainless Steel Legs

TA-25S-4 **Set of 4** (Two with Brakes)
TA-25S-6 **Set of 6** (Two with Brakes)

When Used w/ Galvanized Legs

TA-25G-4 **Set of 4** (Two with Brakes)
TA-25G-6 **Set of 6** (Two with Brakes)

Replacement Casters

For Work Tables

TA-25 **Set of 4** (Two with Brakes)
TA-25A **Set of 6** (Two with Brakes)

200 lbs. Load Capacity Per Caster

Optional Standard Caster Upgrades:

TA-25B **Set** — For brakes on all wheels (Standard Casters) - Add price to the following models: TA-25, TA-25A, TA-25S-4, TA-25S-6, TA-25G-4, TA-25G-6

TA-25C **Per Caster** — Upgrade Standard Caster with Heavy Duty Urethane Wheels (Per Caster)

EQUIPMENT STAND CASTERS

Standard Casters

5" Urethane Wheels.
Maintains the Standard 24" Working Height

200 lbs. Load Capacity Per Caster

w/ Stainless Steel Legs
TA-25ES **Set of 4** (Two with Brakes)

w/ Galvanized Legs
TA-25EG **Set of 4** (Two with Brakes)

HEAVY DUTY Casters

5" Urethane Wheels

400 lbs. Load Capacity Per Caster

TA-255 Super Heavy Duty Set of 4 (Two with Brakes)
TA-256 Super Heavy Duty Set of 6 (Two with Brakes)

Enclosed Base Table Casters

Easy Bolt-On Style

TA-255P **Set of 4** (Two with Brakes)
TA-255AP **Set of 6** (Two with Brakes)

300 lbs. Load Capacity Per Caster

For brakes on all wheels (Enclosed Base Casters) - Add price to models: TA-255P or TA-255AP

TA-255PB

Optional Equipment Stand Caster Upgrade:

TA-255B For brakes on all wheels (Equipment Casters) - Add price to any of the following models: TA-255, TA-256, TA-25ES, TA-25EG

Contact Our SMART FABRICATION™ Department for more information at 800-645-3166 or email in your specifications to smartfab@advancetabco.com

ADVANCE TABCO is constantly engaged in a program of improving our products. Therefore, we reserve the right to change specifications without prior notice.

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Submittal Sheet

09/13/2019

ITEM# 14 - SANDWICH / SALAD PREPARATION REFRIGERATOR (1 EA REQ'D)

Hoshizaki SR48A-12

Steelheart Series Sandwich Top Refrigerator, reach-in, two-section, 48"W, 13.66 cu. ft., self-contained rear mounted refrigeration system, (2) solid hinged doors, (2) adjustable shelves, provided with (12) 1/6 pans 4" deep, 6" maximum pan depth (top rail), 10" D x 1/2" thick white polyethylene cutting board & a full set of adapter bars, stainless steel interior, stainless steel exterior front, sides & hinged top cover, (4) 6" casters (2 with brakes), R290 Hydrocarbon refrigerant, 1/5 HP, NEMA 5-15P, cETLus, ETL-Sanitation

ACCESSORIES

Mfr	Qty	Model	Spec
Hoshizaki	1		Warranty: 3-Year parts & labor on entire machine
Hoshizaki	1		Warranty: 5-Year parts on compressor
Hoshizaki	1		115v/60/1-ph, 2.5 amps, standard

ELECTRICAL

	VOLTS	CYCLE	PHASE	CONN	AFF	NEMA	AMPS	KW	HP	MCA	MOCP
1				Cord & Plug		5-15P			1/5		
2	115	60	1				2.5				

SR48A-8/-12

Sandwich Top 48” Prep Refrigerators

STEELHEART

SR48A-8/-12
02/08/19
Item # 13469

Item #: _____

Project: _____

Qty: _____

AIA#: _____

W x D x H
48” x 30” x 44.25”*
*with 6” casters

SR48A-8

SR48A-12

Dimensions / Capacity	Two-Section SR48A-8/ -12
Interior Storage Capacity (CF)	13.66 ft³
Interior Storage Capacity (CF) (AHAM)	11.95 ft³
Overall Width x Depth (including 1” bumper)	48” x 31”
Height (including 6” casters)	44.25”
Depth with Cutting Board Installed	30.7”
Depth with Door Open at 90° (including 1” bumper)	52.5”
Door Opening Width x Height	19.5” x 23”
Adjustable Shelves	2
Shelf Dimensions (W x D)	21.25” x 16”
Pan Capacity (# of 1/6 size x 4” deep)	8 / 12
Crated Shipping Weight	225 lbs.
Crated Length x Width x Height	52.5” x 32” x 45.75”

Electrical / Refrigeration	Two-Section SR48A-8/ -12
Voltage	115/60/1
HACR Breaker	15.0 Amps
Electrical Connection (NEMA)	5-15P
Voltage Range	104-126
Ambient Temp. Range	45° to 100°F
Control Setpoint Range	32° to 52°F
Amperage	2.5
Energy Consumption (kWh/day) @NSF	3.2
Heat Rejection (BTU/Hr.) @NSF	452.3
Approx. Nominal Compres. BTU/HR (HP)	1354 (1/5HP)
Refrigerant / Charge Amount (oz)	R290 (2.9oz)

Options

- ☐ Stainless steel back
- ☐ Stainless steel lift of covers
- ☐ Additional epoxy shelves
- ☐ Composite cutting board (HS-5268)
- ☐ Rail adapter bars
- ☐ 2.25” Casters
- ☐ 4” Casters
- ☐ Overshelves

Warranty

* 3 Year - parts and Labor on entire machine.
5 Year - Parts on Compressor
Valid in United States, Canada, Puerto Rico and U.S. Territories. Contact factory for warranty in other countries.

Features

- **Engineered to maintain NSF-7 temperatures in 100°F ambient. (Certified to NSF-7 temperatures in 86°F ambient.)**
- **Stainless steel exterior front, sides and top with stainless steel interior sides, back, and floor**
- **Front breathing air flow design**
- Environmentally friendly R290 hydrocarbon refrigerant
- Cabinet and doors are insulated with 2” CFC free, foamed in place polyurethane
- Exclusive “stepped” door design to protect door gasket
- Spring assisted self-closing doors with stay open feature
- Extruded aluminum flush mount door handle
- Field reversible doors
- Magnetic door gasket is easily removable for cleaning
- Innovative air distribution system distributes air evenly to maintain product temperature
- Provided with a full complement of polycarbonate plastic 1/6th size pans, 4” deep
- Rails will also accept 6” deep pans for 50% more pan volume
- 48” x 10” x 1/2” thick white polyethylene cutting board is standard
- E-coated evaporator coil
- One epoxy coated shelf per section is standard
- Anodized aluminum shelf supports adjustable in 1/2” increments
- Removable stainless steel prep guard simplifies cleanup from accidental rail pan drips and spills
- Standard with 6” casters (two with brakes)
- 10 ft. cord and plug

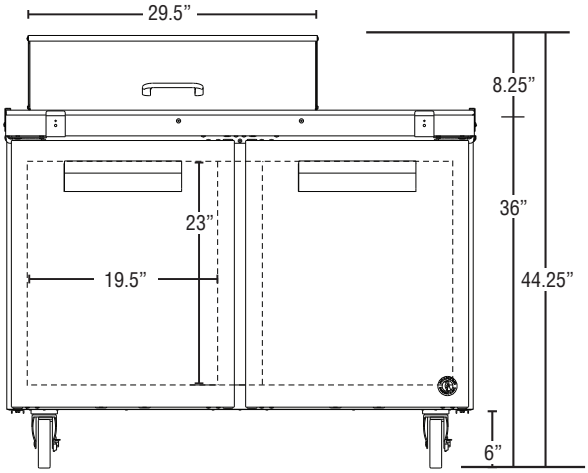
Hoshizaki reserves the right to change specifications without notice.

SR48A-8/-12

Sandwich Top 48” Prep Refrigerators

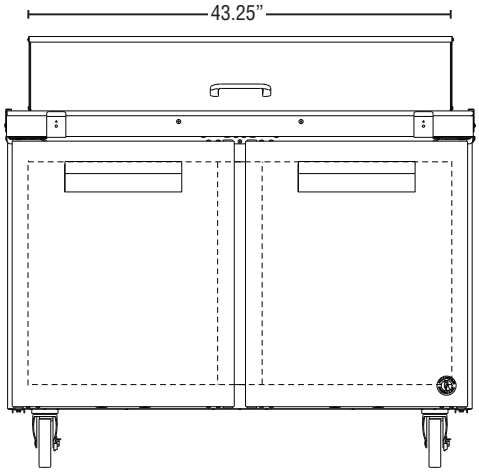
SR48A-8/-12
02/08/19
Item # 13469

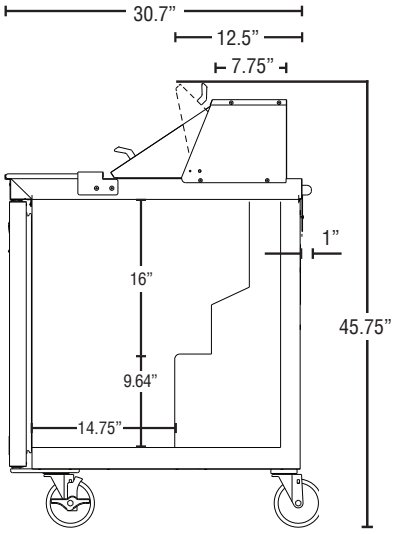
FRONT VIEW



SR48A-8

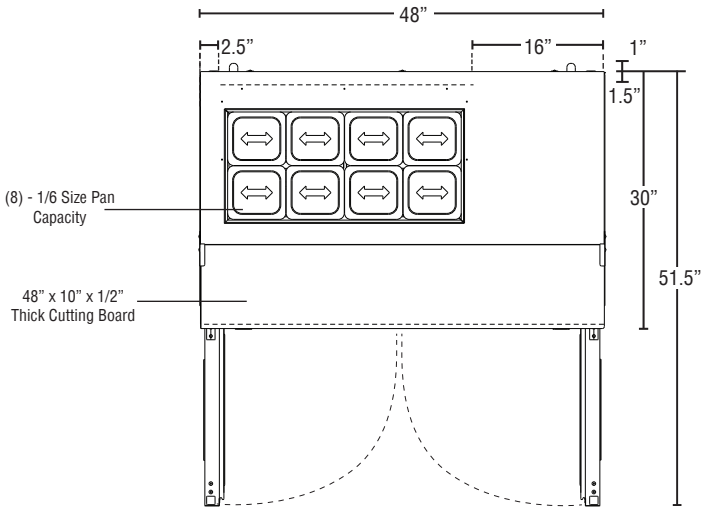
SIDE VIEW



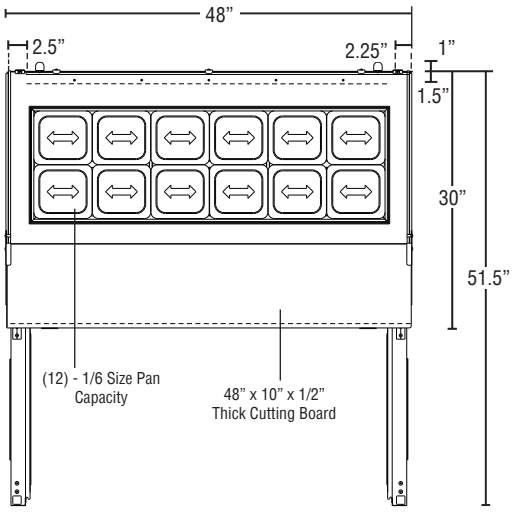


SR48A-12

PLAN VIEW



SR48A-8
(Showing Door Swing)



SR48A-12

Cabinet Construction

The exterior cabinet top, front, and sides, are constructed of high quality stainless steel. Cabinet is provided with a stainless steel top enclosure and an easily removable stainless steel insulated lift-up cover. The exterior back and bottom are constructed of coated steel. The cabinet interior back and sides are stainless steel with an ABS ceiling and stainless steel floor. One heavy duty epoxy coated shelf per section is standard. Mounted on anodized aluminum pilasters the shelf is adjustable in 1/2” increments. Cabinet walls are insulated with 2” of environmentally friendly, CFC free, foamed in place polyurethane. 6” polyolefin, stem casters (two with brakes) are standard. Preparation tables are supplied with a 48” x 10” x 1/2” thick N.S.F. approved white polyethylene cutting board.

Door Construction

Doors are constructed of high grade stainless steel exterior with an ABS interior liner and are insulated with 2” free, foamed in place polyurethane. Hoshizaki’s exclusive “stepped” design protects the gasket while product is removed from the cabinet. Doors are provided with a one piece, extruded aluminum, flush mount handle. Spring assisted self-closing doors are equipped with a stay open feature past 90 degrees. Snap-in magnetic door gaskets are durable and easily removed for cleaning. Field reversible door hinging is standard.

Refrigeration System

Front breathing refrigeration system allows unit to be built in to any enclosure with zero side or rear clearance. The high efficiency refrigeration system is self-contained with an E-coated evaporator for extended life. Condensate removal is accomplished with an energy efficient non-electric evaporation system. A capillary tube controls the flow of environmentally friendly R290 refrigerant through the evaporator. Unit uses a heated, time initiated defrost to eliminate any ice on the evaporator coil. An innovative air distribution system distributes air evenly around the pans. Engineered to maintain NSF-7 temperatures in 100°F ambient. (Certified to NSF-7 temperatures in 86°F ambient.) Preparation tables are supplied with a full complement of N.S.F. approved plastic 1/6 size pans, 4” deep and stainless steel adapter bars. Rails will also accommodate 6” deep pans. Pans are located 1.5” below the top to keep food product within easy reach. 115 volt units are equipped with a ten foot cord and NEMA rated plug (20.0 amps or less).

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Submittal Sheet

09/13/2019

ITEM# 15 - WIRE SHELVING (4 EA REQ'D)

Advance Tabco EG-2472

Special Value Wire Shelving, 72"W x 24"D, heavy duty, green epoxy coated, NSF

ACCESSORIES

Mfr	Qty	Model	Spec
Advance Tabco	4	EGP-74	Special Value Wire Shelving Post, 74"H, numbered, heavy duty, green epoxy coated, adjustable feet, NSF

ADVANCE TABCO
SMART FABRICATION™

GREEN EPOXY COATED

WIRE SHELVING

Item #: _____ ***Qty #:*** _____

Model #: _____

Project #: _____

with
Optional Casters

GREEN EPOXY POSTS

MODEL #	Post Height	Boxed Weight
EGP-14	14”	4 lbs.
EGP-34	34”	8 lbs.
EGP-54	54”	12 lbs.
EGP-64	64”	15 lbs.
EGP-74	74”	17 lbs.
EGP-86	86”	20 lbs.

GREEN EPOXY POSTS WITH ADJUSTABLE FOOT

Numbered Posts

Rubber Caster

Poly Caster

GREEN EPOXY POSTS FOR CASTERS

MODEL #	Post Height	Post Height with Casters	Boxed Weight
EGPC-14	14”	20”	4 lbs.
EGPC-34	34”	40”	8 lbs.
EGPC-54	54”	60”	12 lbs.
EGPC-64	64”	70”	15 lbs.
EGPC-74	74”	80”	17 lbs.
EGPC-86	86”	92”	20 lbs.

Posts are packed 4 to a box.

WIRE SHELVING

MODEL #	Shelf Size	Boxed Weight
EG-1424	14” x 24”	35 lbs.
EG-1430	14” x 30”	41 lbs.
EG-1436	14” x 36”	47 lbs.
EG-1442	14” x 42”	52 lbs.
EG-1448	14” x 48”	58 lbs.
*EG-1460	14” x 60”	38 lbs.
*EG-1472	14” x 72”	45 lbs.
EG-1824	18” x 24”	39 lbs.
EG-1830	18” x 30”	45 lbs.
EG-1836	18” x 36”	51 lbs.
EG-1842	18” x 42”	56 lbs.
EG-1848	18” x 48”	64 lbs.
*EG-1854	18” x 54”	35 lbs.
*EG-1860	18” x 60”	41 lbs.
*EG-1872	18” x 72”	49 lbs.
EG-2124	21” x 24”	41 lbs.
EG-2130	21” x 30”	48 lbs.
EG-2136	21” x 36”	55 lbs.
EG-2142	21” x 42”	63 lbs.
EG-2148	21” x 48”	70 lbs.
*EG-2154	21” x 54”	41 lbs.
*EG-2160	21” x 60”	45 lbs.
*EG-2172	21” x 72”	48 lbs.
EG-2424	24” x 24”	44 lbs.
EG-2430	24” x 30”	51 lbs.
EG-2436	24” x 36”	58 lbs.
EG-2442	24” x 42”	64 lbs.
EG-2448	24” x 48”	72 lbs.
*EG-2454	24” x 54”	41 lbs.
*EG-2460	24” x 60”	47 lbs.
*EG-2472	24” x 72”	55 lbs.

24” to 48” length shelves are packed 4 to a box and *54”, 60” and 72” shelves are packed 2 to a box.

FEATURES:

Each shelf holds up to 800 lbs. evenly distributed weight.

NSF approved for dry storage and wet environments only.

Posts are numbered for easy assembly

CONSTRUCTION:

Unit assembles using tapered split sleeves.

For mobile units, 5” swivel Rubber or Poly casters includes set of 4 casters, (2 with brakes) and 4 donut bumpers.

set of 4 casters, (2 with brakes) and 4 donut bumpers.

MATERIAL:

Zinc plated wire with green epoxy coating.

OPTIONAL ACCESSORIES	MODEL #	Qty
5” Rubber Swivel Stem Caster	EC-25	
5” Poly Swivel Stem Caster	EC-26	

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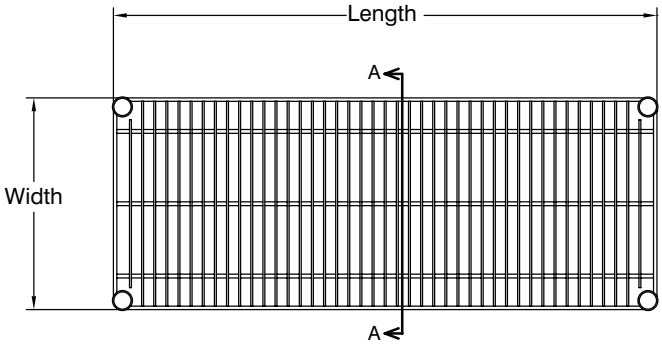
For Smart Fabrication™ Quotes:
Email: smartfab@advancetabco.com or **Fax:** 631-586-2933

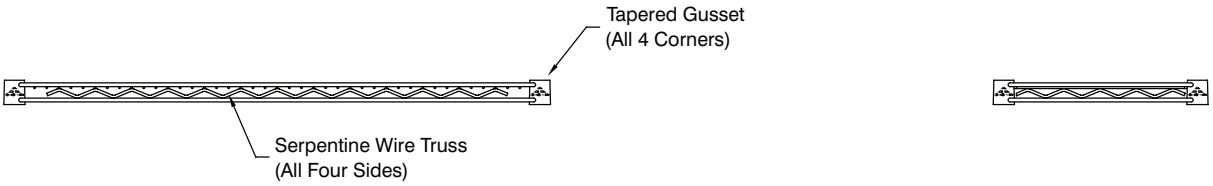
REF-S

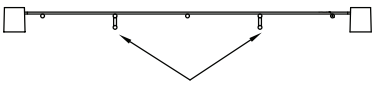
DETAILS and SPECIFICATIONS

TOL ± .500”

ALL DIMENSIONS ARE TYPICAL







SECTION A-A (24" Wide)

SECTION A-A (14”, 18" & 21" Wide)

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GREEN EPOXY COATED

WIRE SHELVING

Item #: _____ *Qty #:* _____

Model #: _____

Project #: _____

with Optional Casters

GREEN EPOXY POSTS

MODEL #	Post Height	Boxed Weight
EGP-14	14”	4 lbs.
EGP-34	34”	8 lbs.
EGP-54	54”	12 lbs.
EGP-64	64”	15 lbs.
EGP-74	74”	17 lbs.
EGP-86	86”	20 lbs.

GREEN EPOXY POSTS WITH ADJUSTABLE FOOT

Numbered Posts

Rubber Caster

Poly Caster

GREEN EPOXY POSTS FOR CASTERS

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Posts are packed 4 to a box.

WIRE SHELVING

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*EG-2460	24” x 60”	47 lbs.
*EG-2472	24” x 72”	55 lbs.

24” to 48” length shelves are packed 4 to a box and *54”, 60” and 72” shelves are packed 2 to a box.

FEATURES:

Each shelf holds up to 800 lbs. evenly distributed weight.

NSF approved for dry storage and wet environments only.

Posts are numbered for easy assembly

CONSTRUCTION:

Unit assembles using tapered split sleeves.

For mobile units, 5” swivel Rubber or Poly casters includes set of 4 casters, (2 with brakes) and 4 donut bumpers.

set of 4 casters, (2 with brakes) and 4 donut bumpers.

MATERIAL:

Zinc plated wire with green epoxy coating.

OPTIONAL ACCESSORIES	MODEL #	Qty
5” Rubber Swivel Stem Caster	EC-25	
5” Poly Swivel Stem Caster	EC-26	

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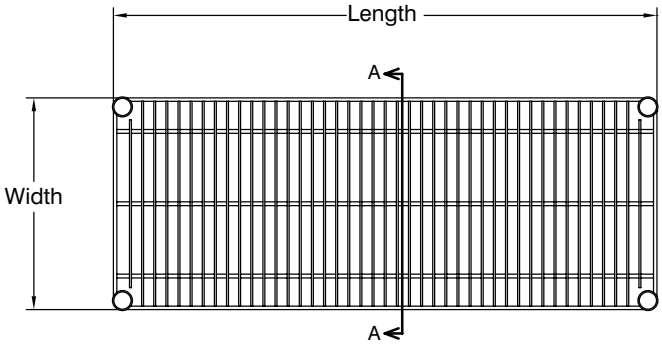
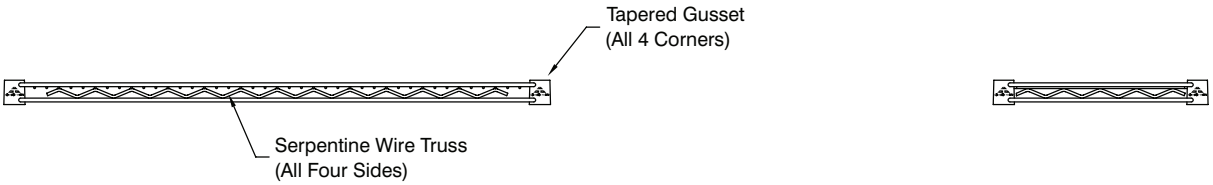
REF-S

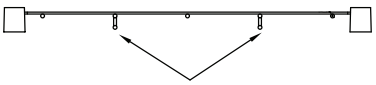
DETAILS and SPECIFICATIONS

TOL ± .500”

ALL DIMENSIONS ARE TYPICAL







Serpentine Wire Truss

SECTION A-A (24" Wide)

Serpentine Wire Truss

SECTION A-A (14”, 18" & 21" Wide)

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Submittal Sheet

09/13/2019

ITEM# 16 - SHELVING, WALL MOUNTED (1 EA REQ'D)

Advance Tabco WS-12-48

Shelf, wall-mounted, 48"W x 12"D, 1-5/8" bullnose front edge, 1-1/2"H rear up-turn, 18/430 satin finish stainless steel, NSF

ADVANCE TABCO
SMART FABRICATION™

STAINLESS STEEL

WALL SHELVES

NSF

Item #: _____ Qty #: _____

Model #: _____

Project #: _____

FEATURES:

Brackets can be positioned to accommodate wall studs.

Furnished with a 1-5/8" Bullnose edge with a 1-1/2" turn-up edge at rear. Ends are turned down square.

MATERIAL:

16 Gauge Series - 304 stainless steel polished to a satin finish.

18 Gauge Series - 430 stainless steel polished to a satin finish.

CONSTRUCTION:

Secured to wall by means of bolts through support brackets.

Units 7 ft. and larger are furnished with 3 brackets.

	10" Wide			12" Wide			15" Wide			18" Wide			
L	16 Ga.	18 Ga.	Approx. Wt.	16 Ga.	18 Ga.	Approx. Wt.	16 Ga.	18 Ga.	Approx. Wt.	16 Ga.	18 Ga.	Approx. Wt.	Approx. Cu. Ft.
24"	WS-10-24-16	WS-10-24	8 lbs.	WS-12-24-16	WS-12-24	9 lbs.	WS-15-24-16	WS-15-24	11 lbs.	WS-18-24-16	WS-18-24	14 lbs.	3
30"	-	-	-	WS-12-30-16	WS-12-30	12 lbs.	-	-	-	-	-	-	4
36"	WS-10-36-16	WS-10-36	10 lbs.	WS-12-36-16	WS-12-36	12 lbs.	WS-15-36-16	WS-15-36	15 lbs.	WS-18-36-16	WS-18-36	21 lbs.	4
42"	-	-	-	WS-12-42-16	WS-12-42	14 lbs.	-	-	-	-	-	-	5
48"	WS-10-48-16	WS-10-48	12 lbs.	WS-12-48-16	WS-12-48	14 lbs.	WS-15-48-16	WS-15-48	18 lbs.	WS-18-48-16	WS-18-48	24 lbs.	5
60"	WS-10-60-16	WS-10-60	15 lbs.	WS-12-60-16	WS-12-60	17 lbs.	WS-15-60-16	WS-15-60	23 lbs.	WS-18-60-16	WS-18-60	28 lbs.	6
72"	WS-10-72-16	WS-10-72	17 lbs.	WS-12-72-16	WS-12-72	21 lbs.	WS-15-72-16	WS-15-72	28 lbs.	WS-18-72-16	WS-18-72	32 lbs.	7
84"	WS-10-84-16	WS-10-84	20 lbs.	WS-12-84-16	WS-12-84	25 lbs.	WS-15-84-16	WS-15-84	32 lbs.	WS-18-84-16	WS-18-84	36 lbs.	8
96"	WS-10-96-16	WS-10-96	23 lbs.	WS-12-96-16	WS-12-96	28 lbs.	WS-15-96-16	WS-15-96	36 lbs.	WS-18-96-16	WS-18-96	42 lbs.	10
108"	WS-10-108-16	WS-10-108	28 lbs.	WS-12-108-16	WS-12-108	32 lbs.	WS-15-108-16	WS-15-108	40 lbs.	WS-18-108-16	WS-18-108	48 lbs.	11
120"	WS-10-120-16	WS-10-120	32 lbs.	WS-12-120-16	WS-12-120	36 lbs.	WS-15-120-16	WS-15-120	44 lbs.	WS-18-120-16	WS-18-120	54 lbs.	12
132"	WS-10-132-16	WS-10-132	36 lbs.	WS-12-132-16	WS-12-132	42 lbs.	WS-15-132-16	WS-15-132	49 lbs.	WS-18-132-16	WS-18-132	60 lbs.	13
144"	WS-10-144-16	WS-10-144	40 lbs.	WS-12-144-16	WS-12-144	48 lbs.	WS-15-144-16	WS-15-144	55 lbs.	WS-18-144-16	WS-18-144	66 lbs.	14

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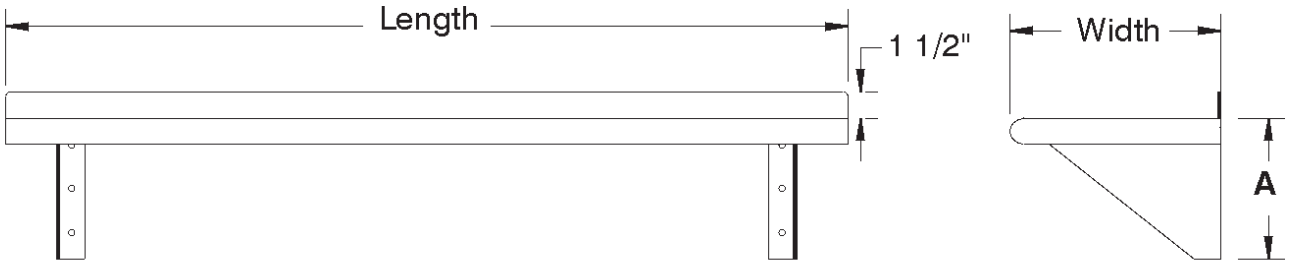
REF-L

DETAILS and SPECIFICATIONS

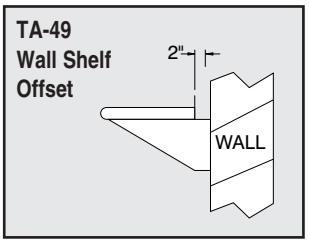
TOL ± .500" ALL DIMENSIONS ARE TYPICAL



Width	A
10"	8 1/2"
12"	10 1/2"
15"	13 1/2"
18"	16 1/2"

Wall Shelf Options

PRT-1	Printer Shelf
TA-22A	Square Edge Shelf
TA-26	Welded Shelf Brackets
TA-49	Wall Shelf 2" Offset
TA-71	Heat Lamp Provision
TA-77	Check Minder
TA-77A	Concealer for Heat Lamp (Requires TA-77)
TA-99A	14 Ga. S/S 304 Upgrade for Overshelves
TA-100A	Bullnose Edge On All 4 Sides of Shelf
TA-102	6" Cantilever Shelf Offset



Requirements for NSF Installations

1. Install at least 60" above floor.
2. Limit to dry storage.
3. Avoid contact with liquids.
4. For "Ganging-Up" installation, allow at least 2" between units or mount units side by side and seal joints with an approved sealant.

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Submittal Sheet

09/13/2019

ITEM# 17 - SHELVING, WALL MOUNTED (1 EA REQ'D)

Advance Tabco WS-12-36

Shelf, wall-mounted, 36"W x 12"D, 1-5/8" bullnose front edge, 1-1/2"H rear up-turn, 18/430 satin finish stainless steel, NSF

ADVANCE TABCO
SMART FABRICATION™

STAINLESS STEEL

WALL SHELVES

NSF

Item #: _____ Qty #: _____

Model #: _____

Project #: _____

FEATURES:

Brackets can be positioned to accommodate wall studs.

Furnished with a 1-5/8" Bullnose edge with a 1-1/2" turn-up edge at rear. Ends are turned down square.

MATERIAL:

16 Gauge Series - 304 stainless steel polished to a satin finish.

18 Gauge Series - 430 stainless steel polished to a satin finish.

CONSTRUCTION:

Secured to wall by means of bolts through support brackets.

Units 7 ft. and larger are furnished with 3 brackets.

	10" Wide			12" Wide			15" Wide			18" Wide			
L	16 Ga.	18 Ga.	Approx. Wt.	16 Ga.	18 Ga.	Approx. Wt.	16 Ga.	18 Ga.	Approx. Wt.	16 Ga.	18 Ga.	Approx. Wt.	Approx. Cu. Ft.
24"	WS-10-24-16	WS-10-24	8 lbs.	WS-12-24-16	WS-12-24	9 lbs.	WS-15-24-16	WS-15-24	11 lbs.	WS-18-24-16	WS-18-24	14 lbs.	3
30"	-	-	-	WS-12-30-16	WS-12-30	12 lbs.	-	-	-	-	-	-	4
36"	WS-10-36-16	WS-10-36	10 lbs.	WS-12-36-16	WS-12-36	12 lbs.	WS-15-36-16	WS-15-36	15 lbs.	WS-18-36-16	WS-18-36	21 lbs.	4
42"	-	-	-	WS-12-42-16	WS-12-42	14 lbs.	-	-	-	-	-	-	5
48"	WS-10-48-16	WS-10-48	12 lbs.	WS-12-48-16	WS-12-48	14 lbs.	WS-15-48-16	WS-15-48	18 lbs.	WS-18-48-16	WS-18-48	24 lbs.	5
60"	WS-10-60-16	WS-10-60	15 lbs.	WS-12-60-16	WS-12-60	17 lbs.	WS-15-60-16	WS-15-60	23 lbs.	WS-18-60-16	WS-18-60	28 lbs.	6
72"	WS-10-72-16	WS-10-72	17 lbs.	WS-12-72-16	WS-12-72	21 lbs.	WS-15-72-16	WS-15-72	28 lbs.	WS-18-72-16	WS-18-72	32 lbs.	7
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144"	WS-10-144-16	WS-10-144	40 lbs.	WS-12-144-16	WS-12-144	48 lbs.	WS-15-144-16	WS-15-144	55 lbs.	WS-18-144-16	WS-18-144	66 lbs.	14

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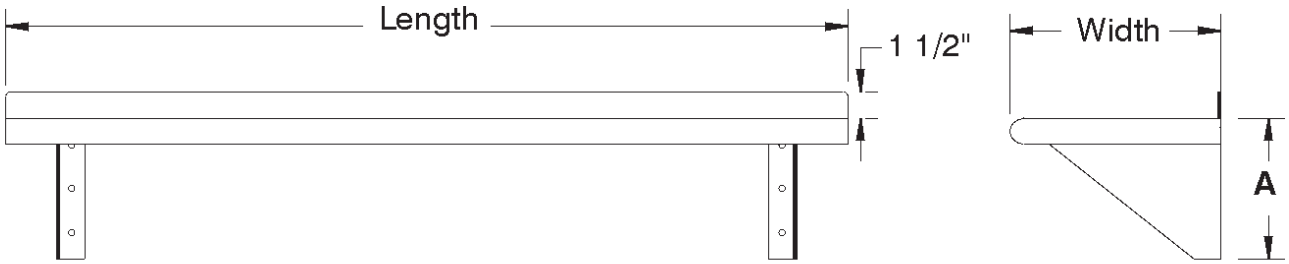
REF-L

DETAILS and SPECIFICATIONS

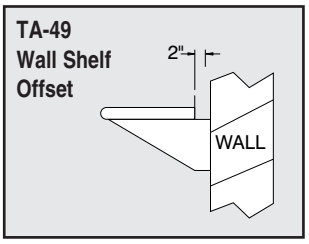
TOL ± .500" ALL DIMENSIONS ARE TYPICAL



Width	A
10"	8 1/2"
12"	10 1/2"
15"	13 1/2"
18"	16 1/2"

Wall Shelf Options

PRT-1	Printer Shelf
TA-22A	Square Edge Shelf
TA-26	Welded Shelf Brackets
TA-49	Wall Shelf 2" Offset
TA-71	Heat Lamp Provision
TA-77	Check Minder
TA-77A	Concealer for Heat Lamp (Requires TA-77)
TA-99A	14 Ga. S/S 304 Upgrade for Overshelves
TA-100A	Bullnose Edge On All 4 Sides of Shelf
TA-102	6" Cantilever Shelf Offset



Requirements for NSF Installations

1. Install at least 60" above floor.
2. Limit to dry storage.
3. Avoid contact with liquids.
4. For "Ganging-Up" installation, allow at least 2" between units or mount units side by side and seal joints with an approved sealant.

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Submittal Sheet

09/13/2019

ITEM# 18 - MICROWAVE OVEN, SHELF (1 EA REQ'D)

Advance Tabco MS-24-24

Microwave Shelf, wall-mounted, 24"W x 24"D, stainless steel, NSF

ADVANCE TABCO
SMART FABRICATION™

STAINLESS STEEL

MICROWAVE SHELVES

NSF

Wall Mounted

Item #: _____ Qty #: _____
Model #: _____
Project #: _____

Model #	Size W x L	Approx. Wt.	Approx. Cu. Ft.
MS-18-24	18" x 24"	27 lbs.	5
MS-20-30	20" x 30"	36 lbs.	5
MS-24-24	24" x 24"	32 lbs.	5
MS-24-36	24" x 36"	38 lbs.	7

CONSTRUCTION:

All TIG welded.

Exposed surfaces polished to a satin finish.

MATERIAL:

18 gauge stainless steel.

OPTIONAL TABLE MOUNTED UNITS:

Mounted on tubular supports and fastened to the top with expanding tubular connectors.

Please use OTS Series Shelving and add TA-102 for 24" x 24" extension for table mounted version.

FOR TABLE MOUNTED MICROWAVE SHELF:

Model #	
MST-24-24	
MST-24-36	

MST Series

TA-102

TABLE MOUNTED SHELF WITH MICROWAVE EXTENTION

Use **OTS Shelving** and add **TA-102** for Microwave 24" x 24" extension. Specify Right or Left.

OPTIONAL:

2" Hole with Grommet For Appliance Cord

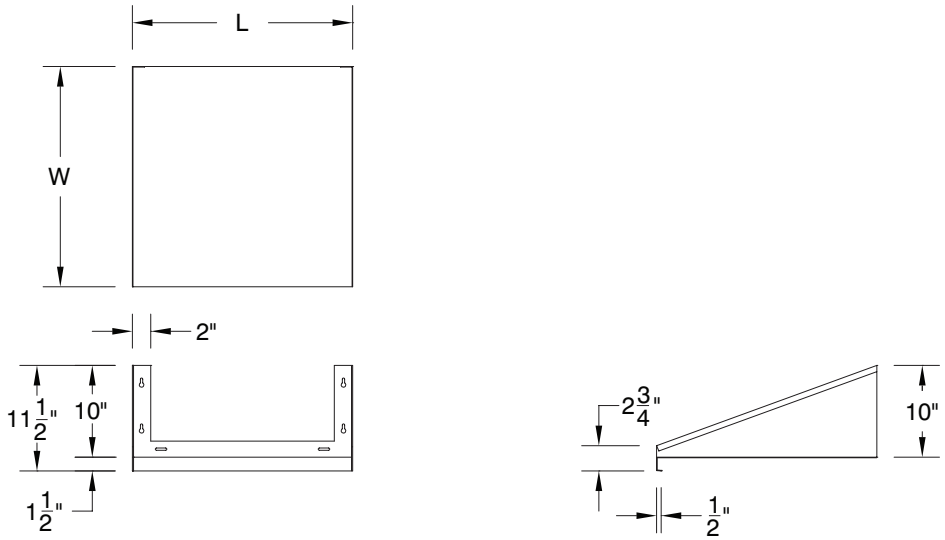
TA-108

DETAILS and SPECIFICATIONS

TOL ± .500"

ALL DIMENSIONS ARE TYPICAL

WALL MOUNTED



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SECTION 12 36 00
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops for architectural cabinetwork.

1.02 DEFINITION

A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.03 RELATED REQUIREMENTS

A. Section 06 41 00 - Architectural Casework

B. Section 09 06 00 - Finish Schedule

C. Section 09 30 00 - Tiling

1.04 ALTERNATIVES

A. See Section 01 2300 - Alternates, for product alternatives affecting this section.

1.05 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

B. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: 3 samples for each finish product specified, minimum size 2 inches representing actual product, color, and patterns.

F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

G. Installation Instructions: Manufacturer's installation instructions and recommendations.

H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.07 QUALITY ASSURANCE

A. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.

B. Qualifications:
   1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

C. Fabricator/installer qualifications:
   1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

D. Applicable standards:
   1. Standards of the following, as referenced herein:

a. American National Standards Institute (ANSI)
b. American Society for Testing and Materials (ASTM)
c. National Electrical Manufacturers Association (NEMA)
d. NSF International

2. Fire test response characteristics:
   a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
      1) Flame Spread Index: 25 or less.
      2) Smoke Developed Index: 450 or less.

E. Coordination drawings:
   1. Shall be prepared indicating:
      a. Plumbing work.
      b. Electrical work.
      c. Miscellaneous steel for the general work.
      d. Indicate location of all walls (rated and non-rated), blocking locations and recessed wall items, etc.
   2. Content:
      a. Project-specific information, drawn accurately to scale.
      b. Do not base coordination drawings on reproductions of the contract documents or standard printed data.
   3. Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.
      a. Provide alternate sketches to designer for resolution of such conflicts.
         1) Minor dimension changes and difficult installations will not be considered changes to the contract.
      b. Drawings must be complete and submitted to the architect within 60 days after award of contract for record only.
         1) No review or approval will be forthcoming.
         2) Coordination drawings are required for the benefit of contractor's fabricators/installers as an aid to coordination of their work so as to eliminate or reduce conflicts that may arise during the installation of their work.

F. Job mock-up:
   1. Prior to fabrication of architectural millwork, erect sample unit to further verify selections made under sample submittals and to demonstrate the quality of materials and execution if requested by architect.

G. Pre-installation conference:
   1. Conduct conference at project site one month prior to installation.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.09 WARRANTY

A. Provide manufacturer's warranty against defects in materials.
   1. Warranty shall provide material and labor to repair or replace defective materials.
   2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.
      a. Warranty shall be transferable to subsequent owner for remainder of warranty period.
   3. Installed Warranty:

a. To qualify for the optional Installed Warranty, fabrication and installation must be performed by a Certified Fabrication/Installation source who will provide a brand plate for the application.
b. This warranty covers all fabrication and installation performed by the certified/approved source subject to the specific wording contained in the Installed Warranty Card.

4. Manufacturer's warranty period:
a. Ten years from date of substantial completion.

1.10 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Countertop Fabrications
1. Subject to compliance with requirements, provide products from manufacturer selected by Architect.
a. Solid Surface Countertops
1) Refer to Section 09 06 00 Finish Schedule
2) Substitutions: Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.
(a) Substitutions shall meet the original specification material characteristics including but not limited to durability, recycled content, color, texture, pattern and sheen.

2.02 COUNTERTOPS

A. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
1. Flat Sheet Thickness: 1/2 inch, minimum.
2. Edge Treatment as indicated on Architectural Drawings.
3. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
b. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
c. Color and Pattern: Refer to Section 09 06 00 Finish Schedule.
4. Other Components Thickness: 1/2 inch, minimum.
5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.

B. Stainless Steel Countertops
1. See drawings.

2.03 MATERIALS

A. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

B. Solid Surface Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined with joints inconspicuous in finished work. Exposed joints/seams shall not be allowed. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.

C. Joint Sealant: Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone - any type), UL-listed silicone sealant in colors matching components. Sealant to be

made by same manufacturer as the solid surface. Install applied sidesplashes using manufacturer's standard color-matched silicone sealant.

D. Joint Sealant: Mildew-resistant silicone sealant, color to match components.

2.04 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.

C. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Seal joint between back/end splashes and vertical surfaces.

3.04 CLEANING AND PROTECTION

A. Clean countertops surfaces thoroughly.

B. Protect installed products until completion of project.

C. Touch-up, repair or replace damaged products before Date of Substantial Completion.

SECTION 21 13 13
WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Fire-protection valves.
3. Fire-department connections.
4. Sprinklers.
5. Alarm devices.
6. Manual control stations.
7. Control panels.
8. Pressure gages.

1.3 DEFINITIONS

A. High-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure higher than standard 175 psig (1200 kPa), but not higher than 300 psig (2070 kPa).

B. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig (1200 kPa) maximum.

1.4 SYSTEM DESCRIPTIONS

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.5 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig (1200-kPa) minimum working pressure.

B. High-Pressure Piping System Component: Listed for 300-psig (2070-kPa) working pressure.

C. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1. Available fire-hydrant flow test records shall indicate the following conditions:
    a. Date
    b. Time
    c. Performed by
    d. Location of Residual Fire Hydrant
    e. Location of Flow Fire Hydrant
    f. Static Pressure at Residual Fire Hydrant
    g. Measured Flow at Flow Fire Hydrant
    h. Residual Pressure at Residual Fire Hydrant

D. Sprinkler system design shall be approved by authorities having jurisdiction.

1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.

   Sprinkler Occupancy Hazard Classifications:

   a. Building Service Areas: Ordinary Hazard, Group 1.
   b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
   c. Stage Area: Ordinary Hazard, Group 2.
   d. General Storage Areas: Ordinary Hazard, Group 1.
   e. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
   f. Classroom, Office and Public Areas: Light Hazard.
   g. Cafeteria Service Areas: Ordinary Hazard, Group 1.

2. Minimum Density for Automatic-Sprinkler Piping Design:

   a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. (4.1 mm/min. over 139-sq. m) area.
   b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. (6.1 mm/min. over 139-sq. m) area.
   c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. (8.1 mm/min. over 139-sq. m) area.
   d. Extra-Hazard, Group 1 Occupancy: 0.30 gpm over 2500-sq. ft. (12.2 mm/min. over 232-sq. m) area.
   e. Extra-Hazard, Group 2 Occupancy: 0.40 gpm over 2500-sq. ft. (16.3 mm/min. over 232-sq. m) area.
   f. Special Occupancy Hazard: As determined by authorities having jurisdiction.

3. Maximum Protection Area per Sprinkler: Per UL listing.

4. Maximum Protection Area per Sprinkler:

   a. Office Spaces: 225 sq. ft. (20.9 sq. m)
   b. Storage Areas: 130 sq. ft. (12.1 sq. m)
   c. Mechanical Equipment Rooms: 130 sq. ft. (12.1 sq. m)
   d. Electrical Equipment Rooms: 130 sq. ft. (12.1 sq. m)
   e. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.

5. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:

   a. Light-Hazard Occupancies: 100 gpm (6.3 L/s) for 30 minutes.
   b. Ordinary-Hazard Occupancies: 250 gpm (15.75 L/s) for 60 to 90 minutes.
   c. Extra-Hazard Occupancies: 500 gpm (31.5 L/s) for 90 to 120 minutes.

E. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated: Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.
2. Piping materials, including sprinkler specialty fittings.
3. Pipe hangers and supports, including seismic restraints.
4. Valves, including listed fire-protection valves, unlisted general-duty valves, and specialty valves and trim.
5. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
6. Hose connections, including size, type, and finish.
7. Alarm devices, including electrical data.

C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

D. Welding certificates.

E. Fire-hydrant flow test report.

F. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."

G. Field quality-control reports.

H. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
    a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13, "Installation of Sprinkler Systems."
2. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."

1.8 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Arrange for pipe spaces, chases, slots and openings in building structure during progress of construction, to allow for mechanical installations

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

1.9 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

2.2 STEEL PIPE AND FITTINGS

A. Standard Weight, Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.

B. Schedule 30, Black - Steel Pipe: ASTM A 135; ASTM A 795/A 795M, Type E; or ASME B36.10M, wrought steel; with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.

C. Thinwall Black Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.

D. Schedule 10, Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, Schedule 10 in NPS 5 (DN 125) and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10 (DN 150 to DN 250), plain end.

E. Black Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

F. Galvanized and Uncoated, Steel Couplings: ASTM A 865, threaded.

G. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

H. Malleable- or Ductile-Iron Unions: UL 860.

I. Cast-Iron Flanges: ASME 16.1, Class 125.

J. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

K. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.

L. Grooved-Joint, Steel-Pipe Appurtenances:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Anvil International, Inc.
    b. Corcoran Piping System Co.
    c. National Fittings, Inc.
    d. Shurjoint Piping Products.
    e. Tyco Fire & Building Products LP.
    f. Victaulic Company.
2. Pressure Rating: 175 psig (1200 kPa) minimum.
3. Galvanized and Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.

4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free.

1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

D. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

E. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493, solvent cement recommended by pipe and fitting manufacturer, and made for joining CPVC sprinkler pipe and fittings. Include cleaner or primer recommended by pipe and fitting manufacturer.

1. Use solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use adhesive primer that has a VOC content of 650 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 LISTED FIRE-PROTECTION VALVES

A. General Requirements:

1. Valves shall be UL listed or FM approved.
2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig (1200 kPa).
3. Minimum Pressure Rating for High-Pressure Piping: 300 psig (2070 kPa).

B. Bronze Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Fivalco Inc.
   b. Global Safety Products, Inc.
   c. Milwaukee Valve Company.
2. Standard: UL 1091.
3. Pressure Rating: 175 psig (1200 kPa).
4. Body Material: Bronze.
5. End Connections: Threaded.

C. Iron Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Anvil International, Inc.
   b. NIBCO INC.
   c. Shurjoint Piping Products.

d. Tyco Fire & Building Products LP.

e. Victaulic Company.

2. Standard: UL 1091.

3. Pressure Rating: 175 psig (1200 kPa).

4. Body Material: Cast or ductile iron.

5. Style: Lug or wafer.

6. End Connections: Grooved.

D. Check Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Cast Iron Pipe Company; Waterous Company Subsidiary.

b. Anvil International, Inc.

c. Clow Valve Company; a division of McWane, Inc.

d. Globe Fire Sprinkler Corporation.

e. NIBCO INC.

f. Potter Roemer.

g. Reliable Automatic Sprinkler Co., Inc.

h. Tyco Fire & Building Products LP.

i. Victaulic Company.

j. Viking Corporation.

k. Watts Water Technologies, Inc.

2. Standard: UL 312.

3. Pressure Rating: 300 psig (2070 kPa).

4. Type: Swing check.

5. Body Material: Cast iron.

6. End Connections: Flanged or grooved.

E. Bronze OS&Y Gate Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Crane Co.; Crane Valve Group; Crane Valves.

b. Crane Co.; Crane Valve Group; Stockham Division.

c. Milwaukee Valve Company.

d. NIBCO INC.

e. United Brass Works, Inc.

2. Standard: UL 262.

3. Pressure Rating: 175 psig (1200 kPa).

4. Body Material: Bronze.

5. End Connections: Threaded.

F. Iron OS&Y Gate Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Clow Valve Company; a division of McWane, Inc.
    b. Mueller Co.; Water Products Division.
    c. NIBCO INC.
    d. Tyco Fire & Building Products LP.
    e. United Brass Works, Inc.
    f. Watts Water Technologies, Inc.
2. Standard: UL 262.
3. Pressure Rating: 300 psig (2070 kPa).
4. Body Material: Cast or ductile iron.
5. End Connections: Flanged or grooved.

G. Indicating-Type Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Anvil International, Inc.
    b. Milwaukee Valve Company.
    c. NIBCO INC.
    d. Tyco Fire & Building Products LP.
    e. Victaulic Company.
2. Standard: UL 1091.
3. Pressure Rating: 175 psig (1200 kPa) minimum.
4. Valves NPS 2 (DN 50) and Smaller:
    a. Valve Type: Ball or butterfly.
    b. Body Material: Bronze.
    c. End Connections: Threaded.
5. Valves NPS 2-1/2 (DN 65) and Larger:
    a. Valve Type: Butterfly.
    b. Body Material: Cast or ductile iron.
    c. End Connections: Flanged, grooved, or wafer.
6. Valve Operation: Integral electrical, 115-V ac, prewired, two-circuit, supervisory switch indicating device.

H. Indicator Posts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Clow Valve Company; a division of McWane, Inc.
    b. Mueller Co.; Water Products Division.
    c. NIBCO INC.

d. Tyco Fire & Building Products LP.

2. Standard: UL 789.

3. Type: Horizontal for wall mounting.

4. Body Material: Cast iron with extension rod and locking device.

5. Operation: Wrench.

2.5 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.

2. Pressure Rating: 175 psig (1200 kPa) minimum.

B. Angle Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Fire Protection Products, Inc.

b. United Brass Works, Inc.

C. Ball Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Anvil International, Inc.

b. Conbraco Industries, Inc.; Apollo Valves.

c. Kitz Corporation.

d. NIBCO INC.

e. Tyco Fire & Building Products LP.

f. Victaulic Company.

g. Watts Water Technologies, Inc.

D. Globe Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Fire Protection Products, Inc.

b. United Brass Works, Inc.

E. Plug Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Southern Manufacturing Group.

2.6 SPECIALTY VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.

2. Pressure Rating:

a. Standard-Pressure Piping Specialty Valves: 175 psig (1200 kPa) minimum.

b. High-Pressure Piping Specialty Valves: 300 psig (2070 kPa).

3. Body Material: Cast or ductile iron.

4. Size: Same as connected piping.

5. End Connections: Flanged or grooved.

B. Alarm Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Reliable Automatic Sprinkler Co., Inc.

b. Tyco Fire & Building Products LP.

c. Victaulic Company.

d. Viking Corporation.

2. Standard: UL 193.

3. Design: For horizontal or vertical installation.

4. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.

5. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.

6. Drip Cup Assembly: Pipe drain with check valve to main drain piping.

C. Automatic (Ball Drip) Drain Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AFAC Inc.

b. Reliable Automatic Sprinkler Co., Inc.

c. Tyco Fire & Building Products LP.

2. Standard: UL 1726.

3. Pressure Rating: 175 psig (1200 kPa) minimum.

4. Type: Automatic draining, ball check.

5. Size: NPS 3/4 (DN 20).

6. End Connections: Threaded.

2.7 FIRE-DEPARTMENT CONNECTIONS

A. Exposed-Type, Fire-Department Connection:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AFAC Inc.

b. Elkhart Brass Mfg. Company, Inc.

c. Fire Protection Products, Inc.

d. Tyco Fire & Building Products LP.

2. Standard: UL 405.

3. Type: Exposed, projecting, for wall mounting.

4. Pressure Rating: 175 psig (1200 kPa) minimum.
5. Body Material: Corrosion-resistant metal.
6. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
7. Caps: Brass, lugged type, with gasket and chain.
8. Escutcheon Plate: Round, brass, wall type.
9. Outlet: Back, with pipe threads.
10. Number of Inlets: Two.
11. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" or "AUTO SPKR".
12. Finish: Polished chrome plated.
13. Outlet Size: NPS 4 (DN 100).

B. Flush-Type, Fire-Department Connection:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AFAC Inc.
   b. Elkhart Brass Mfg. Company, Inc.
   c. GMR International Equipment Corporation.
   d. Guardian Fire Equipment, Inc.
   e. Potter Roemer.
2. Standard: UL 405.
3. Type: Flush, for wall mounting.
4. Pressure Rating: 175 psig (1200 kPa) minimum.
5. Body Material: Corrosion-resistant metal.
6. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
7. Caps: Brass, lugged type, with gasket and chain.
8. Escutcheon Plate: Rectangular, brass, wall type.
9. Outlet: With pipe threads.
10. Body Style: Horizontal.
11. Number of Inlets: Two.
12. Outlet Location: Back.
13. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" or "AUTO SPKR".
14. Finish: Polished chrome plated.
15. Outlet Size: NPS 4 (DN 100).

C. Yard-Type, Fire-Department Connection:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AFAC Inc.
   b. Elkhart Brass Mfg. Company, Inc.
   c. Fire-End & Croker Corporation.

d. Fire Protection Products, Inc.

e. GMR International Equipment Corporation.

f. Guardian Fire Equipment, Inc.

g. Wilson & Cousins Inc.

2. Standard: UL 405.

3. Type: Exposed, freestanding.

4. Pressure Rating: 300 psig (2070 kPa).

5. Body Material: Corrosion-resistant metal.

6. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.

7. Caps: Brass, lugged type, with gasket and chain.

8. Escutcheon Plate: Round, brass, floor type.

9. Outlet: Bottom, with pipe threads.

10. Number of Inlets: Two.

11. Sleeve: Brass.

12. Sleeve Height: 18 inches (460 mm).

13. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" or "AUTO SPKR".

14. Finish: Polished chrome plated.

15. Outlet Size: NPS 4 (DN 100).

2.8 SPRINKLER SPECIALTY PIPE FITTINGS

A. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Anvil International, Inc.

b. National Fittings, Inc.

c. Shurjoint Piping Products.

d. Tyco Fire & Building Products LP.

e. Victaulic Company.

2. Standard: UL 213.

3. Pressure Rating: 175 psig (1200 kPa) minimum.

4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.

5. Type: Mechanical-T and -cross fittings.

6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.

7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.

8. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AGF Manufacturing Inc.

b. Reliable Automatic Sprinkler Co., Inc.

c. Tyco Fire & Building Products LP.

d. Victaulic Company.

2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.

3. Pressure Rating: 175 psig (1200 kPa) minimum

4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.

5. Size: Same as connected piping.

6. Inlet and Outlet: Threaded.

C. Branch Line Testers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Elkhart Brass Mfg. Company, Inc.

b. Fire-End & Croker Corporation.

c. Potter Roemer.

2. Standard: UL 199.

3. Pressure Rating: 175 psig (1200 kPa).

4. Body Material: Brass.

5. Size: Same as connected piping.

6. Inlet: Threaded.

7. Drain Outlet: Threaded and capped.

8. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AGF Manufacturing Inc.

b. Triple R Specialty.

c. Tyco Fire & Building Products LP.

d. Victaulic Company.

e. Viking Corporation.

2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.

3. Pressure Rating: 175 psig (1200 kPa) minimum.

4. Body Material: Cast- or ductile-iron housing with sight glass.

5. Size: Same as connected piping.

6. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. CECA, LLC.

b. Corcoran Piping System Co.

c. Merit Manufacturing; a division of Anvil International, Inc.

2. Standard: UL 1474.

3. Pressure Rating: 250 psig (1725 kPa) minimum

4. Body Material: Steel pipe with EPDM-rubber O-ring seals.

5. Size: Same as connected piping.

6. Length: Adjustable.

7. Inlet and Outlet: Threaded.

F. Flexible, Sprinkler Hose Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Fivalco Inc.

b. FlexHead Industries, Inc.

c. Victaulic

2. Standard: UL 1474.

3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.

4. Pressure Rating: 175 psig (1200 kPa) minimum

5. Size: Same as connected piping, for sprinkler.

2.9 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Globe Fire Sprinkler Corporation.

2. Reliable Automatic Sprinkler Co., Inc.

3. Tyco Fire & Building Products LP.

4. Victaulic Company.

5. Viking Corporation.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.

2. Pressure Rating for Residential Sprinklers: 175 psig (1200 kPa) maximum.

3. Pressure Rating for Automatic Sprinklers: 175 psig (1200 kPa) minimum.

4. Pressure Rating for High-Pressure Automatic Sprinklers: 250 psig (1725 kPa) minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Early-Suppression, Fast-Response Applications: UL 1767.

2. Nonresidential Applications: UL 199.

3. Residential Applications: UL 1626.

4. Characteristics: Nominal 1/2-inch (12.7-mm) orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Open Sprinklers with Heat-Responsive Element Removed: UL 199.

1. Characteristics:
    a. Nominal 1/2-inch (12.7-mm) Orifice: With Discharge Coefficient K between 5.3 and 5.8
    b. Nominal 17/32-inch (13.5-mm) Orifice: With Discharge Coefficient K between 7.4 and 8.2.

E. Sprinkler Finishes:
1. Chrome plated.
2. Bronze.
3. Painted.

F. Special Coatings:
1. Wax.
2. Lead.
3. Corrosion-resistant paint.

G. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

H. Sprinkler Guards:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Reliable Automatic Sprinkler Co., Inc.
    b. Tyco Fire & Building Products LP.
    c. Victaulic Company.
    d. Viking Corporation.

2. Standard: UL 199.
3. Type: Wire cage with fastening device for attaching to sprinkler.

2.10 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Water-Motor-Operated Alarm:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Globe Fire Sprinkler Corporation.
    b. Tyco Fire & Building Products LP.
    c. Victaulic Company.
    d. Viking Corporation.
2. Standard: UL 753.
3. Type: Mechanically operated, with Pelton wheel.
4. Alarm Gong: Cast aluminum with red-enamel factory finish.
5. Size: 10-inch (250-mm) diameter.
6. Components: Shaft length, bearings, and sleeve to suit wall construction.
7. Inlet: NPS 3/4 (DN 20).
8. Outlet: NPS 1 (DN 25) drain connection.

C. Electrically Operated Alarm Bell:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Fire-Lite Alarms, Inc.; a Honeywell company.
    b. Notifier; a Honeywell company.
    c. Potter Electric Signal Company.
2. Standard: UL 464.
3. Type: Vibrating, metal alarm bell.
4. Size: 6-inch (150-mm) minimum diameter.
5. Finish: Red-enamel factory finish, suitable for outdoor use.

D. Water-Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Potter Electric Signal Company.
    b. System Sensor; a Honeywell company.
    c. Viking Corporation.
    d. Watts Industries (Canada) Inc.
2. Standard: UL 346.
3. Water-Flow Detector: Electrically supervised.
4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
6. Pressure Rating: 250 psig (1725 kPa).
7. Design Installation: Horizontal or vertical.

E. Pressure Switches:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Potter Electric Signal Company.
    b. System Sensor; a Honeywell company.
    c. Tyco Fire & Building Products LP.
    d. United Electric Controls Co.
    e. Viking Corporation.
2. Standard: UL 346.
3. Type: Electrically supervised water-flow switch with retard feature.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design Operation: Rising pressure signals water flow.

F. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Fire-Lite Alarms, Inc.; a Honeywell company.
    b. Kennedy Valve; a division of McWane, Inc.
    c. Potter Electric Signal Company.
    d. System Sensor; a Honeywell company.
2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.

G. Indicator-Post Supervisory Switches:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Potter Electric Signal Company.
    b. System Sensor; a Honeywell company.
2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled indicator-post valve is in other than fully open position.

2.11 MANUAL CONTROL STATIONS

A. Description: UL listed or FM approved, hydraulic operation, with union, NPS 1/2 (DN 15) pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

2.12 PRESSURE GAGES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. AMETEK; U.S. Gauge Division.
2. Ashcroft, Inc.
3. Brecco Corporation.
4. WIKA Instrument Corporation.

B. Standard: UL 393.

C. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.

D. Pressure Gage Range: 0 to 250 psig (0 to 1725 kPa) minimum.

E. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.

F. Air System Piping Gage: Include "AIR" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.2 SERVICE-ENTRANCE PIPING

A. Connect sprinkler piping to water-service piping for service entrance to building.

B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping.

C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.3 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

B. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.

C. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.

G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

H. Install sprinkler piping with drains for complete system drainage.

I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

J. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.

K. Install alarm devices in piping systems.

L. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

M. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 (DN 8) and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

N. Fill sprinkler system piping with water.

O. Install electric heating cables and pipe insulation on sprinkler piping in areas subject to freezing. Comply with requirements for heating cables in Section 210533 "Heat Tracing for Fire-Suppression Piping" and for piping insulation in Section 210700 "Fire-Suppression Systems Insulation."

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.4 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

I. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

J. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

K. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

L. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

M. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

N. Plastic-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

3.5 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Specialty Valves:

1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.

2. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.

3.6 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.

B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

C. Where flexible drops are approved, install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.

3.7 FIRE-DEPARTMENT CONNECTION INSTALLATION

A. Install wall-type, fire-department connections.

B. Install yard-type, fire-department connections in concrete slab support. Comply with requirements for concrete in Section 033000 "Cast-in-Place Concrete."

C. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

3.8 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.
6. Coordinate with fire-pump tests. Operate as required.
7. Verify that equipment hose threads are same as local fire-department equipment.

C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.10 CLEANING

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.

3.11 PIPING SCHEDULE

A. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

B. Standard-pressure, wet-pipe sprinkler system, NPS 2 (DN 50) and smaller shall be one of the following:

1. Standard-weight or Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

C. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 4 (DN 65 to DN 100, shall be one of the following:

1. Standard-weight or Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

D. Standard-pressure, wet-pipe sprinkler system, NPS 5 (DN 125) and larger, shall be one of the following:

1. Standard-weight or Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

3.12 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: Upright sprinklers.
2. Rooms with Suspended Ceilings: Pendent, recessed, flush, and concealed sprinklers as indicated.
3. Wall Mounting: Sidewall sprinklers.
4. Spaces Subject to Freezing: Upright, pendent, dry sprinklers; and sidewall, dry sprinklers as indicated.
5. Deluge-Sprinkler Systems: Upright and pendent, open sprinklers.
6. Special Applications: Extended-coverage, flow-control, and quick-response sprinklers where indicated.

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
4. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION

SECTION 22 05 19

METERS AND GAUGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Bimetallic-actuated thermometers.
2. Filled-system thermometers.
3. Liquid-in-glass thermometers.
4. Light-activated thermometers.
5. Thermowells.
6. Dial-type pressure gauges.
7. Gauge attachments.
8. Test plugs.
9. Test-plug kits.
10. Sight flow indicators.

B. Related Sections:

1. Section 211100 "Facility Fire-Suppression Water-Service Piping" for fire-protection water-service meters outside the building.
2. Section 211200 "Fire-Suppression Standpipes" for fire protection pressure gauges.
3. Section 211313 "Wet-Pipe Sprinkler Systems"
4. Section 211316 "Dry-Pipe Sprinkler Systems" for fire protection pressure gauges.
5. Section 211339 "Foam-Water Systems" for fire protection pressure gauges.
6. Section 221113 "Facility Water Distribution Piping" for domestic water meters and combined domestic and fire-protection water-service meters outside the building.
7. Section 221116 "Domestic Water Piping" for water meters inside the building.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gauge, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For meters and gauges to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ashcroft Inc.
2. Ernst Flow Industries.
3. Marsh Bellofram.
4. Miljoco Corporation.

5. Nanmac Corporation.
6. Noshok.
7. Palmer Wahl Instrumentation Group.
8. REOTEMP Instrument Corporation.
9. Tel-Tru Manufacturing Company.
10. Trerice, H. O. Co.
11. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
12. Weiss Instruments, Inc.
13. WIKA Instrument Corporation - USA.
14. Winters Instruments - U.S.

B. Standard: ASME B40.200.

C. Case: Liquid-filled and sealed types; stainless steel with 5-inch (127-mm) nominal diameter.

D. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg F (deg C).

E. Connector Type(s): Union joint, adjustable angle and rigid bottom, with unified-inch screw threads.

F. Connector Size: 1/2 inch (13 mm), with ASME B1.1 screw threads.

G. Stem: 0.25 or 0.375 inch (6.4 or 9.4 mm) in diameter; stainless steel.

H. Window: Plain glass.

I. Ring: Stainless steel.

J. Element: Bimetal coil.

K. Pointer: Dark-colored metal.

L. Accuracy: Plus or minus 1 percent of scale range.

2.2 FILLED-SYSTEM THERMOMETERS

A. Direct-Mounted, Metal-Case, Vapor-Actuated Thermometers:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Ashcroft Inc.
    b. Marsh Bellofram.
    c. Miljoco Corporation.
    d. Palmer Wahl Instrumentation Group.
    e. REOTEMP Instrument Corporation.
    f. Trerice, H. O. Co.
    g. Weiss Instruments, Inc.
2. Standard: ASME B40.200.
3. Case: Sealed type, cast aluminum or drawn steel; 4-1/2-inch (114-mm) nominal diameter.
4. Element: Bourdon tube or other type of pressure element.
5. Movement: Mechanical, dampening type, with link to pressure element and connection to pointer.
6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in deg F (deg C).

7. Pointer: Dark-colored metal.
8. Window: Glass.
9. Ring: Stainless steel.
10. Connector Type(s): Union joint, adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device and rigid, bottom; with ASME B1.1 screw threads.
11. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
    a. Design for Thermowell Installation: Bare stem.
12. Accuracy: Plus or minus 1 percent of scale range.

B. Direct-Mounted, Plastic-Case, Vapor-Actuated Thermometers:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Ashcroft Inc.
    b. Miljoco Corporation.
    c. REOTEMP Instrument Corporation.
2. Standard: ASME B40.200.
3. Case: Sealed type, plastic; 4-1/2-inch (114-mm) nominal diameter.
4. Element: Bourdon tube or other type of pressure element.
5. Movement: Mechanical, with link to pressure element and connection to pointer.
6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in deg F (deg C).
7. Pointer: Dark-colored metal.
8. Window: Glass.
9. Ring: Metal.
10. Connector Type(s): Union joint, adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device and rigid, bottom; with ASME B1.1 screw threads.
11. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
    a. Design for Thermowell Installation: Bare stem.
12. Accuracy: Plus or minus 1 percent of scale range.

C. Remote-Mounted, Metal-Case, Vapor-Actuated Thermometers:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. AMETEK, Inc.; U.S. Gauge.
    b. Ashcroft Inc.
    c. Marsh Bellofram.
    d. Miljoco Corporation.
    e. Palmer Wahl Instrumentation Group.
    f. REOTEMP Instrument Corporation.
    g. Trerice, H. O. Co.
    h. Weiss Instruments, Inc.
    i. WIKA Instrument Corporation - USA.

2. Standard: ASME B40.200.
3. Case: Sealed type, cast aluminum or drawn steel; 4-1/2-inch (114-mm) nominal diameter with back flange and holes for panel mounting.
4. Element: Bourdon tube or other type of pressure element.
5. Movement: Mechanical, with link to pressure element and connection to pointer.
6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in deg F (deg C).
7. Pointer: Dark-colored metal.
8. Window: Glass.
9. Ring: Stainless steel.
10. Connector Type(s): Union joint, back; with ASME B1.1 screw threads.
11. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
    a. Design for Thermowell Installation: Bare stem.
12. Accuracy: Plus or minus 1 percent of scale range.

D. Remote-Mounted, Plastic-Case, Vapor-Actuated Thermometers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. AMETEK, Inc.; U.S. Gauge.
    b. Ashcroft Inc.
    c. Miljoco Corporation.
    d. REOTEMP Instrument Corporation.
    e. Trerice, H. O. Co.
2. Standard: ASME B40.200.
3. Case: Sealed type, plastic; 4-1/2-inch (114-mm) nominal diameter with back flange and holes for panel mounting.
4. Element: Bourdon tube or other type of pressure element.
5. Movement: Mechanical, with link to pressure element and connection to pointer.
6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in deg F (deg C).
7. Pointer: Dark-colored metal.
8. Window: Glass.
9. Ring: Metal.
10. Connector Type(s): Union joint, threaded, back; with ASME B1.1 screw threads.
11. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
    a. Design for Thermowell Installation: Bare stem.
12. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.3 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Compact-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Trerice, H. O. Co.
2. Standard: ASME B40.200.
3. Case: Cast aluminum; 6-inch (152-mm) nominal size.
4. Case Form: Back angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue or red organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F (deg C).
7. Window: Glass or plastic.
8. Stem: Aluminum or brass and of length to suit installation.
    a. Design for Thermowell Installation: Bare stem.
9. Connector: 3/4 inch (19 mm), with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

B. Plastic-Case, Compact-Style, Liquid-in-Glass Thermometers:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Flo Fab Inc.
    b. Miljoco Corporation.
    c. Tel-Tru Manufacturing Company.
    d. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
    e. Weiss Instruments, Inc.
    f. WIKA Instrument Corporation - USA.
2. Standard: ASME B40.200.
3. Case: Plastic; 6-inch (152-mm) nominal size.
4. Case Form: Back angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue or red organic liquid.
6. Tube Background: Nonreflective with permanently etched scale markings graduated in deg F (deg C).
7. Window: Glass or plastic.
8. Stem: Aluminum or brass and of length to suit installation.
    a. Design for Thermowell Installation: Bare stem.
9. Connector: 3/4 inch (19 mm), with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

C. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Flo Fab Inc.
    b. Miljoco Corporation.

c. Palmer Wahl Instrumentation Group.

d. Tel-Tru Manufacturing Company.

e. Trerice, H. O. Co.

f. Weiss Instruments, Inc.

g. Winters Instruments - U.S.

2. Standard: ASME B40.200.

3. Case: Cast aluminum; 7-inch (178-mm) nominal size unless otherwise indicated.

4. Case Form: Adjustable angle unless otherwise indicated.

5. Tube: Glass with magnifying lens and blue or red organic liquid.

6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F (deg C).

7. Window: Glass.

8. Stem: Aluminum and of length to suit installation.

a. Design for Thermowell Installation: Bare stem.

9. Connector: 1-1/4 inches (32 mm), with ASME B1.1 screw threads.

10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

D. Plastic-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Ernst Flow Industries.

b. Marsh Bellofram.

c. Miljoco Corporation.

d. Palmer Wahl Instrumentation Group.

e. REOTEMP Instrument Corporation.

f. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.

g. Weiss Instruments, Inc.

h. WIKA Instrument Corporation - USA.

2. Standard: ASME B40.200.

3. Case: Plastic; 7-inch (178-mm) nominal size unless otherwise indicated.

4. Case Form: Adjustable angle unless otherwise indicated.

5. Tube: Glass with magnifying lens and blue or red organic liquid.

6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F (deg C).

7. Window: Glass.

8. Stem: Aluminum, brass, or stainless steel and of length to suit installation.

a. Design for Thermowell Installation: Bare stem.

9. Connector: 1-1/4 inches (32 mm), with ASME B1.1 screw threads.

10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.4 LIGHT-ACTIVATED THERMOMETERS

A. Direct-Mounted, Light-Activated Thermometers:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Flo Fab Inc.
    b. REOTEMP Instrument Corporation.
    c. Trerice, H. O. Co.
    d. Weiss Instruments, Inc.
    e. WIKA Instrument Corporation - USA.
    f. Winters Instruments - U.S.
2. Case: Plastic; 7-inch (178-mm) nominal size unless otherwise indicated.
3. Scale(s): Deg F (Deg C).
4. Case Form: Adjustable angle.
5. Connector: 1-1/4 inches (32 mm), with ASME B1.1 screw threads.
6. Stem: Aluminum and of length to suit installation.
    a. Design for Thermowell Installation: Bare stem.
7. Display: Digital.
8. Accuracy: Plus or minus 2 deg F (1 deg C).

B. Remote-Mounted, Light-Activated Thermometers:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Miljoco Corporation.
    b. Weiss Instruments, Inc.
    c. Winters Instruments - U.S.
2. Case: Plastic, for wall mounting.
3. Scale(s): Deg F (Deg C).
4. Sensor: Bulb and thermister wire.
    a. Design for Thermowell Installation: Bare stem.
5. Display: Digital.
6. Accuracy: Plus or minus 2 deg F (1 deg C).

2.5 THERMOWELLS

A. Thermowells:
1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR or CUNI.
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, (DN 15, DN 20, or NPS 25,) ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch (13, 19, and 25 mm), with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.

10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.6 PRESSURE GAUGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gauges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AMETEK, Inc.; U.S. Gauge.
   b. Ashcroft Inc.
   c. Ernst Flow Industries.
   d. Flo Fab Inc.
   e. Marsh Bellofram.
   f. Miljoco Corporation.
   g. Noshok.
   h. Palmer Wahl Instrumentation Group.
   i. REOTEMP Instrument Corporation.
   j. Tel-Tru Manufacturing Company.
   k. Trerice, H. O. Co.
   l. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
   m. Weiss Instruments, Inc.
   n. WIKA Instrument Corporation - USA.
   o. Winters Instruments - U.S.
2. Standard: ASME B40.100.
3. Case: Liquid-filled type(s); cast aluminum or drawn steel; 4-1/2-inch (114-mm) nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2 (DN 8 or DN 15), ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi (kPa).
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Metal.

B. Direct-Mounted, Plastic-Case, Dial-Type Pressure Gauges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AMETEK, Inc.; U.S. Gauge.
   b. Ashcroft Inc.
   c. Flo Fab Inc.
   d. Marsh Bellofram.

e. Miljoco Corporation.
f. Noshok.
g. Palmer Wahl Instrumentation Group.
h. REOTEMP Instrument Corporation.
i. Tel-Tru Manufacturing Company.
j. Trerice, H. O. Co.
k. Weiss Instruments, Inc.
l. WIKA Instrument Corporation - USA.
m. Winters Instruments - U.S.

2. Standard: ASME B40.100.
3. Case: Sealed type; plastic; 4-1/2-inch (114-mm) nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2 (DN 8 or DN 15), ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi (kPa).
8. Pointer: Dark-colored metal.
9. Window: Glass.

C. Remote-Mounted, Metal-Case, Dial-Type Pressure Gauges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AMETEK, Inc.; U.S. Gauge.
   b. Ashcroft Inc.
   c. Ernst Flow Industries.
   d. Flo Fab Inc.
   e. Marsh Bellofram.
   f. Miljoco Corporation.
   g. Noshok.
   h. Palmer Wahl Instrumentation Group.
   i. REOTEMP Instrument Corporation.
   j. Tel-Tru Manufacturing Company.
   k. Trerice, H. O. Co.
   l. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
   m. Weiss Instruments, Inc.
   n. WIKA Instrument Corporation - USA.
   o. Winters Instruments - U.S.
2. Standard: ASME B40.100.
3. Case: Liquid-filled type; cast aluminum or drawn steel; 4-1/2-inch (114-mm) nominal diameter with back flange and holes for panel mounting.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.

5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2 (DN 8 or DN 15), ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi (kPa).
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Stainless steel.

D. Remote-Mounted, Plastic-Case, Dial-Type Pressure Gauges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AMETEK, Inc.; U.S. Gauge.
   b. Ashcroft Inc.
   c. Miljoco Corporation.
   d. Noshok.
   e. Palmer Wahl Instrumentation Group.
   f. REOTEMP Instrument Corporation.
   g. Tel-Tru Manufacturing Company.
   h. Trerice, H. O. Co.
   i. Weiss Instruments, Inc.
   j. WIKA Instrument Corporation - USA.
   k. Winters Instruments - U.S.
2. Standard: ASME B40.100.
3. Case: Sealed type; plastic; 4-1/2-inch (114-mm) nominal diameter with back flange and holes for panel mounting.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2 (DN 8 or DN 15), ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi (kPa).
8. Pointer: Dark-colored metal.
9. Window: Glass.

2.7 GAUGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2 (DN 8 or DN 15), ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. Valves: Brass ball, with NPS 1/4 or NPS 1/2 (DN 8 or DN 15), ASME B1.20.1 pipe threads.

2.8 TEST PLUGS

A. Manufacturers: Subject to compliance with requirements, **available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**:

1. Flow Design, Inc.

2. Miljoco Corporation.
3. National Meter, Inc.
4. Peterson Equipment Co., Inc.
5. Sisco Manufacturing Company, Inc.
6. Trerice, H. O. Co.
7. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
8. Weiss Instruments, Inc.

B. Description: Test-station fitting made for insertion into piping tee fitting.

C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

D. Thread Size: NPS 1/4 (DN 8) or NPS 1/2 (DN 15), ASME B1.20.1 pipe thread.

E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F (3450 kPa at 93 deg C).

F. Core Inserts: Chlorosulfonated polyethylene synthetic and EPDM self-sealing rubber.

2.9 TEST-PLUG KITS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flow Design, Inc.
2. Miljoco Corporation.
3. National Meter, Inc.
4. Peterson Equipment Co., Inc.
5. Sisco Manufacturing Company, Inc.
6. Trerice, H. O. Co.
7. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
8. Weiss Instruments, Inc.

B. Furnish one test-plug kit(s) containing one thermometer(s), one pressure gauge and adapter, and carrying case. Thermometer sensing elements, pressure gauge, and adapter probes shall be of diameter to fit test plugs and of length to project into piping.

C. Low-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch- (25- to 51-mm-) diameter dial and tapered-end sensing element. Dial range shall be at least 25 to 125 deg F (minus 4 to plus 52 deg C).

D. High-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch- (25- to 51-mm-) diameter dial and tapered-end sensing element. Dial range shall be at least 0 to 220 deg F (minus 18 to plus 104 deg C).

E. Pressure Gauge: Small, Bourdon-tube insertion type with 2- to 3-inch- (51- to 76-mm-) diameter dial and probe. Dial range shall be at least 0 to 200 psig (0 to 1380 kPa).

F. Carrying Case: Metal or plastic, with formed instrument padding.

2.10 SIGHT FLOW INDICATORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Archon Industries, Inc.
2. Dwyer Instruments, Inc.
3. Emerson Process Management; Brooks Instrument.
4. Ernst Co., John C., Inc.
5. Ernst Flow Industries.

6. KOBOLD Instruments, Inc. - USA; KOBOLD Messring GmbH.
7. OPW Engineered Systems; a Dover company.
8. Penberthy; A Brand of Tyco Valves & Controls - Prophetstown.

B. Description: Piping inline-installation device for visual verification of flow.

C. Construction: Bronze or stainless-steel body, with sight glass and ball, flapper, or paddle wheel indicator, and threaded or flanged ends.

D. Minimum Pressure Rating: 125 psig (860 kPa).

E. Minimum Temperature Rating: 200 deg F (93 deg C).

F. End Connections for NPS 2 (DN 50) and Smaller: Threaded.

G. End Connections for NPS 2-1/2 (DN 65) and Larger: Flanged.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

G. Install direct-mounted pressure gauges in piping tees with pressure gauge located on pipe at the most readable position.

H. Install remote-mounted pressure gauges on panel.

I. Install valve and snubber in piping for each pressure gauge for fluids.

J. Install test plugs in piping tees.

K. Install thermometers in the following locations:

1. Inlet and outlet of each water heater.
2. Inlets and outlets of each domestic water heat exchanger.
3. Inlet and outlet of each domestic hot-water storage tank.
4. Inlet and outlet of each remote domestic water chiller.

L. Install pressure gauges in the following locations:

1. Building water service entrance into building.
2. Inlet and outlet of each pressure-reducing valve.
3. Suction and discharge of each domestic water pump.

3.2 CONNECTIONS

A. Install meters and gauges adjacent to machines and equipment to allow service and maintenance of meters, gauges, machines, and equipment.

3.3 ADJUSTING

A. Adjust faces of meters and gauges to proper angle for best visibility.

3.4 THERMOMETER SCHEDULE

A. Thermometers at inlet and outlet of each domestic water heater shall be one of the following:

1. Liquid-filled, bimetallic-actuated type.
2. Direct-mounted, metal-case, vapor-actuated type.

3. Compact-style, liquid-in-glass type.
4. Direct-mounted, light-activated type.
5. Test plug with chlorosulfonated polyethylene synthetic self-sealing rubber inserts.

B. Thermometers at inlets and outlets of each domestic water heat exchanger shall be one of the following:
1. Liquid-filled, bimetallic-actuated type.
2. Direct-mounted, metal-case, vapor-actuated type.
3. Compact-style, liquid-in-glass type.
4. Direct-mounted, light-activated type.
5. Test plug with chlorosulfonated polyethylene synthetic self-sealing rubber inserts.

C. Thermometers at inlet and outlet of each domestic hot-water storage tank shall be one of the following:
1. Liquid-filled, bimetallic-actuated type.
2. Direct-mounted, metal-case, vapor-actuated type.
3. Compact-style, liquid-in-glass type.
4. Direct-mounted, light-activated type.
5. Test plug with chlorosulfonated polyethylene synthetic self-sealing rubber inserts.

D. Thermometers at inlet and outlet of each remote domestic water chiller shall be[one of] the following:
1. Liquid-filled, bimetallic-actuated type.
2. Direct-mounted, metal-case, vapor-actuated type.
3. Compact-style, liquid-in-glass type.
4. Direct-mounted, light-activated type.
5. Test plug with chlorosulfonated polyethylene synthetic self-sealing rubber inserts.

E. Thermometer stems shall be of length to match thermowell insertion length.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Domestic Cold-Water Piping: 0 to 100 deg F (Minus 20 to plus 50 deg C).

B. Scale Range for Domestic Cold-Water Piping: 0 to 150 deg F (Minus 20 to plus 70 deg C).

C. Scale Range for Domestic Cold-Water Piping: 30 to 240 deg F (0 to plus 115 deg C).

D. Scale Range for Domestic Hot-Water Piping: 0 to 250 deg F (0 to 150 deg C).

E. Scale Range for Domestic Hot-Water Piping: 20 to 240 deg F (0 to 150 deg C).

F. Scale Range for Domestic Hot-Water Piping: 30 to 240 deg F (0 to plus 115 deg C).

G. Scale Range for Domestic Cooled-Water Piping: 0 to 100 deg F (Minus 20 to plus 50 deg C).

H. Scale Range for Domestic Cooled-Water Piping: 0 to 150 deg F (Minus 20 to plus 70 deg C).

3.6 PRESSURE-GAUGE SCHEDULE

A. Pressure gauges at discharge of each water service into building shall be[one of] the following:
1. Liquid-filled direct-mounted, metal case.
2. Sealed, direct-mounted, plastic case.
3. Test plug with chlorosulfonated polyethylene synthetic self-sealing rubber inserts.

B. Pressure gauges at inlet and outlet of each water pressure-reducing valve shall be one of the following:
1. Liquid-filled, direct-mounted, metal case.
2. Sealed, direct-mounted, plastic case.

3. Test plug with chlorosulfonated polyethylene synthetic self-sealing rubber inserts.

C. Pressure gauges at suction and discharge of each domestic water pump shall be one of the following:

1. Liquid-filled, direct-mounted, metal case.
2. Sealed, direct-mounted, plastic case.
3. Test plug with chlorosulfonated polyethylene synthetic self-sealing rubber inserts.

3.7 PRESSURE-GAUGE SCALE-RANGE SCHEDULE

A. Scale Range for Water Service Piping: 0 to 200 psi (0 to 1400 kPa).

B. Scale Range for Domestic Water Piping: 0 to 160 psi (0 to 1100 kPa).

END OF SECTION

SECTION 22 05 29
HANGERS & SUPPORTS – PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Fiberglass pipe hangers.
4. Metal framing systems.
5. Fiberglass strut systems.
6. Thermal-hanger shield inserts.
7. Fastener systems.
8. Pipe stands.
9. Pipe positioning systems.
10. Equipment supports.

B. Related Sections:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 220516 "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.

3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Allied Tube & Conduit.
   b. Cooper B-Line, Inc.
   c. Flex-Strut Inc.
   d. GS Metals Corp.
   e. Thomas & Betts Corporation.
   f. Unistrut Corporation; Tyco International, Ltd.

g. Wesanco, Inc.

2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Metallic Coating: Electroplated zinc.
8. Paint Coating: Vinyl
9. Plastic Coating: PVC.

B. Non-MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Anvil International; a subsidiary of Mueller Water Products Inc.
   b. Empire Industries, Inc.
   c. ERICO International Corporation.
   d. Haydon Corporation; H-Strut Division.
   e. NIBCO INC.
   f. PHD Manufacturing, Inc.
   g. PHS Industries, Inc.
2. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Coating: PVC.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.
4. National Pipe Hanger Corporation.
5. PHS Industries, Inc.
6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig (688-kPa)] or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, [zinc-coated] [stainless-] steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Stainless steel.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.7 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.8 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.9 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

G. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

M. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

O. Insulated Piping:

1. Attach clamps and spacers to piping.
    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
    a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
    b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
    c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
    d. NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
    e. NPS 16 to NPS 24 (DN 400 to DN 600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.
5. Pipes NPS 8 (DN 200) and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are as specified.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal framing systems and attachments for general service applications.

F. Use stainless-steel pipe hangers and fiberglass pipe hangers and fiberglass strut systems and stainless-steel or corrosion-resistant attachments for hostile environment applications.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F (566 deg C), pipes NPS 4 to NPS 24 (DN 100 to DN 600), requiring up to 4 inches (100 mm) of insulation.

3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8 (DN 20 to DN 200).
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8 (DN 10 to DN 200).
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3 (DN 10 to DN 80).
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 (DN 65 to DN 900) if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 (DN 25 to DN 750), from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24 (DN 65 to DN 600), from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 (DN 50 to DN 1050) if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 (DN 50 to DN 600) if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 (DN 50 to DN 750) if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).
13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

Q. Use [powder-actuated fasteners] [or] [mechanical-expansion anchors] instead of building attachments where required in concrete construction.

R. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Stencils.
5. Valve tags.
6. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Stainless steel, 0.025-inch (0.64-mm) or anodized aluminum, 0.032-inch (0.8-mm)] minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
3. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.

2. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).

3. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

4. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

5. Fasteners: Stainless-steel rivets or self-tapping screws.

6. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.

B. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).

C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

D. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

E. Fasteners: Stainless-steel rivets or self-tapping screws.

F. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

G. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.

2. Lettering Size: At least 1-1/2 inches (38 mm)high.

2.4 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

1. Tag Material: Stainless steel, 0.025-inch (0.64-mm) or anodized aluminum, 0.032-inch (0.8-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.

2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.5 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches (75 by 133 mm) minimum.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Section 099123 "Interior Painting."

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Cold Water: 2 inches (50 mm), round.

b. Hot Water: 2 inches (50 mm), round.

c. Low-Pressure Compressed Air: 2 inches (50 mm), round.

d. High-Pressure Compressed Air: 2 inches (50 mm), round.

3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

SECTION 22 07 19
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Domestic recirculating hot-water piping.
4. Domestic chilled-water piping for drinking fountains.
5. Sanitary waste piping exposed to freezing conditions.
6. Storm-water piping exposed to freezing conditions.
7. Roof drains and rainwater leaders.

B. Related Sections:

1. Section 22 07 16 “Plumbing Equipment Insulation.”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water vapor permeance thickness, and jackets (both factory- and field-applied, if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Performed Pipe Insulation Materials: 12 inches (300 mm) long by NPS 2 (DN 50).
2. Jacket Materials for Pipe: 12 inches (300 mm) long by NPS 2 (DN 50).
3. Sheet Jacket Materials: 12 inches (300mm) square.
4. Manufacturer’s Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 22 05 29 “Hangers and Supports for Plumbing Piping and Equipment.”

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in “Piping Insulation Schedule, General,” “Indoor Piping Insulation Schedule,” “Outdoor, Aboveground Piping Insulation Schedule,” and “Outdoor,

Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead mercury, or mercury compounds.

C. Products that come on contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in manufacturing process.

F. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Fibrex Insulations Inc.; Coreplus 1200
   b. Johns Manville; Micro-Lok.
   c. Knauf Insulation; 1000-Degree Pipe Insulation
   d. Manson Insulation Inc.; Alley-K.
   e. Owens Corning; Fiberglas Pipe Insulation
2. Type I, 850 Deg F (454 Deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, [without factory-applied jacket] [with factory-applied ASJ] [with factory-applied ASJ-SSL]. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulation, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
   b. Eagle Bridges – Marathon Industries; 225.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
   d. Mon-Eco Industries, Inc.; 22-25.
2. For indoor applications, adhesive shall have a VOC content of 80g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Dow Corning Corporation; 739, Dow Silicone.

b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.

c. P.I.C. Plastic, Inc.; Welding Adhesive.

d. Speedline Corporation; Polyco VP Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.

b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43 mil (1.09 mm) dry film thickness.

3. Service Temperature Range: Minus 20 to plus 180 Deg F (Minus 29 to plus 82 Deg C).

4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.

5. Color: White.

2.4 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I. Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.

b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.

c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.

4. Service Temperature Range: 0 to plus 180 Deg F (Minus 18 to plus 82 Deg C).

5. Color: White.

2.5 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.6 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. ABI, Ideal Tape Division; 428 AWF ASJ.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
   c. Compac Corporation; 104 and 105.
   d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
2. Width: 3 inches (75 mm).
3. Thickness: 11.5 mils (0.29 mm).
4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

2.7 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. ITW Insulation Systems; Gerrard Strapping and Seals.
   b. RPR Products, Inc.; Insul-Mate Strapping and Seals.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch (0.38 mm) thick, 1/2 inch (13 mm) wide with wing seal or closed seal.
3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 1/2 inch (13 mm) wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4 inch (19 mm) wide, stainless steel or Monel.

C. Wire: 0.080 inch (2.0 mm) nickel-copper alloy.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. C & F Wire.

2.8 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Engineered Brass Company
    b. Insul-Tect Products Co.; a subsidiary of MVG Molded Products
    c. McGuire Manufacturing
    d. Plumberex
    e. Truebro; a brand of IPS Corporation
    f. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.
2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. TrueBro; a brand of IPS Corporation
    b. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation
2. Description: Manufactured plastic enclosure for covering plumbing hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant. UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    a. Johns Manville; Zeston.
    b. P.I.C. Plastics, Inc.; FG Series.
    c. Proto Corporation; LoSmoke.
    d. Speedline Corporation; SmokeSafe.
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
    a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and ends seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer’s recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3 inch (75 mm) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [2 inches (50 mm)] [4 inches (100 mm)] o.c.
    a. For below-ambient services, apply vapor-barrier mastic over staples.
4. Cover joints and seams with tape, according to insulation material manufacturer's written instruction, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insualtion to the following:
1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor

insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).

4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 07 84 13 “Penetration Firestopping” for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.

2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 “Penetration Firestopping.”

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using performed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of the pipe insulation, or one pipe diameter, whichever is thicker.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

9. Stencil or label the outside insulation jacket of each union with the word “union.” Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flanges and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples 6 inches (150 mm) o.c.

4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flanges.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1 inch (25 mm) overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.8 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below as specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the “Piping Insulation Schedule, General” Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor’s option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.

2. Underground piping.

3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Water (Hot & Cold):

1. Insulation shall be:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (13 mm) thick.

B. Stormwater and Overflow:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (13 mm) thick.

C. Roof Drain and Overflow Drain Bodies:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (13 mm) thick.

D. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet (3 m) of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):

1. All Pipe Sizes: Insulation shall be of the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (13 mm) thick.

END OF SECTION

SECTION 22 11 16
DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.
2. Encasement for piping.

B. Related Requirements:

1. Section 221113 "Facility Water Distribution Piping" for water-service piping and water meters] outside the building from source to the point where water-service piping enters the building.

1.3 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.4 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

1.5 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Architect and Owner no fewer than two days in advance of proposed interruption of water service.
2. Do not interrupt water service without Architect's and Owner's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B) tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) water tube, annealed temper.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

F. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

G. Copper Pressure-Seal-Joint Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Elkhart Products Corporation.
    b. NIBCO Inc.
    c. Viega.
2. Fittings for NPS 2 (DN 50) and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
3. Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

H. Copper Push-on-Joint Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Victaulic Company.
2. Description:
    a. Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22.
    b. Stainless-steel teeth and EPDM-rubber, O-ring seal in each end instead of solder-joint ends.

I. Appurtenances for Grooved-End Copper Tubing:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Anvil International.
    b. Shurjoint Piping Products.
    c. Victaulic Company.
2. Bronze Fittings for Grooved-End, Copper Tubing: ASTM B 75 (ASTM B 75M) copper tube or ASTM B 584 bronze castings.
3. Mechanical Couplings for Grooved-End Copper Tubing:
    a. Copper-tube dimensions and design similar to AWWA C606.
    b. Ferrous housing sections.
    c. EPDM-rubber gaskets suitable for hot and cold water.
    d. Bolts and nuts.
    e. Minimum Pressure Rating: 300 psig (2070 kPa).

2.3 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105/A21.5.

B. Form: Sheet or tube.

2.4 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Cascade Waterworks Manufacturing.
    b. Dresser, Inc.; Piping Specialties Products.
    c. Ford Meter Box Company, Inc. (The).
    d. JCM Industries.
    e. Romac Industries, Inc.
    f. Smith-Blair, Inc.; a Sensus company.
    g. Viking Johnson.

D. Plastic-to-Metal Transition Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Charlotte Pipe and Foundry Company.
    b. Harvel Plastics, Inc.
    c. Spears Manufacturing Company.
2. Description:
    a. CPVC or PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
    b. One end with threaded brass insert and one solvent-cement-socket or threaded end.

E. Plastic-to-Metal Transition Unions:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Colonial Engineering, Inc.
    b. NIBCO Inc.
    c. Spears Manufacturing Company.
2. Description:
    a. CPVC or PVC four-part union.
    b. Brass or stainless-steel threaded end.
    c. Solvent-cement-joint or threaded plastic end.
    d. Rubber O-ring.
    e. Union nut.

2.5 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
b. Central Plastics Company.
c. Hart Industries International, Inc.
d. Jomar International.
e. Matco-Norca.
f. McDonald, A. Y. Mfg. Co.
g. Watts; a division of Watts Water Technologies, Inc.
h. Wilkins; a Zurn company.

2. Standard: ASSE 1079.
3. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C).
4. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
   b. Central Plastics Company.
   c. Matco-Norca.
   d. Watts; a division of Watts Water Technologies, Inc.
   e. Wilkins; a Zurn company.
2. Standard: ASSE 1079.
3. Factory-fabricated, bolted, companion-flange assembly.
4. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C).
5. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Central Plastics Company.
   d. Pipeline Seal and Insulator, Inc.
2. Nonconducting materials for field assembly of companion flanges.
3. Pressure Rating: 150 psig (1035 kPa).
4. Gasket: Neoprene or phenolic.
5. Bolt Sleeves: Phenolic or polyethylene.
6. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Elster Perfection Corporation.

b. Grinnell Mechanical Products; Tyco Fire Products LP.

c. Matco-Norca.

d. Precision Plumbing Products, Inc.

e. Victaulic Company.

2. Standard: IAPMO PS 66.

3. Electroplated steel nipple complying with ASTM F 1545.

4. Pressure Rating and Temperature: 300 psig (2070 kPa) at 225 deg F (107 deg C).

5. End Connections: Male threaded or grooved.

6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install underground copper tube and ductile-iron pipe in PE encasement according to ASTM A 674 or AWWA C105/A21.5.

D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

G. Install domestic water piping level and plumb.

H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

I. Install seismic restraints on piping.

J. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

K. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

L. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

M. Install piping to permit valve servicing.

N. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

O. Install piping free of sags and bends.

P. Install fittings for changes in direction and branch connections.

Q. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

R. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping."

S. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 221123 "Domestic Water Pumps."

T. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

U. Install sleeves for piping penetrations of walls, ceilings, and floors.

V. Install sleeve seals for piping penetrations of concrete walls and slabs.

W. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.

G. Push-on Joints for Copper Tubing: Clean end of tube. Measure insertion depth with manufacturer's depth gage. Join copper tube and push-on-joint fittings by inserting tube to measured depth.

3.4 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. Fittings for NPS 1-1/2 (DN 40) and Smaller: Fitting-type coupling.
2. Fittings for NPS 2 (DN 50) and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 (DN 50) and Smaller: Plastic-to-metal transition fittings or unions.

3.5 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric couplings or nipples.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flanges.

D. Dielectric Fittings for NPS 5 (DN 125) and Larger: Use dielectric flange kits.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
    a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
4. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.
5. NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet (3 m) with 1/2-inch (13-mm) rod.
6. NPS 6 (DN 150): 10 feet (3 m) with 5/8-inch (16-mm) rod.
7. NPS 8 (DN 200): 10 feet (3 m) with 3/4-inch (19-mm) rod.

F. Install supports for vertical copper tubing every 10 feet (3 m).

G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.

3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.

b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.

2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.

d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.

c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.

d. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.

f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.

2. Open shutoff valves to fully open position.

3. Open throttling valves to proper setting.

4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.

b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.

6. Remove and clean strainer screens. Close drain valves and replace drain plugs.

7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.

8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.

2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

b. Fill and isolate system according to either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.

2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

d. Repeat procedures if biological examination shows contamination.

e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.12 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building-service piping, NPS 3 (DN 80) and smaller, shall be one of the following:

1. Soft copper tube, ASTM B 88, Type K (ASTM B 88M, Type A); wrought-copper, solder-joint fittings; and brazed joints.

E. Under-building-slab, domestic water, building-service piping, NPS 4 to NPS 8 (DN 100 to DN 200) and larger, shall be[one of] the following:

1. Soft copper tube, ASTM B 88, Type K (ASTM B 88M, Type A); wrought-copper, solder-joint fittings; and brazed joints.

F. Under-building-slab, combined domestic water, building-service, and fire-service-main piping, NPS 6 to NPS 12 (DN 150 to DN 300), shall be one of the following:

1. Mechanical-joint, ductile-iron pipe; standard-pattern, mechanical-joint fittings; and mechanical joints.
2. Push-on-joint, ductile-iron pipe; standard-pattern, push-on-joint fittings; and gasketed joints.
3. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.

G. Under-building-slab, domestic water piping, NPS 2 (DN 50) and smaller, shall be one of the following:
1. Soft copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); wrought-copper, solder-joint fittings; and brazed joints.
2. PVC, Schedule 40; socket fittings; and solvent-cemented joints.
3. PP, SDR 7.4 socket fittings; and fusion-welded joints.

H. Aboveground domestic water piping, NPS 2 (DN 50) and smaller, shall be one of the following:
1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); cast- or wrought-]copper, solder-joint fittings; and soldered joints.
2. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); copper pressure-seal-joint fittings; and pressure-sealed joints.
3. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); copper push-on-joint fittings; and push-on joints.

I. Aboveground domestic water piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100), shall be one of the following:
1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); cast- or wrought-]copper, solder-joint fittings; and soldered joints.
2. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); copper pressure-seal-joint fittings; and pressure-sealed joints.
3. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); grooved-joint, copper-tube appurtenances; and grooved joints.

J. Aboveground domestic water piping, NPS 5 to NPS 8 (DN 125 to DN 200), shall be one of the following:
1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); cast- or wrought-]copper, solder-joint fittings; and soldered joints.
2. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); grooved-joint, copper-tube appurtenances; and grooved joints.

3.13 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Shutoff Duty: Use ball or gate valves for piping NPS 2 (DN 50) and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
2. Throttling Duty: Use ball or globe valves for piping NPS 2 (DN 50) and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
3. Hot-Water Circulation Piping, Balancing Duty: Calibrated balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

C. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION

SECTION 22 11 19
DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Balancing valves.
5. Temperature-actuated, water mixing valves.
6. Strainers.
7. Wall hydrants.
8. Drain valves.
9. Water-hammer arresters.
10. Air vents.
11. Trap-seal primer valves.
12. Trap-seal primer systems.
13. Specialty valves.
14. Flexible connectors.
15. Water meters.

B. Related Requirements:

1. Section 220519 "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Section 221116 "Domestic Water Piping" for water meters.
3. Section 224500 "Emergency Plumbing Fixtures" for water tempering equipment.
4. Section 224713 "Drinking Fountains" for water filters for water coolers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For domestic water piping specialties.

1. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa) unless otherwise indicated.

2.3 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
    b. Conbraco Industries, Inc.
    c. FEBCO; a division of Watts Water Technologies, Inc.
    d. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    e. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
2. Standard: ASSE 1001.
3. Size: NPS 1/4 to NPS 3 (DN 8 to DN 80), as required to match connected piping.
4. Body: Bronze.
5. Inlet and Outlet Connections: Threaded.
6. Finish: Rough bronze.

B. Laboratory-Faucet Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Conbraco Industries, Inc.
    b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    c. Woodford Manufacturing Company; a division of WCM Industries, Inc.
    d. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
2. Standard: ASSE 1035.
3. Size: NPS 1/4 or NPS 3/8 (DN 8 or DN 10) matching faucet size.
4. Body: Bronze.
5. End Connections: Threaded.
6. Finish: Chrome plated.

2.4 WATER PRESSURE-REDUCING VALVES

A. Water Regulators:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Cash Acme; a division of Reliance Worldwide Corporation.
    b. Conbraco Industries, Inc.
    c. Honeywell International Inc.
    d. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
    e. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
2. Standard: ASSE 1003.
3. Pressure Rating: Initial working pressure of 150 psig (1035 kPa).

4. Body: Bronze with chrome-plated finish for NPS 2 (DN 50) and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).
5. Valves for Booster Heater Water Supply: Include integral bypass.
6. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).

2.5 BALANCING VALVES

A. Copper-Alloy Calibrated Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Armstrong International, Inc.
   b. Flo Fab Inc.
   c. ITT Corporation; Bell & Gossett Div.
   d. NIBCO Inc.
   e. TACO Incorporated.
   f. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
2. Type: Ball or Y-pattern globe valve with two readout ports and memory-setting indicator.
3. Body: Brass or bronze.
4. Size: Same as connected piping, but not larger than NPS 2 (DN 50).
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

2.6 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Primary, Thermostatic, Water Mixing Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Armstrong International, Inc.
   b. Lawler Manufacturing Company, Inc.
   c. Leonard Valve Company.
   d. Powers; a division of Watts Water Technologies, Inc.
   e. Symmons Industries, Inc.
2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig (860 kPa)minimum unless otherwise indicated.
4. Type: Cabinet-type, thermostatically controlled, water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded or union inlets and outlet.
7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Valve Finish: Chrome plated.
9. Piping Finish: Chrome plated.
10. Cabinet: Factory fabricated, stainless steel, for recessed mounting and with hinged, stainless-steel door.

2.7 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for NPS 2-1/2 (DN 65) and larger.
3. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Drain: Factory-installed, hose-end drain valve.

2.8 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig (860 kPa).
7. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Service Areas: Chrome or nickel plated.
10. Finish for Finished Rooms: Chrome or nickel plated.
11. Operation for Equipment Rooms: Wheel handle or operating key.
12. Operation for Service Areas: Wheel handle.
13. Operation for Finished Rooms: Operating key.
14. Include operating key with each operating-key hose bibb.
15. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.9 WALL HYDRANTS

A. Nonfreeze Wall Hydrants:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Josam Company.
    b. MIFAB, Inc.
    c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    d. Tyler Pipe; Wade Div.
    e. Watts Drainage Products.
    f. Woodford Manufacturing Company; a division of WCM Industries, Inc.
    g. Zurn Industries, LLC; Plumbing Products Group; Light Commercial Products.
    h. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.
2. Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.
3. Pressure Rating: 125 psig (860 kPa).
4. Operation: Loose key.

5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
6. Inlet: NPS 3/4 or NPS 1 (DN 20 or DN 25).
7. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
8. Box: Deep, flush mounted with cover.
9. Box and Cover Finish: Chrome plated.
10. Retain "Outlet," "Box," and "Box and Cover Finish" subparagraphs above for concealed-outlet-type wall hydrants or "Outlet" and "Nozzle and Wall-Plate Finish" subparagraphs below for exposed-outlet-type wall hydrants.
11. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
12. Nozzle and Wall-Plate Finish: Polished nickel bronze

2.10 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
3. Size: NPS 3/4 (DN 20).
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.11 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. AMTROL, Inc.
   b. MIFAB, Inc.
   c. Precision Plumbing Products, Inc.
   d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   e. Tyler Pipe; Wade Div.
   f. Watts Drainage Products.
   g. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Copper tube with piston.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.12 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. MIFAB, Inc.
    b. Precision Plumbing Products, Inc.
    c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    d. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig (860 kPa) minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

B. Drainage-Type, Trap-Seal Primer Device:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
2. Standard: ASSE 1044, lavatory P-trap with NPS 3/8 (DN 10) minimum, trap makeup connection.
3. Size: NPS 1-1/4 (DN 32) minimum.
4. Material: Chrome-plated, cast brass.

2.13 TRAP-SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Precision Plumbing Products, Inc.
2. Standard: ASSE 1044.
3. Piping: NPS 3/4, ASTM B 88, Type L (DN 20, ASTM B 88M, Type B); copper, water tubing.
4. Cabinet: Recessed-mounted steel box with stainless-steel cover.
5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
    a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
6. Vacuum Breaker: ASSE 1001.

2.14 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Flex-Hose Co., Inc.
2. Flexicraft Industries.
3. Flex Pression, Ltd.
4. Flex-Weld Incorporated.

5. Hyspan Precision Products, Inc.

B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: Minimum 200 psig (1380 kPa).

2. End Connections NPS 2 (DN 50) and Smaller: Threaded copper pipe or plain-end copper tube.

3. End Connections NPS 2-1/2 (DN 65) and Larger: Flanged copper alloy.

C. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.

1. Working-Pressure Rating: Minimum 200 psig (1380 kPa).

2. End Connections NPS 2 (DN 50) and Smaller: Threaded steel-pipe nipple.

3. End Connections NPS 2-1/2 (DN 65) and Larger: Flanged steel nipple.

D. Remote Registration System: Direct-reading type complying with AWWA C706; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.

E. Remote Registration System: Encoder type complying with AWWA C707; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.

2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.

3. Do not install bypass piping around backflow preventers.

B. Install water regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.

C. Install water-control valves with inlet and outlet shutoff valves and bypass with globe valve. Install pressure gages on inlet and outlet.

D. Install balancing valves in locations where they can easily be adjusted.

E. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install cabinet-type units recessed in or surface mounted on wall as specified.

F. Install Y-pattern strainers for water on supply side of each water pressure-reducing valve and pump.

G. Install outlet boxes recessed in wall or surface mounted on wall. Install 2-by-4-inch (38-by-89-mm) fire-retardant-treated-wood blocking, wall reinforcement between studs. Comply with requirements for fire-retardant-treated-wood blocking in Section 061000 "Rough Carpentry."

H. Install hose stations with check stops or shutoff valves on inlets and with thermometer on outlet.

1. Install cabinet-type units recessed in or surface mounted on wall as specified. Install 2-by-4-inch (38-by-89-mm) fire-retardant-treated-wood blocking, wall reinforcement between studs. Comply with requirements for fire-retardant-treated-wood blocking in Section 061000 "Rough Carpentry."

I. Install ground hydrants with 1 cu. yd. (0.75 cu. m) of crushed gravel around drain hole. Set ground hydrants with box flush with grade.

J. Install draining-type post hydrants with 1 cu. yd. (0.75 cu. m) of crushed gravel around drain hole. Set post hydrants in concrete paving or in 1 cu. ft. (0.03 cu. m) of concrete block at grade.

K. Set nonfreeze, nondraining-type post hydrants in concrete or pavement.

L. Set freeze-resistant yard hydrants with riser pipe in concrete or pavement. Do not encase canister in concrete.

M. Install water-hammer arresters in water piping according to PDI-WH 201.

N. Install air vents at high points of water piping. Install drain piping and discharge onto floor drain.

O. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

P. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

Q. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 CONNECTIONS

A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test each pressure vacuum breaker, reduced-pressure-principle backflow preventer, double-check, backflow-prevention assembly and double-check, detector-assembly backflow preventer according to authorities having jurisdiction and the device's reference standard.

B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION

SECTION 22 13 16
SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa)

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owner and Architect no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Owner’s and Architect’s written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service and Extra Heavy classes.

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.

C. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. ANACO-Husky.
    b. Dallas Specialty & Mfg. Co.
    c. Fernco Inc.
    d. Matco-Norca, Inc.
    e. MIFAB, Inc.
    f. Tyler Pipe.
2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. ANACO-Husky.
    b. Clamp-All Corp.
    c. Dallas Specialty & Mfg. Co.
    d. MIFAB, Inc.
    e. Tyler Pipe.
2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

E. Cast-Iron, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. MG Piping Products Company.
2. Standard: ASTM C 1277.
3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 COPPER TUBE AND FITTINGS

A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.

B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

C. Hard Copper Tube: ASTM B 88, Type L and Type M (ASTM B 88M, Type B and Type C), water tube, drawn temper.

D. Soft Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B), water tube, annealed temper.

E. Copper Pressure Fittings:

1. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

2. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

F. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.

1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

G. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.5 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.

C. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

D. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.

2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

3. Unshielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Dallas Specialty & Mfg. Co.

2) Fernco Inc.

3) Mission Rubber Company; a division of MCP Industries, Inc.

4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.

b. Standard: ASTM C 1173.

c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

d. Sleeve Materials:

1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.

2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.

3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

4. Shielded, Nonpressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Cascade Waterworks Mfg. Co.

2) Mission Rubber Company; a division of MCP Industries, Inc.

b. Standard: ASTM C 1460.

c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

5. Pressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Cascade Waterworks Mfg. Co.

2) Dresser, Inc.

3) EBAA Iron, Inc.

4) JCM Industries, Inc.

5) Romac Industries, Inc.

6) Smith-Blair, Inc.; a Sensus company.

7) The Ford Meter Box Company, Inc.

8) Viking Johnson.

b. Standard: AWWA C219.

c. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.

d. Center-Sleeve Material: Manufacturer's standard.

e. Gasket Material: Natural or synthetic rubber.

f. Metal Component Finish: Corrosion-resistant coating or material.

B. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

2. Dielectric Unions:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1) Capitol Manufacturing Company.
   2) Central Plastics Company.
   3) Hart Industries International, Inc.
   4) Jomar International Ltd.
   5) Matco-Norca, Inc.
   6) McDonald, A. Y. Mfg. Co.
   7) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   8) Wilkins; a Zurn company.

b. Description:
   1) Standard: ASSE 1079.
   2) Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C)
   3) End Connections: Solder-joint copper alloy and threaded ferrous.

3. Dielectric Flanges:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1) Capitol Manufacturing Company.
   2) Central Plastics Company.
   3) Matco-Norca, Inc.
   4) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   5) Wilkins; a Zurn company.

b. Description:
   1) Standard: ASSE 1079.
   2) Factory-fabricated, bolted, companion-flange assembly.
   3) Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C)
   4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

4. Dielectric-Flange Insulating Kits:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1) Advance Products & Systems, Inc.
   2) Calpico, Inc.
   3) Central Plastics Company.
   4) Pipeline Seal and Insulator, Inc.

b. Description:
   1) Nonconducting materials for field assembly of companion flanges.
   2) Pressure Rating: 150 psig (1035 kPa).
   3) Gasket: Neoprene or phenolic.
   4) Bolt Sleeves: Phenolic or polyethylene.

5) Washers: Phenolic with steel backing washers.

5. Dielectric Nipples:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Elster Perfection.

2) Grinnell Mechanical Products.

3) Matco-Norca, Inc.

4) Precision Plumbing Products, Inc.

5) Victaulic Company.

b. Description:

1) Standard: IAPMO PS 66

2) Electroplated steel nipple.

3) Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).

4) End Connections: Male threaded or grooved.

5) Lining: Inert and noncorrosive, propylene.

2.7 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Standard: ASTM A 674 or AWWA C105/A 21.5.

B. Material: Linear low-density polyethylene film of 0.008-inch (0.20-mm) or high-density, cross-laminated polyethylene film of 0.004-inch (0.10-mm) minimum thickness.

C. Form: Sheet or tube.

D. Color: Black or natural.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

O. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

P. Install aboveground PVC piping according to ASTM D 2665.

Q. Install underground PVC piping according to ASTM D 2321.

R. Plumbing Specialties:

1. Install backwater valves in sanitary waster gravity-flow piping. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."
2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."
3. Install drains in sanitary drainage gravity-flow piping. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

S. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

E. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

F. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

G. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Shielded, nonpressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric unions.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flanges.
4. Dielectric Fittings for NPS 5 (DN 125) and Larger: Use dielectric flange kits.

3.5 VALVE INSTALLATION

A. General valve installation requirements are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves:

1. Install shutoff valve on each sewage pump discharge.
2. Install gate or full-port ball valve for piping NPS 2 (DN 50) and smaller.
3. Install gate valve for piping NPS 2-1/2 (DN 65) and larger.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

C. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Install horizontal backwater valves with cleanout cover flush with floor.
6. Comply with requirements for backwater valves, cleanouts, and drains specified in Section 221319 "Sanitary Waste Piping Specialties."
7. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 (DN 65) and larger.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes

before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.10 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed ABS and PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.11 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

C. Aboveground, vent piping shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

D. Underground, soil, waste, and vent piping shall be any of the following:

1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

END OF SECTION

SECTION 22 13 19
SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Backwater valves.
2. Cleanouts.
3. Floor drains.
4. Trench drains.
5. Roof flashing assemblies.
6. Through-penetration firestop assemblies.
7. Miscellaneous sanitary drainage piping specialties.
8. Flashing materials.
9. Grease interceptors.
10. Grease removal devices.
11. Solids interceptors.

B. Related Requirements:

1. Section 221423 "Storm Drainage Piping Specialties" for storm drainage piping inside the building, drainage piping specialties, and drains.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. FRP: Fiberglass-reinforced plastic.

C. HDPE: High-density polyethylene plastic.

D. PE: Polyethylene plastic.

E. PP: Polypropylene plastic.

F. PVC: Polyvinyl chloride plastic.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:

1. Grease interceptors.

B. Shop Drawings: Show fabrication and installation details for frost-resistant vent terminals.

1. Wiring Diagrams: Power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer Seismic Qualification Certification: Submit certification that grease interceptors, grease removal devices, accessories, and components will withstand seismic forces defined in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.8 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

B. Coordinate size and location of roof penetrations.

1.9 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Cultures: Provide 1-gal. (3.8-L) bottles of bacteria culture recommended by manufacturer of FOG disposal systems equal to 200 percent of amount installed, but no fewer than 2 1-gal. (3.8-L) bottles.

PART 2 - PRODUCTS

2.1 BACKWATER VALVES

A. Horizontal, Cast-Iron Backwater Valves :

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Josam Company; Josam Div.

b. MIFAB, Inc.

c. Smith, Jay R. Mfr. Co.; Division of Smith Industries, Inc.

d. Tyler Pipe; Wade Div.

e. Watts Drainage Products Inc.

f. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.14.1.

3. Size: Same as connected piping.

4. Body: Cast iron.

5. Cover: Cast iron with bolted or threaded access check valve.
6. End Connections: Hub and spigot or hubless.
7. Type Check Valve: Removable, bronze, swing check, factory assembled.
8. Extension: ASTM A 74, Service class; full-size, cast-iron, soil-pipe extension to field-installed cleanout at floor; replaces backwater valve cover.

B. Drain-Outlet Backwater Valves:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Josam Company; Josam Div.
b. Smith, Jay R. Mfr. Co.; Division of Smith Industries, Inc.
c. Watts Drainage Products Inc.
d. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Size: Same as floor drain outlet.
3. Body: Cast iron or bronze made for vertical installation in bottom outlet of floor drain.
4. Check Valve: Removable ball float.
5. Inlet: Threaded.
6. Outlet: Threaded or spigot.

C. Horizontal, Plastic Backwater Valves:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. IPS Corporation.
b. NDS Inc.
c. Oatey.
d. Zurn Plumbing Products Group; Light Commercial Operation.
2. Size: Same as connected piping.
3. Body: PVC.
4. Cover: Same material as body with threaded access to check valve.
5. Check Valve: Removable swing check.
6. End Connections: Socket type.

2.2 CLEANOUTS

A. Exposed Metal Cleanouts:
1. ASME A112.36.2M, Cast-Iron Cleanouts:
a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1) Josam Company.
2) MIFAB, Inc.
3) Smith, Jay R. Mfg. Co.
4) Tyler Pipe.
5) Watts Drainage Products.

6) Zurn Plumbing Products Group.

2. Closure: Stainless-steel plug with seal.

B. Metal Floor Cleanouts:

1. ASME A112.36.2M, Cast-Iron Cleanouts:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Josam Company.

2) Oatey.

3) Smith, Jay R. Mfg. Co.

4) Tyler Pipe.

5) Watts Drainage Products.

6) Zurn Plumbing Products Group.

2. ASME A112.36.2M, Stainless-Steel Cleanouts:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Josam Company.

2) Kusel Equipment Co.

3) Smith, Jay R. Mfg. Co.

C. Cast-Iron Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Josam Company; Josam Div.

b. MIFAB, Inc.

c. Smith, Jay R. Mfg. Co.

d. Tyler Pipe; Wade Div.

e. Watts Drainage Products.

f. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M. Include wall access.

3. Size: Same as connected drainage piping.

4. Body: Hub-and-spigot, cast-iron soil pipe T-branch or Hubless, cast-iron soil pipe test tee as required to match connected piping.

5. Closure: Countersunk or raised-head, cast-iron plug.

6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

8. Wall Access: Round, nickel-bronze, copper-alloy, or stainless-steel wall-installation frame and cover.

D. Plastic Floor Cleanouts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Canplas LLC.

b. IPS Corporation.
c. NDS Inc.
d. Plastic Oddities.
e. Sioux Chief Manufacturing Company, Inc.
f. Zurn Plumbing Products Group; Light Commercial Operation.

2. Size: Same as connected branch.
3. Body: PVC.
4. Closure Plug: PVC.
5. Riser: Drainage pipe fitting and riser to cleanout of same material as drainage piping.

2.3 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. MIFAB, Inc.
b. Smith, Jay R. Mfg. Co.
c. Tyler Pipe; Wade Div.
d. Watts Drainage Products.
e. Zurn Plumbing Products Group;

2. Standard: ASME A112.6.3.
3. Body Material: Gray iron.
4. Clamping Device: Required.
5. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel.
6. Top or Strainer Material: Nickel bronze.
7. Top of Body and Strainer Finish: Nickel bronze.

B. Stainless-Steel Floor Drains:

1. ASME A112.3.1, Stainless-Steel Floor Drains:
   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      1) Josam Company.
2. ASME A112.6.3, Stainless-Steel Floor Drains:
   a. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
      1) Josam Company.
      2) Smith, Jay R. Mfg. Co.
      3) Tyler Pipe.
      4) Watts Drainage Products.
      5) Zurn Plumbing Products Group.
3. Standard: ASME A112.3.1.

4. Top or Strainer Material: Stainless steel.
5. Clamping Device: Required.

2.4 CHANNEL DRAINAGE SYSTEMS

A. Stainless-Steel Channel Drainage Systems:

1. ASME A112.3.1, Stainless-Steel Channel Drainage Systems:
    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        1) Josam Company.
2. Non-ASME A112.3.1, Stainless-Steel Channel Drainage Systems:
    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        1) MultiDrain Systems.
        2) Zurn Plumbing Products Group.
3. Type: Modular system of stainless-steel channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling.
    a. Standard: ASME A112.3.1, for trench drains.
    b. Channel Sections: Interlocking-joint, stainless-steel with level invert.
        1) Dimensions: [5.8 inches (147 mm)] [11.7 inches (297mm)] wide. Include number of units required to form total lengths indicated.
    c. Covers: Solid ductile or gray iron, of width and thickness that fit recesses in channels, and of lengths indicated.
    d. Supports, Anchors, and Setting Devices: Manufacturer's standard, unless otherwise indicated.
    e. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.
4. Type: Modular system of stainless-steel channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling.
    a. Channel Sections: Interlocking-joint, stainless steel with level invert.
    b. Grates: Manufacturer's designation "heavy duty," with slots or perforations, and of width and thickness that fit recesses in channels.
    c. Show locations and lengths of covers on Drawings.
    d. Covers: Solid ductile or gray iron, of width and thickness that fit recesses in channels, and of lengths indicated.
    e. Supports, Anchors, and Setting Devices: Manufacturer's standard, unless otherwise indicated.
    f. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.

2.5 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Acorn Engineering Company; Elmdor/Stoneman Div.
    b. Thaler Metal Industries Ltd.

2. Description: Manufactured assembly made of 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch- (1.6-mm-) thick, lead flashing collar and skirt extending at least 8 inches (200 mm) from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.
    a. Open-Top Vent Cap: Without cap.
    b. Low-Silhouette Vent Cap: With vandal-proof vent cap.
    c. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.6 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. ProSet Systems Inc.
2. Standard: UL 1479 assembly of sleeve and stack fitting with firestopping plug.
3. Size: Same as connected soil, waste, or vent stack.
4. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
5. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
6. Special Coating: Corrosion resistant on interior of fittings.

2.7 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Open Drains:
1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
2. Size: Same as connected waste piping.

B. Deep-Seal Traps:
1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
2. Size: Same as connected waste piping.
    a. NPS 2 (DN 50): 4-inch- (100-mm-) minimum water seal.
    b. NPS 2-1/2 (DN 65) and Larger: 5-inch- (125-mm-) minimum water seal.

C. Floor-Drain, Trap-Seal Primer Fittings:
1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
2. Size: Same as floor drain outlet with NPS 1/2 (DN 15) side inlet.

D. Air-Gap Fittings:
1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

E. Sleeve Flashing Device:

1. Description: Manufactured, cast-iron fitting, with clamping device, that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 2 inches (51 mm) above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stack piping.

F. Stack Flashing Fittings:

1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

G. Vent Caps:

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

H. Frost-Resistant Vent Terminals:

1. Description: Manufactured or shop-fabricated assembly constructed of copper, lead-coated copper, or galvanized steel.
2. Design: To provide 1-inch (25-mm) enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.

I. Expansion Joints:

1. Standard: ASME A112.21.2M.
2. Body: Cast iron with bronze sleeve, packing, and gland.
3. End Connections: Matching connected piping.
4. Size: Same as connected soil, waste, or vent piping.

2.8 FLASHING MATERIALS

A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

1. General Use: 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness.
2. Vent Pipe Flashing: 3.0-lb/sq. ft. (15-kg/sq. m), 0.0469-inch (1.2-mm) thickness.
3. Burning: 6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness.

B. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses, unless otherwise indicated:

1. General Applications: 12 oz./sq. ft. (3.7 kg/sq. m or 0.41-mm thickness).
2. Vent Pipe Flashing: 8 oz./sq. ft. (2.5 kg/sq. m or 0.27-mm thickness).

C. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch (1.01-mm) minimum thickness, unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.

D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1.01-mm) minimum thickness.

E. Fasteners: Metal compatible with material and substrate being fastened.

F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

G. Solder: ASTM B 32, lead-free alloy.

H. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

2.9 GREASE INTERCEPTORS

A. Grease Interceptors:

1. Cast-Iron or Steel Grease Interceptors:
    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        1) Applied Chemical Technology, Incorporated.
        2) Rockford Sanitary Systems, Inc.
        3) Smith, Jay R. Mfg. Co.
        4) Tyler Pipe.
        5) Watts Drainage Products.
        6) Zurn Plumbing Products Group.
2. Plastic Grease Interceptors:
    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        1) Ashland Trap Distribution Co.
        2) Schier Products Company.
        3) Zurn Plumbing Products Group.
3. Standard: ASME A112.14.3 and PDI-G101, for intercepting and retaining fats, oils, and greases from food-preparation or -processing wastewater.
4. Plumbing and Drainage Institute Seal: Required.
5. Body Material: Cast iron or steel.
6. Interior Lining: Corrosion-resistant enamel.
7. Exterior Coating: Corrosion-resistant enamel.
8. Cleanout: Integral or field installed on outlet.
9. Mounting: Recessed, flush with floor.
10. Operation: Manual cleaning.

2.10 SOLIDS INTERCEPTORS

A. Solids Interceptors:
1. Cast-Iron or Steel Solids Interceptors:
    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        1) Josam Company.
        2) Rockford Sanitary Systems, Inc.
        3) Smith, Jay R. Mfg. Co.
        4) Watts Drainage Products.
        5) Zurn Plumbing Products Group.
2. Plastic Solids Interceptors:
    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        1) Ashland Trap Distribution Co.
        2) Schier Products Company.
        3) Town & Country Plastics, Inc.

3. Type: Factory-fabricated interceptor made for removing and retaining sediment from wastewater.
4. Body Material: Cast iron or steel
5. Interior Separation Device: Baffles.
6. Interior Lining: Corrosion-resistant enamel.
7. Exterior Coating: Corrosion-resistant enamel.
8. End Connections: Threaded.
9. Mounting: Inline.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment Mounting:
1. Install grease interceptors, grease removal devices, and solids interceptors on cast-in-place concrete equipment base(s).
2. Comply with requirements for vibration isolation and seismic control devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment"
3. Comply with requirements for vibration isolation devices specified in Section 220548.13 "Vibration Controls for Plumbing Piping and Equipment."

B. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.

C. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
4. Locate at base of each vertical soil and waste stack.

D. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

E. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

F. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
a. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
b. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
c. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.
3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

G. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.

H. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.

I. Install through-penetration firestop assemblies in plastic conductors and stacks at floor penetrations.

J. Assemble open drain fittings and install with top of hub 2 inches (51 mm) above floor.

K. Install deep-seal traps on floor drains and other waste outlets, if indicated.

L. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.

2. Size: Same as floor drain inlet.

M. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

N. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

O. Install vent caps on each vent pipe passing through roof.

P. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch (25-mm) clearance between vent pipe and roof substrate.

Q. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

R. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch (25-mm) clearance between vent pipe and roof substrate.

S. Install grease interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.

1. Above-Floor Installation: Set unit with bottom resting on floor, unless otherwise indicated.

2. Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor.

3. Recessed Floor Installation: Set unit in receiver housing having bottom or cradle supports, with receiver housing cover flush with finished floor.

4. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

T. Install solids interceptors with cleanout immediately downstream from interceptors that do not have integral cleanout on outlet. Install trap on interceptors that do not have integral trap and are connected to sanitary drainage and vent systems.

U. Install wood-blocking reinforcement for wall-mounting-type specialties.

V. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness or thinner.
2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (250 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Section 076200 "Sheet Metal Flashing and Trim."

F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 221413

FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.
2. Specialty pipe fittings.
3. Encasement for underground metal piping.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water (30 kPa).

B. Seismic Performance: Storm drainage piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For controlled-flow roof drainage system. Include calculations, plans, and details.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For storm drainage piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect and Owner no fewer than two days in advance of proposed interruption of storm-drainage service.
2. Do not proceed with interruption of storm-drainage service without Architect's and Owner's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service classes.

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ANACO-Husky.

b. Charlotte Pipe
c. Dallas Specialty & Mfg. Co.
d. Fernco Inc.
e. Matco-Norca, Inc.

f. MIFAB, Inc.
g. Mission Rubber Company; a division of MCP Industries, Inc.
h. Stant.
i. Tyler Pipe.

2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. ANACO-Husky.

b. Charlotte Pipe
c. Clamp-All Corp.
d. Dallas Specialty & Mfg. Co.
e. MIFAB, Inc.
f. Mission Rubber Company; a division of MCP Industries, Inc.
g. Stant.
h. Tyler Pipe.

2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Cast-Iron, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. MG Piping Products Company.

2. Standard: ASTM C 1277.
3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified-piping-system fitting.
3. Unshielded, Nonpressure Transition Couplings:

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

        1) Dallas Specialty & Mfg. Co.
        2) Fernco Inc.
        3) Mission Rubber Company; a division of MCP Industries, Inc.
        4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.

    b. Standard: ASTM C 1173.
    c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
    d. Sleeve Materials:

        1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
        2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
        3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

4. Shielded, Nonpressure Transition Couplings:

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

        1) Cascade Waterworks Mfg. Co.
        2) Mission Rubber Company; a division of MCP Industries, Inc.

    b. Standard: ASTM C 1460.

c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

5. Pressure Transition Couplings:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Cascade Waterworks Mfg. Co.
2) Dresser, Inc.
3) EBAA Iron, Inc.
4) Ford Meter Box Company, Inc. (The)
5) JCM Industries, Inc.
6) Romac Industries, Inc.
7) Smith-Blair, Inc.; a Sensus company.
8) Viking Johnson; c/o Mueller Co.

b. Standard: AWWA C219.
c. Description: Metal, sleeve-type couplings same size as, with pressure rating at least equal to and ends compatible with, pipes to be joined.
d. Center-Sleeve Material: Manufacturer's standard.
e. Gasket Material: Natural or synthetic rubber.
f. Metal Component Finish: Corrosion-resistant coating or material.

B. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Capitol Manufacturing Company.
2) Central Plastics Company.
3) Hart Industries International, Inc.
4) Jomar International Ltd.
5) Matco-Norca, Inc.
6) McDonald, A. Y. Mfg. Co.
7) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
8) Wilkins; a Zurn company.

b. Description:

1) Standard: ASSE 1079.
2) Pressure Rating: 150 psig (1035 kPa) at 180 deg F (82 deg C).
3) End Connections: Solder-joint copper alloy and threaded ferrous.

3. Dielectric Flanges:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Capitol Manufacturing Company.
2) Central Plastics Company.
3) Matco-Norca, Inc.
4) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
5) Wilkins; a Zurn company.

b. Description:

1) Standard: ASSE 1079.
2) Factory-fabricated, bolted, companion-flange assembly.
3) Pressure Rating: 175 psig (1200 kPa) minimum.
4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

4. Dielectric-Flange Insulating Kits:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Advance Products & Systems, Inc.
2) Calpico, Inc.
3) Central Plastics Company.
4) Pipeline Seal and Insulator, Inc.

b. Description:

1) Nonconducting materials for field assembly of companion flanges.
2) Pressure Rating: [150 psig (1035 kPa).
3) Gasket: Neoprene or phenolic.
4) Bolt Sleeves: Phenolic or polyethylene.
5) Washers: Phenolic with steel-backing washers.

5. Dielectric Nipples:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Elster Perfection.
2) Grinnell Mechanical Products.
3) Matco-Norca, Inc.
4) Precision Plumbing Products, Inc.
5) Victaulic Company.

b. Description:

1) Electroplated steel nipple complying with ASTM F 1545.
2) Pressure Rating: 300 psig (2070 kPa) at 225 deg F (107 deg C).
3) End Connections: Male threaded or grooved.
4) Lining: Inert and noncorrosive, propylene.

2.6 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Material: High-density, crosslaminated PE film of 0.004-inch (0.10-mm) or LLDPE film of 0.008-inch (0.20-mm) minimum thickness.

C. Form: Sheet or tube.

D. Color: Black or natural.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Install seismic restraints on piping.

K. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

L. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

M. Install storm drainage piping at the following minimum slopes unless otherwise indicated:

1. Building Storm Drain: 1 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
2. Horizontal Storm-Drainage Piping: 2 percent downward in direction of flow.

N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.

O. Install aboveground PVC piping according to ASTM D 2665.

P. Install underground PVC piping according to ASTM D 2321.

Q. Install engineered controlled-flow drain specialties and storm drainage piping in locations indicated.

R. Plumbing Specialties:

1. Install backwater valves in storm drainage gravity-flow piping.
2. Install drains in storm drainage gravity-flow piping.

S. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

T. Install sleeves for piping penetrations of walls, ceilings, and floors.

U. Install sleeve seals for piping penetrations of concrete walls and slabs.

V. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 JOINT CONSTRUCTION

A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Hub-and-Spigot, Cast-Iron Soil Piping Calked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.

C. Hubless, Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

D. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

E. Plastic, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Shielded, nonpressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric nipples.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100) Use dielectric flanges.
4. Dielectric Fittings for NPS 5 (DN 125) and Larger: Use dielectric flange kits.

3.5 VALVE INSTALLATION

A. General valve installation requirements are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves: Install shutoff valve on each sump pump discharge.

1. Install gate or full-port ball valve for piping NPS 2 (DN 50) and smaller.
2. Install gate valve for piping NPS 2-1/2 (DN 65) and larger.

C. Check Valves: Install swing-check valve, between pump and shutoff valve, on each sump pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Install backwater valves in accessible locations.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
5. Vertical Piping: MSS Type 8 or Type 42, clamps.
6. Individual, Straight, Horizontal Piping Runs:

a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.

7. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
8. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting, valve, and coupling.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 and NPS 8 (DN 150 and DN 200): 60 inches (1500 mm) with 3/4-inch (19-mm) rod.
5. NPS 10 and NPS 12 (DN 250 and DN 300): 60 inches (1500 mm) with 7/8-inch (22-mm) rod.
6. Spacing for 10-foot (3-m) pipe lengths may be increased to 10 feet (3 m). Spacing for fittings is limited to 60 inches (1500 mm).

F. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).

G. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 and NPS 8 (DN 150 and DN 200): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.
5. NPS 10 and NPS 12 (DN 250 and DN 300): 48 inches (1200 mm) with 7/8-inch (22-mm) rod.

H. Install supports for vertical PVC piping every 48 inches (1200 mm).

I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.

1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.
2. Install horizontal backwater valves with cleanout cover flush with floor.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

A. Identify exposed storm drainage piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.

4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.10 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.11 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground storm drainage piping NPS 6 (DN 150) and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI, hubless-piping couplings; and coupled joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

C. Aboveground, storm drainage piping NPS 8 (DN 200) and larger shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI, hubless-piping couplings; and coupled joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

D. Underground storm drainage piping NPS 6 (DN 150) and smaller shall be any of the following:

1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
2. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

E. Underground, storm drainage piping NPS 8 (DN 200) and larger shall be any of the following:

1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
2. Cellular-core, sewer and drain series, PVC pipe; PVC socket fittings; and solvent-cemented joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

END OF SECTION 221413

SECTION 223400

FUEL-FIRED, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Commercial, atmospheric, gas-fired, storage, domestic-water heaters.
2. Commercial, power-burner, gas-fired, storage, domestic-water heaters.
3. Commercial, power-vent, gas-fired, storage, domestic-water heaters.
4. Commercial, gas-fired, high-efficiency, storage, domestic-water heaters.
5. Domestic-water heater accessories.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For fuel-fired, domestic-water heaters, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Product Certificates: For each type of commercial gas-fired and gas-fired tankless domestic-water heater, from manufacturer.

C. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

D. Source quality-control reports.

E. Field quality-control reports.

F. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.

C. ASME Compliance:

1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

a. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:

1) Storage Tank: Five years.
2) Controls and Other Components: Two year(s).

b. Compression Tanks: Five years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, GAS-Fired, STORAGE, domestic-WATER HEATERS

A. Commercial, Gas-Fired, High-Efficiency, Storage, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AERCO International, Inc.
b. Lochinvar Corporation.
c. PVI Industries, LLC.
d. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
e. State Industries.

2. Standard: ANSI Z21.10.3/CSA 4.3.
3. Storage-Tank Construction: ASME-code steel with 150-psig minimum working-pressure rating.

a. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.

1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.

b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
c. Lining: complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.

4. Factory-Installed Storage-Tank Appurtenances:

a. Anode Rod: Powered Anode
b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
c. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
d. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
e. Condensate Neutralization Kit
f. Jacket: Steel with enameled finish.
g. Burner or Heat Exchanger: Comply with UL 795 or approved testing agency requirements for gas-fired, high-efficiency, domestic-water heaters and natural-gas fuel.
h. Temperature Control: Adjustable thermostat.
i. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
j. Combination Temperature-and-Pressure Relief Valves: ANSI Z21.22/CSA 4.4-M. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

5. Draft Hood: Draft diverter, complying with ANSI Z21.12

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AMTROL Inc.
b. Honeywell International Inc.
c. State Industries.
d. Zurn/Wilkens Industries

2. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. Construction:

a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.

b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
c. Air-Charging Valve: Factory installed.

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 (DN 20) with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.

D. Heat-Trap Fittings: ASHRAE 90.2.

E. Manifold Kits: Domestic-water heater manufacturer's factory-fabricated inlet and outlet piping for field installation, for multiple domestic-water heater installation. Include ball type shutoff valves to isolate each domestic-water heater and balancing valves to provide balanced flow through each domestic-water heater.
1. Comply with requirements for balancing valves specified in Section 221119 "Domestic Water Piping Specialties."

F. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1-M, manually operated. Furnish for installation in piping.

G. Gas Pressure Regulators: ANSI Z21.18/CSA 6.3, appliance type. Include pressure rating as required to match gas supply.

H. Automatic Gas Valves: ANSI Z21.21/CSA 6.5, appliance, electrically operated, on-off automatic valve.

I. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.

J. Pressure Relief Valves: Include pressure setting less than domestic-water heater working-pressure rating.

1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.

K. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4-M.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect assembled domestic-water heaters and storage tanks specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test domestic-water heaters and storage tanks to minimum of one and one-half times pressure rating before shipment.

C. Domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on concrete base. Comply with requirements for concrete base as specified.
   1. Maintain manufacturer's recommended clearances.
   2. Arrange units so controls and devices that require servicing are accessible.
   3. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
   4. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
   5. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   6. Install anchor bolts to elevations required for proper attachment to supported equipment.
   7. Anchor domestic-water heaters to substrate.

B. Install domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

   1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping.

C. Install gas-fired, domestic-water heaters according to NFPA 54.

   1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.
   2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
   3. Install automatic gas valves on gas supplies to gas-fired, domestic-water heaters if required for operation of safety control.

D. Install commercial domestic-water heaters with seismic-restraint devices.

E. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

F. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains.

G. Install thermometer on outlet piping of domestic-water heaters.

H. Assemble and install inlet and outlet piping manifold kits for multiple domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each domestic-water heater outlet.

I. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.

J. Fill domestic-water heaters with water.

K. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."

B. Drawings indicate general arrangement of piping, fittings, and specialties.

C. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

C. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain domestic-water heaters.

END OF SECTION

SECTION 22 42 13
COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Water closets.
2. Flushometer valves.
3. Toilet seats.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than one of each type.

PART 2 - PRODUCTS

2.1 FLOOR-MOUNTED, BOTTOM-OUTLET WATER CLOSETS

A. Water Closets: Floor mounted, bottom outlet, top spud.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Standard America.
   b. Crane Plumbing, L.L.C.
   c. Gerber Plumbing Fixtures LLC.
   d. Kohler Co.
   e. Mansfield Plumbing Products LLC.
   f. TOTO USA, INC.
   g. Zurn Industries, LLC; Commercial Brass and Fixtures.
2. Bowl:
   a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
   b. Material: Vitreous china.
   c. Type: Siphon jet.

d. Style: Flushometer valve.

e. Rim Contour: Elongated.

f. Spud Size and Location: NPS 1-1/2 (DN 40); top.

g. Color: White

3. Bowl-to-Drain Connecting Fitting: ASTM A 1045 or ASME A112.4.3.

2.2 WALL-MOUNTED WATER CLOSETS

A. Water Closets: Wall mounted, top spud.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Standard America.

b. Briggs Plumbing Products, Inc.

c. Crane Plumbing, L.L.C.

d. Gerber Plumbing Fixtures LLC.

e. Kohler Co.

f. TOTO USA, INC.

g. Zurn Industries, LLC; Commercial Brass and Fixtures.

2. Bowl:

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.

b. Material: Vitreous china.

c. Type: Siphon jet.

d. Style: Flushometer valve.

e. Height: Standard.

f. Rim Contour: Elongated.

g. Spud Size and Location: NPS 1-1/2 (DN 40); top.

3. Support:

a. Standard: ASME A112.6.1M.

b. Description: Waste-fitting assembly as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

2.3 FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Gerber Plumbing Fixtures LLC.

b. Sloan Valve Company.

c. Zurn Industries, LLC; Commercial Brass and Fixtures.

2. Standard: ASSE 1037.

3. Minimum Pressure Rating: 125 psig (860 kPa).

4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: **Exposed**.
9. Minimum Inlet: NPS 1 (DN 25).
10. Minimum Outlet: NPS 1-1/4 (DN 32).

2.4 TOILET SEATS

A. Toilet Seats:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Standard America.
   b. Bemis Manufacturing Company.
   c. Centoco Manufacturing Corporation.
   d. Church Seats.
   e. Jones Stephens Corp.; Comfort Seat Brand.
   f. Kohler Co.
   g. TOTO USA, INC.
   h. Zurn Industries, LLC; Commercial Brass and Fixtures.
2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.
4. Shape: Elongated rim, open front
5. Hinge: Self-sustaining, check
6. Hinge Material: Noncorroding metal.
7. Seat Cover: Not required.
8. Color: White

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.

B. Examine walls and floors for suitable conditions where water closets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.

2. Use carrier supports with waste-fitting assembly and seal.
3. Install floor-mounted, back-outlet water closets attached to building floor substrate, onto waste-fitting seals; and attach to support.
4. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.

C. Flushometer-Valve Installation:
1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
4. Install actuators in locations that are easy for people with disabilities to reach.
5. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

D. Install toilet seats on water closets.

E. Wall Flange and Escutcheon Installation:
1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

F. Joint Sealing:
1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 22 42 14
COMMERCIAL URINALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Urinals.
2. Flushometer valves.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for urinals.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than one of each type.

PART 2 - PRODUCTS

2.1 WALL-HUNG URINALS

A. Urinals: Wall hung, back outlet, siphon jet, accessible.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. American Standard America.
    b. Gerber Plumbing Fixtures LLC.
    c. Kohler Co.
2. Fixture:
    a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
    b. Material: Vitreous china.
    c. Type: Siphon jet.
    d. Strainer or Trapway: Manufacturer's standard strainer with integral trap.
    e. Water Consumption: Water saving.
    f. Spud Size and Location: NPS 3/4 (DN 20); top.
    g. Outlet Size and Location: NPS 2 (DN 50); back.

3. Waste Fitting:
    a. Standard: ASME A112.18.2/CSA B125.2 for coupling.
    b. Size: NPS 2 (DN 50).
4. Support: ASME A112.6.1M, Type I, urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture. Include rectangular, steel uprights.

2.2 URINAL FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Sloan Valve Company.
    b. Zurn Industries, LLC; Commercial Brass and Fixtures.
2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig (860 kPa).
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Minimum Inlet: NPS 3/4 (DN 20).
9. Minimum Outlet: NPS 3/4 (DN 32).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before urinal installation.
B. Examine walls and floors for suitable conditions where urinals will be installed.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Urinal Installation:
1. Install urinals level and plumb according to roughing-in drawings.
2. Install wall-hung, back-outlet urinals onto waste fitting seals and attached to supports.
3. Install wall-hung, bottom-outlet urinals with tubular waste piping attached to supports.
4. Install accessible, wall-mounted urinals at mounting height for the handicapped/elderly, according to ICC/ANSI A117.1.
5. Install trap-seal liquid in waterless urinals.

B. Support Installation:
1. Install supports, affixed to building substrate, for wall-hung urinals.
2. Use off-floor carriers with waste fitting and seal for back-outlet urinals.
3. Use carriers without waste fitting for urinals with tubular waste piping.
4. Use chair-type carrier supports with rectangular steel uprights for accessible urinals.

C. Flushometer-Valve Installation:
1. Install flushometer-valve water-supply fitting on each supply to each urinal.

2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible urinals with handle mounted on open side of compartment.
4. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

D. Wall Flange and Escutcheon Installation:
1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Joint Sealing:
1. Seal joints between urinals and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to urinal color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect urinals with water supplies and soil, waste, and vent piping. Use size fittings required to match urinals.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to urinals, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust urinals and controls. Replace damaged and malfunctioning urinals, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. Clean urinals and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed urinals and fittings.

C. Do not allow use of urinals for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 22 42 16
COMMERCIAL SINKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Service basins.
2. Service sinks.
3. Utility sinks.
4. Handwash sinks.
5. Sink faucets.
6. Supply fittings.
7. Waste fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.
2. Include rated capacities, operating characteristics[, electrical characteristics,] and furnished specialties and accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sinks to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 SERVICE SINKS

A. Service Sinks: Enameled, cast iron, trap standard mounted.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Standard America.
   b. Commercial Enameling Company.
   c. Gerber Plumbing Fixtures LLC.
   d. Kohler Co.
   e. Zurn Industries, LLC; Commercial Brass and Fixtures.

2. Fixture:
    a. Standard: ASME A112.19.1/CSA B45.2.
    b. Type: Service sink with back.
    c. Mounting: NPS 3 (DN 80) P-trap standard with grid strainer inlet, cleanout, and floor flange.
    d. Rim Guard: On front and sides.

3. Support: ASME A112.6.1M, Type II, sink carrier.

2.2 UTILITY SINKS

A. Utility Sinks: Stainless steel, counter mounted.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Advance Tabco.
    b. Eagle Group; Foodservice Equipment Division.
    c. Elkay Manufacturing Co.
    d. Griffin Products, Inc.
    e. Just Manufacturing.
2. Fixture:
    a. Standard: ASME A112.19.3/CSA B45.4.
    b. Type: Ledge back.
    c. Metal Thickness: 0.050 inch (1.3 mm).
    d. Compartment:
        1) Drain: Grid with NPS 2 (DN 50) tailpiece and twist drain.
3. Supply Fittings:
    a. Standard: ASME A112.18.1/CSA B125.1.
    b. Supplies: Chrome-plated brass compression stop with inlet connection matching water-supply piping type and size.
        1) Operation: Loose key or Wheel handle.
        2) Risers: NPS 1/2 (DN 15), chrome-plated, soft-copper flexible tube.
4. Waste Fittings:
    a. Standard: ASME A112.18.2/CSA B125.2.
    b. Trap(s):
        1) Size: NPS 1-1/2 (DN 40).
        2) Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch- (0.83-mm-) thick brass tube to wall; and chrome-plated brass or steel wall flange.
        3) Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-) thick stainless-steel tube to wall; and stainless-steel wall flange.
    c. Continuous Waste:
        1) Size: NPS 1-1/2 (DN 40).

2) Material: Chrome-plated, 0.032-inch- (0.83-mm-) thick brass tube.

5. Mounting: On counter with sealant.

2.3 SINK FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.

B. Sink Faucets: Manual type, mixing valve.

1. Commercial, Solid-Brass Faucets.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) American Standard America.

2) Chicago Faucets.

3) Delta Faucet Company.

4) Elkay Manufacturing Co.

5) Kohler Co.

6) Moen Incorporated.

7) T & S Brass and Bronze Works, Inc.

8) Zurn Plumbing Products Group.

2. General-Duty, Solid-Brass Faucets.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) American Standard America.

2) Central Brass Company.

3) Chicago Faucets.

4) Delta Faucet Company.

5) Elkay Manufacturing Co.

6) Gerber Plumbing Fixtures LLC.

7) Kohler Co.

8) Moen Incorporated.

9) T & S Brass and Bronze Works, Inc.

10) Zurn Plumbing Products Group

3. Copper- or Brass-Underbody Faucets.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) American Standard America.

2) Delta Faucet Company.

3) Ferguson Enterprises, Inc.

4) Gerber Plumbing Fixtures LLC.

5) Moen Incorporated.

4. Standard: ASME A112.18.1/CSA B125.1.

5. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.

6. Maximum Flow Rate: 2.2 gpm (8.3 L/min.).
7. Vacuum Breaker: Required for hose outlet.

2.4 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Loose key or Wheel handle.

F. Risers:

1. NPS 1/2 (DN 15).
2. Chrome-plated, soft-copper flexible tube.

2.5 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 (DN 40) offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 (DN 40).
2. Material: Chrome-plated, [two-piece, cast-brass trap and swivel elbow with 0.032-inch- (0.83-mm-) thick brass tube to wall; and chrome-plated brass or steel wall flange.
3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-) thick stainless-steel tube to wall; and stainless-steel wall flange.

2.6 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.

B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sinks level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 220523 "General-Duty Valves for Plumbing Piping."
2. Install stops in locations where they can be easily reached for operation.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

G. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 22 42 17
COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
    a. Servicing and adjustments of automatic faucets.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 VITREOUS-CHINA, COUNTER-MOUNTED LAVATORIES

A. Lavatory: self-rimming, vitreous china, counter mounted.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. American Standard America.
    b. Crane Plumbing, L.L.C.
    c. Kohler Co.
    d. TOTO USA, INC.
2. Fixture:
    a. Standard: ASME A112.19.2/CSA B45.1.

b. Type: Self-rimming for above-counter mounting.

c. Faucet-Hole Location: Top.

d. Mounting Material: Sealant.

2.2 SOLID-BRASS, AUTOMATICALLY OPERATED LAVATORY FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Lavatory Faucets: Automatic-type, electronic-sensor-operated, solid-brass valve.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Standard America.

b. Chicago Faucets.

c. Kohler Co.

d. Moen Incorporated.

e. Sloan Valve Company.

f. T & S Brass and Bronze Works, Inc.

g. TOTO USA, INC.

h. Zurn Industries, LLC; Commercial Brass and Fixtures.

2. Standards: ASME A112.18.1/CSA B125.1 and UL 1951.

3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

4. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.

5. Body Material: Commercial, solid brass.

6. Finish: Polished chrome plate.

7. Maximum Flow Rate: 0.5 gpm (1.5 L/min.).

8. Drain: Not part of faucet.

2.3 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Loose key or Wheel handle.

F. Risers:

1. NPS 1/2 (DN 15).

2. Chrome-plated, soft-copper flexible tube riser.

2.4 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 (DN 32) offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 by NPS 1-1/4 (DN 40 by DN 32).
2. Material: Chrome-plated, [two-piece, cast-brass trap and swivel elbow with 0.032-inch- (0.83-mm-) thick brass tube to wall; and chrome-plated, brass or steel wall flange.
3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch- (0.30-mm-) thick stainless-steel tube to wall; and stainless-steel wall flange.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.

B. Examine counters and walls for suitable conditions where lavatories will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 22 47 13
DRINKING FOUNTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes drinking fountains and related components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of drinking fountain.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include operating characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For drinking fountains to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 DRINKING FOUNTAINS

A. Drinking Fountains: Wall mounted.

1. Bronze Drinking Fountains:
    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        1) Elkay Manufacturing Co.
        2) Filtrine Manufacturing Company.
        3) Halsey Taylor.
        4) Haws Corporation.
2. Stainless-Steel Drinking Fountains:
    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
        1) Elkay Manufacturing Co.
        2) Filtrine Manufacturing Company.
        3) Halsey Taylor.
        4) Haws Corporation.
        5) Murdock-Super Secur; a division of Acorn Engineering Company.
        6) Stern-Williams Co., Inc.
        7) Tri Palm International, LLC.
3. Standards:
    a. Comply with ASME A112.19.3/CSA B45.4.

    Comply with NSF 61.
4. Back Panel: Stainless-steel wall plate behind drinking fountain.
5. Drain: Grid type with NPS 1-1/4 (DN 32) tailpiece.
6. Supply: NPS 3/8 (DN 10) with shutoff valve.

7. Waste Fitting: ASME A112.18.2/CSA B125.2, NPS 1-1/4 (DN 32) chrome-plated brass P-trap and waste.
8. Support: ASME A112.6.1M, Type III lavatory carrier.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.

B. Examine walls and floors for suitable conditions where fixtures will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.

B. Set pedestal drinking fountains on floor.

C. Install recessed drinking fountains secured to wood blocking in wall construction.

D. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.

E. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 220523 "General-Duty Valves for Plumbing Piping."

F. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

G. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

H. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Install ball, gate, or globe shutoff valve on water supply to each fixture. Comply with valve requirements specified in Section 220523 "General-Duty Valves for Plumbing Piping."

D. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Adjust fixture flow regulators for proper flow and stream height.

3.5 CLEANING

A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.

C. Provide protective covering for installed fixtures.

D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 23 01 00

GENERAL PROVISIONS, MECHANICAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials, equipment, fabrication, installation, and tests in conformity with applicable codes and authorities having jurisdiction for the following:
   1. Mechanical work covered by all sections within DIVISION 23 - MECHANICAL of these Specifications, including but not limited to:
      a. Heating, ventilating, and air conditioning systems and equipment.
      b. Plumbing systems and equipment.

1.2 RELATED SECTIONS

A. DIVISION 9 - FINISHES.

B. DIVISION 23 - MECHANICAL.

C. DIVISION 26 - ELECTRICAL.

1.3 REFERENCE STANDARDS, CODES, FEES AND UTILITY CONNECTION CHARGES

A. Local codes.
B. Standard Building Codes.
C. State Codes.
D. FM - Factory Mutual.
E. Federal Codes.
F. ASME Boiler Code.
G. AGA - American Gas Association.
H. ASH RAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
I. AABC - Associated Air Balance Council.
J. ADC - Air Diffusion Council.
K. IEEE - Institute of Electrical Electronic Engineers.
L. ANSI - American National Standards Institute.
M. ASME - American Society of Mechanical Engineers.
N. NEMA - National Electrical Manufacturer's Association.
0. NFPA - National Fire Protection Association.
P. ARI - Air-Conditioning and Refrigeration Institute.
Q. UL - Underwriters Laboratories, Inc.
R. NBC - National Building Code.
S. NMC - National Mechanical Code.
T. NPC - National Plumbing Code.
U. OSHA - Occupational Safety and Health Act.
V. SMACNA - Sheet Metal and Air Conditioning Contractors National Association, Inc.
W. Standards Compliance: When materials or equipment must conform to the standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories (UL), proof of such conformance shall be submitted for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified.
X. Contractor shall make arrangements with utility company(ies) for their services and metering work. Pay all charges therefor, and include the cost thereof in the contract price.

1.4 QUALITY ASSURANCE

A. Supply all equipment and accessories new and free from defects.

B. Products Criteria:
   1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products. Items of equipmentshall essentially duplicate equipment that has been in satisfactory use at least two yearsprior to bid opening. Provide list of users upon request.
   2. Equipment having less than a two-year use record, which in the opinion of the Engineer, provides significant benefits to the Owner such as improved energy efficiency, will be acceptable if it is a product of a manufacturer who has been regularly engaged in the manufacture of that specific type of product which has been used in similar applications for a period of two years. The Architect/Engineer reserves the right to require the Contractor to submit evidence to this effect for his approval.
   3. Equipment Service: Products shall be supported by a service organization which maintains an adequate inventory of repair parts and is located, in the opinion of t h e Architect/Engineer, reasonably close to the site.
   4. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
   5. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
   6. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.

C. Equipment Vibration Tolerance:
   1. After air and/or water balance work is completed and permanent drive mechanisms are in place, perform field mechanical balancing and adjustments required to meet the specified vibration tolerance.

D. Welding: Before any welding is performed submit a copy of the Welding Procedure Specification (WPS) together with the Procedure Qualification Record as required by Section **IX** of the ASME Boiler and Pressure Vessel Code.
   1. Before any welder performs any welding, submit a copy of the Manufacturer's Record of Welder or Welding Operator Qualification Tests as required by Section **IX** of the ASME Boiler and Pressure Vessel Code. The letter or symbol (as shown on the qualification testform) shall be used to identify the work of that welder and shall be affixed in accordancewith appropriate construction code, to each completed weld.
   2. The types and extent of non-destructive examinations required for pipe welds are shown in Table 136.4 of the Code for Pressure Piping, ANSI/ASME B31.1.

E. Supply all equipment and accessories in compliance with the applicable standards listed in Article 1.3 of this section and with all applicable national, state, and local codes.

F. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material beinginstalled, printed copies of these recommendations shall be furnished for record to theArchitect/Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations may be causefor rejection of the material.

G. When included, reflected ceiling plan drawings shall govern over mechanical and electrical drawings for location of ceiling-installed elements.

H. In addition to all requirements specified hereinafter, each material and equipment item shall have all features as standard with its manufacturer and/or required for the complete operational system.

I. Capacities, ratings, sizes, and other requirements not specified hereinafter shall be as scheduled or otherwise indicated on the drawings.

J. Should the Contractor at any time discover a discrepancy in the drawings or with respect to a variance of code requirements, he shall notify the Architect/Engineer for clarification and shall not proceed with the work affected until clarification has been made.

1.5 SUBMITTALS

A. Submittals and shop drawings shall be submitted in accordance with these CONTRACT DOCUMENTS and in accordance with the following:
   1. Submit shop drawings, manufacturers data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and have them approved before procurement, fabrication, or delivery of the items to the job site. Partial submittals will not be acceptable and will be returned without review. All equipment, material, and manufacturer's literature shall be submitted for approval at one time and in a tabulated binder. Control drawings and the controls equipment submittal may be submitted at a later time, but as soon as practical after the contract has been awarded and after the general equipment submittal has been made. However, every attempt shall be made to include the complete controls submittal with the general equipment submittal at one time.
   2. The submittal shall include summary cover sheet(s) and manufacturer's literature under each tab of the submittal binder which together clearly indicate compliance or deviation from the specifications and drawings.
   3. Submission material and all shop drawings shall be marked with the appropriate identification relating the equipment to the drawings. Mark and reference each item on the submittal summary sheet and the manufacturer's literature to the appropriate paragraph number in the specifications. Manufacturer's standard catalogs will not be accepted.
   4. Failure to comply with the above for a complete and clear submittal may result in resubmittal.

B. Operating instructions and parts lists.
   1. Before requesting acceptance of work, furnish the number of printed and hardback bound sets required.
   2. Equipment and systems.
      a. Complete description of equipment and systems and basic operating features.
      b. Manufacturer's name, model number, service manual, spare parts list, and descriptive literature for all components
   3. Maintenance instructions.
   4. Listing of possible breakdown and repairs.
   5. Instruction for starting and operation.
   6. Detailed and simplified one line, color coded flow and wiring diagrams.
   7. Schedule of valve identification.

C. Field-test report as required by Section 230593 - BALANCING AND TESTING BY INDEPENDENT AGENCY.

1.6 JOB CONDITIONS

A. Examine related work and surfaces before starting work of any section.
   1. Report in writing, conditions which will prevent proper provision of this work.
   2. Installed work which interferes with architectural or any other work, or which deviates from drawings and specifications without prior approval, shall be altered by contractor, without cost to Owner, to clear such interferences, or to comply with the drawings a n d specifications. Interferences or discrepancies which may be discovered or anticipated shall

      be reported promptly. Architect/Engineer shall have privilege of making minor changes without additional cost, provided that such changes are made before commencing work on items involved.

B. Continuity of Services and Connections to Existing Work:
   1. At no additional cost to Owner, provide all necessary temporary connections and temporary

facilities to accomplish the required continuity of services and existing operations.

2. Arrange all work to interfere as little as possible with the normal existing operations. Do not interrupt any existing utility or other service or existing operation at any time without Owner's prior approval. After each interruption has been made, make all necessary connections and alterations, and restore services and avoid interferences with normal existing operations as quickly as possible.
3. Install newwork and connect to existing work with minimum interference to existing facilities and maintain water and air tightness when applicable.
4. Temporary shutdowns of existing services:
   a. At no additional charges.
   b. At times not to interfere with normal operation of existing facilities.
   c. Only with written consent of Owner.
5. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work.
6. Connect new work to existing work in neat and satisfactory high quality workmanship manner.
7. Restore existing disturbed work to original or better conditions.

1.7 ACCURACY OF DATA AND DRAWINGS

A. Drawings are generally diagrammatic, and where not dimensioned or detailed, indicated approximate locations of work. Examine carefully existing buildings and structures, existing systems, and all other contract drawings, and install work to conform as nearly as possible to locations and arrangements indicated, with only such minor adjustments as necessary to coordinate mechanical work with other work, and to avoid interferences therewith. All piping and ductwork, offsets, rises, and fittings are not necessarily shown; however, provide these as required by the conditions involved.

B. Building and structure dimensions: TAKE THESE FROM ARCHITECTURAL AND FROM ACTUAL MEASUREMENTS OF EACH EXISTING BUILDING AND EACH EXISTING STRUCTURE INVOLVED.

1.8 COORDINATION

A. Carefully examine the architectural, electrical, heating and air-conditioning, plumbing, fire protection, structural, and site plan drawings and specifications, and coordinate this work among trades to avoid delay.

B. In general, permanent openings or knockout panels are provided to permit only future service or replacement of system components, not the entire assembly. The Contractor shall coordinate his equipment delivery with construction progress so that installation may be made in an orderly manner.

C. The structural design is based on installed locations of the equipment only. Any necessary shoring or other protection necessary for moving heavy equipment to installed location is the responsibility of the Contractor. Take extra precautions in using any existing structure for hoisting or temporary support.

D. Wherever piping, conduits, ducts, or other items are to run in the same general direction, elevation, or location, coordinate for the proper allocation of the space position. If necessary, consult the Architect/Engineer, whose decision shall be final.

E. Wherever work is to be concealed or installed above ceilings, maintain adequate clearance to allow for access, repairs, and removal of all devices.

F. Coordinate setting of sleeves, anchor bolts, and inserts as required to accommodate equipment before concrete is set and masonry is placed.

1.9 ELECTRICAL CHARACTERISTICS, MOTORS, MOTOR STARTERS, CONTROLS, AND

WIRING

A. Electrical Characteristics: Refer to electrical section for electrical characteristics of motors specified or scheduled under the Mechanical Section.

B. Motor Sizes: Motor horsepowers specified in Mechanical Section and/or indicated on mechanical drawings are approximate, and are not intended to limit motor sizes. Each motor shall be of proper size to operate continuously the actual equipment driven thereby, without overload on motor under all operating conditions, except as otherwise specified.

C. Motor starters and other electrical control devices: Generally, motor starters for equipment motors shall be furnished by contractor. Also, provide electrical control devices required for the Mechanical system, unless otherwise specified.

D. All motor starters shall comply with specifications for motor starters as specified in DIVISION 16.

E. In addition to the items specified in DIVISION 16, starters that operate in parallel with other starters shall be equipped with auxiliary contacts on the main disconnect for breaking one leg of the control power. In these cases, the secondaries of the starter transformers shall be properly phased.

F. Installation of electrical devices, EXCEPT those factories mounted on equipment: electrical control devices which require electrical connections ONLY, shall be installed by contractor; electrical control devices which required piping, linkage, remote bulb, or other mechanical connections IN ADDITION TO electrical connections, shall be installed by contractor, ready for electrical connections. Electric wiring: All electric wiring required to operate the mechanical systems, EXCEPT wiring which is factory installed on equipment, shall be done by contractor, in accordance with approved wiring diagrams which shall be furnished by this Section.

G. Install name plates with full data on all motors, starters, and disconnect switches.

1.10 TRANSPORTATION AND HANDLING

A. Pay all transportation and handling charges. Immediately report any damage to equipment received to the carrier so that job progress will not be delayed.

B. All items received by the Contractor shall be left in their original containers, or as shipped, where possible, until installed in final locations.

C. All items shall be protected from the elements. If stored outside, provide blocking to raise the base of each item well above ground and/or water levels.

D. Provide additional protection for items subject to damage, where necessary, so that when installed, the items will be in new condition.

E. Supply electrical items that might be damaged by condensation with heated air in an enclosed area until placed into service.

1.11 CUTTING AND PATCHING

A. Execute cutting (including excavating), fitting, and patching of work required to:

1. Make several parts fit properly.
2. Uncover work to provide for installation of ill-timed work.
3. Remove defective work.
4. Remove work not complying with the requirements of the contract documents.
5. Remove samples of installed work as specified for testing.
6. Where work is cut for any reason, restore cut and damaged areas with new materials meeting requirements of the contract documents.

B. In addition to the requirements above and upon written instructions of the Architect/ Engineer, provide cutting, fitting, and patching to:
   1. Uncover work to provide observation of covered work.
   2. Remove samples of installed materials for testing.

C. Do not endanger work by cutting or altering work or any part of it.

D. Prior to cutting that affects structural safety of project, submit written notice to Architect/Engineer requesting consent to proceed with cutting, including:
   1. Identification of project.
   2. Description of affected work.
   3. Necessity for cutting.
   4. Effect on other work and on structural integrity of project.
   5. Description of proposed work. Designate scope of cutting and patching, trades to execute work, products proposed to be used, and extent of refinishing.
   6. Alternatives to cutting and patching.
   7. Designation of party responsible for cost of cutting and patching.

E. Prior to cutting and patching done on the instruction of the Architect/Engineer, submit cost estimate.

F. Should conditions of work or schedule indicate the need for change of materials or methods, submit written recommendations Architect/Engineer, including conditions indicating the need for change, recommendations for alternative materials or methods, submittals as required for substitution of materials, and cost estimate for changing materials or methods.

G. Submit written notice designating time work will be uncovered to provide for observation.

H. Costs caused by ill-timed or defective work and work not complying with requirements of the contract documents, including costs of additional services of Architect/Engineer, shall be borne by the party responsible for the ill-timed, defective, or non-complying work.

1.12 INSTRUCTION TO OWNER/OPERATING PERSONNEL

A. The Contractor shall furnish the services of factory trained instructors who will give full instruction to the designated personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the equipment or system specified. The instruction will be for 8 hours. Each instructor shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given after the equipment or system has been accepted for regular operation. When significant changes or modifications in the equipment or system are made under the terms of the contract, additional instruction shall be provided to acquaint the operating personnel with the changes or modifications.

PART 2 PRODUCTS

2.1 MATERIALS, SUBSTITUTIONS, AND PRODUCT OPTIONS

A. Manufacturers or Trade Names:
   1. The use of manufacturer's names and catalog numbers in these specifications or on the drawings indicates the type, size, rating, capacity, design, quality, or kind of materials required, and a closed specification is not intended, and similar and equal products of any reputable manufacturer which will satisfactorily perform the required functions will be acceptable, unless otherwise indicated by the words NO SUBSTITUTES, or unless otherwise specifically stated. The Architect/Engineer reserves the right to reject all materials which he deems not equal to those specified, or which he decides will not satisfactorily perform the required functions.
   2. Any manufacturer providing equipment for this project shall provide a written guarantee to the Contractor stipulating that any parts used in the equipment so provided will be readily

available for a minimum of ten years from date of shipment from the factory. The Contractor shall, in turn, provide the Owner with these guarantees in the brochures submitted covering all the equipment used.

2.2 VALVE TAG IDENTIFICATION

A. Minimum 1-1/2-inch diameter.

B. Brass or aluminum.

C. Identifying numbers and letters shall be stamped 1/4-inch (minimum) height.

D. Fasten to valve with 18 (minimum) gauge solid copper or galvanized steel wire.

2.3 NAME PLATE IDENTIFICATION

A. Four by two-inch (minimum) size engraved and laminated plastic nameplate or black lamicoid sheet with white lettering.

2.4 PIPE IDENTIFICATION

A. Brady B-500 or equal self-sticking vinyl cloth markers and pipe marker arrows.

2.5 MOTORS

A. All motors 10 hp and larger shall be high efficiency motors in accordance with NEMA MA-1-12.53b and IEEE 112A, Test Method B, with guaranteed minimum efficiency of 88.5 percent, an across-the-line minimum power factor of 85 percent (for synchronous speeds of 1,800 and 3,600 rpm), and a service factor of 1 .15.

B. Every electric motor shall comply with NEMA Standard and be sized and designed to operate continuously at full load and full speed without causing noise, vibration, or temperature rise in excess of its rating.

C. Motors on belt drive equipment shall be furnished with apparatus for belt tension adjustment slide rails, idler pulley, or similar.

D. Motors shall be of sufficient size for the duty to be performed and shall not exceed the motor's full rated load when the driven equipment is operating at specified capacity under the most severe conditions likely to be encountered. Insulation shall be Class F with Class B rise and moisture, fungus, and oil resistant treatment and shall be of a type designed and constructed to withstand the severe moisture conditions and the wide range of ambient temperature to which the motors will be subjected. Unless otherwise specified, all motors shall have open dripproof frames and shall be rated for continuous full load operation without exceeding the standard temperature rise permitted for the frame construction and class of insulation used.

PART 3 EXECUTION

3.1 FIELD TESTS

A. All piping shall be free of leaks, and test gauges shall show no loss of pressure for at least 30 minutes after source of test pressure has been cut off, or as noted. Pipes may be tested in sections as the work progresses. Repair and retest all sections failing to pass tests, as required to obtain approval of tests. No caulking, welding, or brazing will be permitted on threaded pipe or fittings to stop leaks. Replace with new material all cracked or otherwise defective pipe and fittings of all types, as approved. Furnish suitable testing equipment, give all applicable authorities ample advance notice of all proposed tests and readiness of work for inspections, and advance

notice of all proposed tests and readiness of work for inspections, and conduct eachtest in their presence, as approved. Do not conceal or insulate piping and do not conceal ductwork until all inspections have been made and all required tests have been approved by all applicable authorities. Submit results for review.

B. Provide required labor, material, equipment, and connections.

C. Test all piping, EXCEPT as otherwise specified below, as follows: hydrostatic test, at 150 percent of normal operating pressure of piping involved, or 100 psi, whichever is higher, AFTER removing all air from piping involved in test.
   1. Natural gas and fuel oil piping: 50 psi test using air or inert gas.
   2. Soil, waste, vent, roof drainage, and acid waste piping: standard water test, by filling piping with water up to top of vent stack or highest point of piping test section involved, but no section tested with less than a ten-foot head with no pressure loss for at least 30 minutes.
   3. Compressed air: air test at 150 percent of normal working pressure of piping involved, or 100 psi, whichever is higher.
   4. Test all equipment in accordance with sections specified hereinafter.

D. Test all ductwork in accordance with leakage test method recommended in latest edition of SMACNA "HVAC Duct Construction Standards - Metal and Flexible". After remedying audible leaks, total leakage on system shall not exceed one percent of system total design air flow rate.

3.2 ADJUSTING AND CLEANING

A. Flush or blow all welding slag, pipe joint compound, loose scale, and other debris from pipework before connecting equipment thereto.

B. After systems have been tested and before any field painting is commenced, clean up all work thoroughly. Remove all foreign matter which has accumulated in ducts, casings, enclosures, fixtures, and equipment. Clean and polish all valves, plates, and other surfaces that are not to be painted, so that they present a new and acceptable appearance.

C. Put systems in operation, test all fixtures and other equipment, remedy all leaks and defects, make all necessary adjustments, and remove all air from water circulating systems. Adjust allair and water flows to indicated and/or required quantities, and adjust all controls and other items as required to balance system and provide uniform air flows and uniform temperatures in air conditioned areas. Demonstrate that all controls and mechanical equipment functionsatisfactorily, as specified, as indicated, and as approved.

D. Sterilization of Domestic Water System: AFTER all water connections have been made to all fixtures and equipment, and BEFORE plumbing system is used by Owner, sterilize entire potable water system as specified below, and submit a written report certifying that this has been done in accordance with the requirements of the State Department of Public Health.
   1. Drain entire water system.
   2. Refill entire water system with a sterilizing solution of potable water containing at least 50 parts per million of available chlorine.
   3. Allow sterilizing solution to remain in water system for at least 24 hours, then drain all sterilizing solution from water system.
   4. With potable water, flush all traces of sterilizing solution from entire water system through each fixture and each water outlet.

E. Strainers and Dirt Pockets: Clean out each of these; REMOVE EACH STRAINER SCREEN FOR CLEANING.

F. Circulating Water Systems: Completely drain each of these, and refill with clean water.

G. Compressed air and gas piping shall be cleaned in accordance with the requirements.

H. After systems have been tested and before putting any part of or the entire system in operation for Owner's beneficial use, insure that all necessary adjustments have been made.
   1. Bearings and other items requiring lubrication, except factory permanently lubricated type: lubricate each of these as recommended by its manufacturer; this includes lubricated type plug valves.
   2. Belts: adjust each of these to proper tension.
   3. Filters: replace each disposable ("throw-away") filter with a new clean filter (except blanket roll and high efficiency type). Clean each cleanable filter. NOTE: ALL FILTERS SHALL BE IN PLACE DURING TESTING AND ADJUSTING.
   4. Motor load tests: make an ammeter check of actual running current of each motor in mechanical system under operating conditions. Correct all motors which are found to beoverloaded, as approved.

3.3 INSTALLATION

A. Equipment rooms and other areas in which equipment is to be installed have limiting dimensions. Install all mechanical work within these areas substantially as indicated, with ample unobstructed access space around each piece of equipment to facilitate proper installation, operation, and maintenance of equipment, and to allow ample space for plumbing, electrical, and otherequipment indicated to be installed therein. Minor revisions in layout may be made subject toapproval, but major changes in layout to accommodate proposed equipment which differs substantially from specified equipment in size and arrangement may not be considered or will be subjected to the provisions of paragraph 2.1 C. hereinbefore. Each bidder shall determine before bidding that equipment upon which he proposes to base his bid will conform to theserequirements. Install each equipment item in accordance with its manufacturer'srecommendations, and as indicated on the drawings, and/or specified. If the drawings and/or specifications conflict with the manufacturer's recommendations, report this to the Architect/Engineer for his decision before proceeding with the work involved.

B. Generally, install pipework and ductwork as follows unless otherwise indicated.
   1. Finished areas: conceal pipework and ductwork within pipe chases, above suspended ceiling, and within other building construction, and other finished areas, unless otherwise indicated.
   2. Unfinished areas: install aboveground pipework and ductwork exposed in areas where pipe chases or suspended ceilings are not indicated or concealing is otherwise impracticable,in mechanical and electrical equipment rooms, manufacturing areas, warehouse, or storage areas, and other unfinished areas.

3. ALL areas: install pipework and ductwork parallel or at right angles with beams, walls, ceilings, and other building lines, in straight lines between required direction changes, with vertical runs plumb. Install exposed pipework and ductwork as close as practicable to walls, columns, ceilings, and overhead construction, and to provide maximum headroom and minimum interference with usable building space.

3.4 REMOVAL AND RELOCATION OF EXISTING WORK

A. Disconnect, remove or relocate material, equipment, piping, and other work noted and required by removal or changes in existing construction.

B. Provide new material and equipment related for relocated equipment.

C. Plug or cap active piping or ductwork behind or below finish.

D. Do not leave long dead end branches:
   1. Cap or plug as close to active line as possible.

E. Salvaged Existing Mechanical Materials and Equipment: Promptly haul away from Owner's premises all materials and equipment which are removed from existing system and are neither indicated nor required to be reused in the completed project, EXCEPT as otherwise specified. Owner may select certain removed existing materials and equipment and retain them for his future use. Before removing any existing materials and equipment, determine from Owner whichof these materials and equipment he desires to retain. Remove all Owner selected materials and equipment without unnecessary damage thereto, and safely store them at locations designated by Owner.

3.5 CUTTING AND PATCHING

A. Inspect existing conditions of work, including elements subject to movement or damage during cutting and patching and excavating and backfilling.

B. After uncovering work, inspect conditions affecting installation of new products.

C. Provide shoring, bracing, and support required to maintain structural integrity of the project.

D. Provide protection for other portions of the project.

E. Provide protection from the elements.

F. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances and finishes.

G. Execute cutting and demolition by methods that prevent damage to other work and provide proper surfaces to receive installation of repairs and new work.

H. Refinish the entire surfaces where cutting and patching work occurs to provide an even, continuous surface to the nearest intersections. Where assemblies are damaged by cutting and patching, refinish entire assemblies.

3.6 PAINTING

A. All equipment shall be factory prime coated and painted, however, the following may be shop prime coated and made ready for painting:
   1. Tanks.
   2. Structural supports and frames.

B. Uncoated Hangers, Supports, Rods, and inserts shall be prime coated.

C. Exposed, uninsulated black steel piping, pipe supports, and pipe braces shall be prime coated.

D. Marred surfaces of prime coated or factory painted surfaces shall be painted and/or primed to match adjacent coat.

3.7 IDENTIFICATION

A. Identify valves, (including main pipe sectionalizing valves and branch valves) except those on or within hand reach of equipment controlled thereby with a minimum 1-1/2-inch diameter around brass or aluminum tag stamped with 1/4-inch (minimum) height letters designating materialcontrolled by valve, and attached to valve body with 18 (minimum) gauge solid copper orgalvanized steel wire. Submit a typed valve identification schedule with the operating instructions and parts list submittal described above under 1.5 SUBMITTALS.

B. Identify piping and ductwork with Brady B-500 or equal self-sticking vinyl cloth pipe markers and pipe marker arrows, each sized as recommended by marker manufacturer for outside diameterof pipe (including pipe insulation) labeled therewith. Marker background colors shall conform toOSHA and **ANSI** pipe identification standards. Each pipe marker shall be lettered to indicate thematerial contained in the pipeline involved, and arrows shall indicate direction of material flow in the pipelines. Install appropriate pipe markers, each with a marker arrow adjacent thereto, onall above ground pipelines on 20 foot maximum centers, with at least one marker and arrow in each vertical run between floor and ceiling.

C. Equipment: Label each major mechanical equipment item (such as AHU, pump, fan, condensing unit, boiler, water heaters, etc.) with nameplate engraved with equipment designation and number, and securely attached to equipment.

END OF SECTION

SECTION 23 05 00
BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes the following basic mechanical materials and methods to complement other Division 23 Sections.

1. Piping materials and installation instructions common to most piping systems.
2. Concrete base construction requirements.
3. Dielectric fittings.
4. Flexible connectors.
5. Mechanical sleeve seals.
6. Equipment nameplate data requirements.
7. Labeling and identifying mechanical systems and equipment is specified in Division 23 Section "Mechanical Identification."
8. Nonshrink grout for equipment installations.
9. Field-fabricated metal and wood equipment supports.
10. Installation requirements common to equipment specification sections.
11. Cutting and patching.
12. Painting and finishing.

B. Pipe and pipe fitting materials are specified in Division 23 piping system Sections.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Construction Agreement and Division 1 Specification Sections, apply to this Section.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. CR: Chlorosulfonated polyethylene synthetic rubber.
2. EPDM: Ethylene propylene diene terpolymer rubber.

1.4 SUBMITTALS

A. Submittals and shop drawings shall be submitted in accordance with Division 1 - SUBMITTALS.

B. Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.

C. Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

D. Coordination Drawings: For access panel and door locations.

1.5 QUALITY ASSURANCE

A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

B. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate mechanical equipment installation with other building components.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

E. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dielectric Unions:
    a. Capitol Manufacturing Co.
    b. Central Plastics Co.
    c. Eclipse, Inc.; Rockford-Eclipse Div.
    d. Epco Sales Inc.
    e. Hart Industries International, Inc.
    f. Watts Industries, Inc.; Water Products Div.
    g. Zurn Industries, Inc.; Wilkins Div.
2. Dielectric Flanges:
    a. Capitol Manufacturing Co.
    b. Central Plastics Co.
    c. Epco Sales Inc.
    d. Watts Industries, Inc.; Water Products Div.
3. Dielectric-Flange Insulating Kits:
    a. Calpico, Inc.
    b. Central Plastics Co.
4. Dielectric Couplings:
    a. Calpico, Inc.
    b. Lochinvar Corp.
5. Dielectric Nipples:
    a. Grinnell Corp.; Grinnell Supply Sales Co.
    b. Perfection Corp.
    c. Victaulic Co. of America.
6. Metal, Flexible Connectors:
    a. ANIMATE Industrial, Inc.
    b. Central Sprink, Inc.
    c. Flexicraft Industries.
    d. Flex-Weld, Inc.
    e. Grinnell Corp.; Grinnell Supply Sales Co.
    f. Hyspan Precision Products, Inc.
    g. McWane, Inc.; Tyler Pipe; Gustin-Bacon Div.
    h. Mercer Rubber Co.
    i. Metraflex Co.
    j. Proco Products, Inc.
    k. Uniflex, Inc.
7. Mechanical Sleeve Seals:
    a. Calpico, Inc.
    b. Metraflex Co.
    c. Thunderline/Link-Seal.

2.2 PIPE AND PIPE FITTINGS

A. Refer to individual Division 23 piping Sections for pipe and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness, unless thickness or specific material is indicated.
   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32.

1. Alloy Sn95 or Alloy Sn94: Approximately 95 percent tin and 5 percent silver, with
   0.10 percent lead content.
2. Alloy E: Approximately 95 percent tin and 5 percent copper, with 0.10 percent maximum lead content.
3. Alloy HA: Tin-antimony-silver-copper zinc, with 0.10 percent maximum lead content.
4. Alloy HB: Tin-antimony-silver-copper nickel, with 0.10 percent maximum lead content.
5. Alloy Sb5: 95 percent tin and 5 percent antimony, with 0.20 percent maximum lead content.

F. Brazing Filler Metals: AWS A5.8.

1. BCuP Series: Copper-phosphorus alloys.
2. BAg1: Silver alloy.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements: Manufacturer's standard solvent cements for the following:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

I. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.

J. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.

K. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.

1. Sleeve: ASTM A 126, Class B, gray iron.
2. Followers: ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 536 ductile iron.
3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.

5. Finish: Enamel paint.

2.4 DIELECTRIC FITTINGS

A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.

C. Insulating Material: Suitable for system fluid, pressure, and temperature.

D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

F. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

2.5 FLEXIBLE CONNECTORS

A. General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig (860-kPa) minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:

1. 2-Inch NPS (DN50) and Smaller: Threaded.
2. 2-1/2-Inch NPS (DN65) and Larger: Flanged.
3. Option for 2-1/2-Inch NPS (DN65) and Larger: Grooved for use with keyed couplings.

B. Bronze-Hose, Flexible Connectors: Corrugated, bronze, inner tubing covered with bronze wire braid. Include copper-tube ends or bronze flanged ends, braze welded to hose.

2.6 MECHANICAL SLEEVE SEALS

A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.7 PIPING SPECIALTIES

A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

1. Steel Sheet Metal: 0.0239-inch (0.6-mm) minimum thickness, galvanized, round tube closed with welded longitudinal joint.
2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.8 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 3000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 **PIPING SYSTEMS - COMMON REQUIREMENTS**

A. General: Install piping as described below, unless piping Sections specify otherwise.

Individual Division 23 piping Sections specify unique piping installation requirements.

B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

C. Install piping at indicated slope.

D. Install components with pressure rating equal to or greater than system operating pressure.

E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

F. Install piping free of sags and bends.

G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

I. Install piping to allow application of insulation plus 1-inch (25-mm) clearance around insulation.

J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

K. Install fittings for changes in direction and branch connections.

L. Install couplings according to manufacturer's written instructions.

M. Sleeves are not required for core drilled holes.

N. Permanent sleeves are not required for holes formed by PE removable sleeves.

O. Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.

P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.
    a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
2. Install sleeves large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
    a. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS (DN150).
    b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS (DN150) and larger,

penetrating gypsum-board partitions.

3. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants.
4. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.

Q. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) in diameter and larger.
3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

R. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 7 Section "Firestopping" for materials.

S. Verify final equipment locations for roughing-in.

T. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

U. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1.

   Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

   a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
   b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
   c. Align threads at point of assembly.
   d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
   e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.

7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

8. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:

   a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

   b. ABS Piping: ASTM D 2235 and ASTM D 2661.

   c. CPVC Piping: ASTM D 2846 and ASTM F 493

   d. PVC Pressure Piping: ASTM D 2672.

   e. PVC Nonpressure Piping: ASTM D 2855.

   f. PVC to ABS Nonpressure Transition Fittings: Procedure and solvent cement according to ASTM D 3138.

9. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657 procedures and manufacturer's written instructions.

   a. Plain-End Pipe and Fittings: Use butt fusion.

   b. Plain-End Pipe and Socket Fittings: Use socket fusion.

V. Piping Connections: Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping 2-inch NPS (DN50) and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS (DN50) or smaller threaded pipe connection.

2. Install flanges, in piping 2-1/2-inch NPS (DN65) and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.

3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment giving right of way to piping installed at required slope.

F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

3.3 PAINTING AND FINISHING

A. Apply paint to exposed piping according to the following, unless otherwise indicated:

1. Interior insulated piping: Use two coats of semi-gloss, acrylic-enamel finish. Paint to match the existing.
2. Interior or Exterior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer. Paint to match existing.
3. Exterior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
4. Exterior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.

B. Paint piping specialties to match piping.

C. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 5000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified on the structural drawings.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.6 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair cut surfaces to match adjacent surfaces.

3.7 GROUTING

A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placing of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases to provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout according to manufacturer's written instructions.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Fiberglass pipe hangers.
4. Metal framing systems.
5. Fiberglass strut systems.
6. Thermal-hanger shield inserts.
7. Fastener systems.
8. Pipe stands.
9. Equipment supports.

B. Related Sections:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 230516 "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.
3. Vibration and Seismic Controls for HVAC"
4. Metal Ducts for duct hangers and supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel .

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :
   a. Allied Tube & Conduit.
   b. Cooper B-Line, Inc.
   c. Flex-Strut Inc.
   d. GS Metals Corp.
   e. Thomas & Betts Corporation.
   f. Unistrut Corporation; Tyco International, Ltd.
   g. Wesanco, Inc.
2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following

1. Carpenter & Paterson, Inc.
2. Clement Support Services.
3. ERICO International Corporation.
4. National Pipe Hanger Corporation.
5. PHS Industries, Inc.

6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig (688-kPa minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, [zinc-coated] [stainless-] steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured.

Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

M. Insulated Piping:

1. Attach clamps and spacers to piping.
    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
    a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
    b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
    c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
    d. NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
    e. NPS 16 to NPS 24 (DN 400 to DN 600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.
5. Pipes NPS 8 (DN 200) and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.

6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm)

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.

3. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
4. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8 (DN 20 to DN 200).
5. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
6. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
7. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
8. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
9. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 (DN 65 to DN 900) if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.

E. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.

F. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

G. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.

8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).
13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

H. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

I. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

J. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

K. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

END OF SECTION

SECTION 23 05 53

MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes mechanical identification materials and devices.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Construction Agreement and Division 1 Specification Sections, apply to this Section.

1.3 SUBMITTALS

A. Submittals and shop drawings shall be submitted in accordance with Section 01 30 00 - SUBMITTALS.

B. Product Data: For identification materials and devices.

1.4 QUALITY ASSURANCE

A. Comply with ASME A13.1, "Scheme for the Identification of Piping Systems" for lettering size, length of color field, colors, and viewing angles of identification devices.

1.5 SEQUENCING AND SCHEDULING

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 IDENTIFYING DEVICES AND LABELS

A. General: Products specified are for applications referenced in other Division 23 Sections. If more than single type is specified for listed applications, selection is Installer's option.

B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
2. Location: Accessible and visible.

C. Snap-On Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type.

Include color-coding according to ASME A13.1, unless otherwise indicated.

D. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive, vinyl type with permanent adhesive.

E. Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Full-band pipe markers, extending 360 degrees around pipe at each location.

F. Pipes with OD, Including Insulation, 6 Inches (150 mm) and Larger: Either full-band or strip-type pipe markers, at least 3 times letter height and of length required for label.

G. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.

1. Arrows: Either integrally with piping system service lettering, to accommodate both directions, or as separate unit, on each pipe marker to indicate direction of flow.

H. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive, vinyl tape, at least 3 mils (0.08 mm) thick.

1. Width: 1-1/2 inches (40 mm) on pipes with OD, including insulation, less than 6 inches (150 mm); 2-1/2 inches (65 mm) for larger pipes.
2. Color: Comply with ASME A13.1, unless otherwise indicated.

I. Valve Tags: Stamped or engraved with 1/4-inch (6-mm) letters for piping system abbreviation and 1/2-inch (13-mm) sequenced numbers. Include 5/32-inch (4-mm) hole for fastener.

1. Material: 3/32-inch- (2.4-mm-) thick plastic laminate with 2 black surfaces and a white inner layer.
2. Material: Valve manufacturer's standard solid plastic.
3. Size: 1-1/2-inches (40-mm) diameter, unless otherwise indicated.
4. Shape: As indicated for each piping system.

J. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.

K. Valve Tag Fasteners: Brass, wire-link chain; beaded chain; or S-hooks.

L. Access Panel Markers: 1/16-inch- (2-mm-) thick, engraved plastic-laminate markers, with abbreviated terms and numbers corresponding to concealed valve. Provide 1/8-inch (3-mm) center hole for attachment.

M. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
2. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

N. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:

1. Green: Cooling equipment and components.
2. Yellow: Heating equipment and components.
3. Brown: Energy reclamation equipment and components.
4. Blue: Equipment and components that do not meet criteria above.
5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
6. Terminology: Match schedules as closely as possible. Include the following:
   a. Name and plan number.
   b. Equipment service.
   c. Design capacity.
   d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
7. Size: 2-1/2 by 4 inches (65 by 100 mm) for control devices, dampers, and valves; 4-1/2 by 6 inches (115 by 150 mm) for equipment.

O. Plasticized Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with mat finish suitable for writing.

1. Size: 3-1/4 by 5-5/8 inches (85 by 145 mm).

3 Fasteners: Brass grommets and wire.

4 Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.

P. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of mechanical systems and equipment.

1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

PART 3 - EXECUTION

3.1 LABELING AND IDENTIFYING PIPING AND DUCT SYSTEMS

A. Install pipe markers on each system. Include arrows showing normal direction of flow.

B. Marker Type: Stenciled markers complying with ASME A13.1.

C. Marker Type: Plastic markers, with application systems. Install on pipe insulation segment where required for hot, noninsulated pipes.

D. Fasten markers on pipes and insulated pipes smaller than 6 inches (150 mm) OD by one of following methods:

1. Snap-on application of pretensioned, semirigid plastic pipe marker.
2. Adhesive lap joint in pipe marker overlap.
3. Laminated or bonded application of pipe marker to pipe or insulation.
4. Taped to pipe or insulation with color-coded plastic adhesive tape, not less than 3/4 inch (20 mm) wide, lapped a minimum of 1-1/2 inches (40 mm) at both ends of pipe marker, and covering full circumference of pipe.

E. Fasten markers on pipes and ducts 6 inches and larger by one of following methods:

1. Laminated or bonded application of pipe marker to pipe or insulation.
2. Taped to pipe or insulation with color-coded plastic adhesive tape, not less than 1-1/2 inches (40 mm) wide, lapped a minimum of 3 inches (75 mm) at both ends of pipe marker, and covering full circumference of pipe.
3. Strapped to pipe or insulation with manufacturer's standard stainless-steel bands.

F. Locate markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations according to the following:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units.

   Mark each pipe at branch, where flow pattern is not obvious.
3. Near penetrations through walls, floors, ceilings, or nonaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at a maximum of 50-foot (15-m) intervals along each run. Reduce intervals to 25 feet (7.5 m) in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

3.2 VALVE TAGS

A. Install on control valves and control devices in piping systems.

B. Valve Tag Application Schedule: Tag valves according to size, shape, color scheme, and with captions similar to those indicated in the following:

C. Tag Material: Brass.

D. Tag Size and Shape: According to the following:

1. Cold Water: 2 inches (50 mm), round.

E. Tag Color: According to the following:

1. Cold Water: Blue.

F. Letter Color: According to the following:

1. Cold Water: White.

G. Install mounted valve schedule in each major equipment room.

3.3 EQUIPMENT SIGNS AND MARKERS

A. Install engraved plastic-laminate signs or equipment markers on or near each major item of mechanical equipment. Include signs for the following general categories of equipment:

1. Pumps, chillers, condensers, and similar motor-driven units.
2. Heat exchangers, cooling towers, and similar equipment.
3. Fans, blowers, primary balancing dampers, and mixing boxes.
4. Water-treatment systems, and similar equipment.

B. Plasticized Tags: Install within concealed space, to reduce amount of text in exposed sign outside concealment, if equipment to be identified is concealed above acoustical ceiling or similar concealment.

1. Identify operational valves and similar minor equipment items located in unoccupied spaces, including machine rooms, by installing plasticized tags.

3.4 ADJUSTING AND CLEANING

A. Relocate mechanical identification materials and devices that have become visually blocked by work of this or other Divisions.

B. Clean faces of identification devices and glass frames of valve charts.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Variable-air-volume systems.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Certified TAB reports.

C. Sample report forms.

D. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC or NEBB

B. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

C. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

D. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

E. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.6 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TAB SPECIALISTS

A. Subject to compliance with requirements,:

1. Environmental Systems
2. Air technical services.

3.2 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Section 233113 "Metal Ducts and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.

L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

M. Examine operating safety interlocks and controls on HVAC equipment.

N. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Automatic temperature-control systems are operational.
3. Equipment and duct access doors are securely closed.
4. Balance, smoke, and fire dampers are open.
5. Isolating and balancing valves are open and control valves are operational.
6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.6 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.

2. Measure fan static pressures as follows to determine actual static pressure:

a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.

b. Measure static pressure directly at the fan outlet or through the flexible connection.

c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.

d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.

a. Report the cleanliness status of filters and the time static pressures are measured.

4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.

5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.

6. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.

7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.

1. Measure airflow of submain and branch ducts.

a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.

3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

C. Measure air outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.

2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.7 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.

B. Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.

2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.

3. Measure total system airflow. Adjust to within indicated airflow.

4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.

5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

    a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.

6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

    a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.

8. Record final fan-performance data.

3.8 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.

2. Motor horsepower rating.

3. Motor rpm.

4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.9 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record compressor data.

3.10 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each water coil:

1. Entering- and leaving-water temperature.
2. Water flow rate.
3. Water pressure drop.
4. Dry-bulb temperature of entering and leaving air.
5. Wet-bulb temperature of entering and leaving air for cooling coils.
6. Airflow.
7. Air pressure drop.

B. Measure, adjust, and record the following data for each electric heating coil:

1. Nameplate data.
2. Airflow.
3. Entering- and leaving-air temperature at full load.
4. Voltage and amperage input of each phase at full load and at each incremental stage.
5. Calculated kilowatt at full load.
6. Fuse or circuit-breaker rating for overload protection.

C. Measure, adjust, and record the following data for each steam coil:

1. Dry-bulb temperature of entering and leaving air.
2. Airflow.
3. Air pressure drop.
4. Inlet steam pressure.

D. Measure, adjust, and record the following data for each refrigerant coil:

1. Dry-bulb temperature of entering and leaving air.
2. Wet-bulb temperature of entering and leaving air.
3. Airflow.
4. Air pressure drop.
5. Refrigerant suction pressure and temperature.

3.11 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10

2. Air Outlets and Inlets: Plus or minus 10 percent

3.12 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.13 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:
    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.
12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:
    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.

c. Cooling coil, wet- and dry-bulb conditions.
d. Face and bypass damper settings at coils.
e. Fan drive settings including settings and percentage of maximum pitch diameter.
f. Inlet vane settings for variable-air-volume systems.
g. Settings for supply-air, static-pressure controller.
h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data:
a. Unit identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Unit arrangement and class.
g. Discharge arrangement.
h. Sheave make, size in inches (mm), and bore.
i. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
j. Number, make, and size of belts.
k. Number, type, and size of filters.
2. Motor Data:
a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches (mm), and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
3. Test Data (Indicated and Actual Values):
a. Total air flow rate in cfm (L/s).
b. Total system static pressure in inches wg (Pa).
c. Fan rpm.
d. Discharge static pressure in inches wg (Pa).

e. Filter static-pressure differential in inches wg (Pa).
f. Preheat-coil static-pressure differential in inches wg (Pa).
g. Cooling-coil static-pressure differential in inches wg (Pa).
h. Heating-coil static-pressure differential in inches wg (Pa).
i. Outdoor airflow in cfm (L/s).
j. Return airflow in cfm (L/s).
k. Outdoor-air damper position.
l. Return-air damper position.
m. Vortex damper position.

F. Apparatus-Coil Test Reports:
1. Coil Data:
a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch (mm) o.c.
f. Make and model number.
g. Face area in sq. ft. (sq. m).
h. Tube size in NPS (DN).
i. Tube and fin materials.
j. Circuiting arrangement.
2. Test Data (Indicated and Actual Values):
a. Air flow rate in cfm (L/s).
b. Average face velocity in fpm (m/s).
c. Air pressure drop in inches wg (Pa).
d. Outdoor-air, wet- and dry-bulb temperatures in deg F (deg C).
e. Return-air, wet- and dry-bulb temperatures in deg F (deg C).
f. Entering-air, wet- and dry-bulb temperatures in deg F (deg C).
g. Leaving-air, wet- and dry-bulb temperatures in deg F (deg C).
h. Water flow rate in gpm (L/s).
i. Water pressure differential in feet of head or psig (kPa).
j. Entering-water temperature in deg F (deg C).
k. Leaving-water temperature in deg F (deg C).
l. Refrigerant expansion valve and refrigerant types.
m. Refrigerant suction pressure in psig (kPa).
n. Refrigerant suction temperature in deg F (deg C).
o. Inlet steam pressure in psig (kPa).

G. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:
1. Unit Data:
a. System identification.
b. Location.

c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Fuel type in input data.
g. Output capacity in Btu/h (kW).
h. Ignition type.
i. Burner-control types.
j. Motor horsepower and rpm.
k. Motor volts, phase, and hertz.
l. Motor full-load amperage and service factor.
m. Sheave make, size in inches (mm), and bore.
n. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).

2. Test Data (Indicated and Actual Values):
a. Total air flow rate in cfm (L/s).
b. Entering-air temperature in deg F (deg C).
c. Leaving-air temperature in deg F (deg C).
d. Air temperature differential in deg F (deg C).
e. Entering-air static pressure in inches wg (Pa).
f. Leaving-air static pressure in inches wg (Pa).
g. Air static-pressure differential in inches wg (Pa).
h. Low-fire fuel input in Btu/h (kW).
i. High-fire fuel input in Btu/h (kW).
j. Manifold pressure in psig (kPa).
k. High-temperature-limit setting in deg F (deg C).
l. Operating set point in Btu/h (kW).
m. Motor voltage at each connection.
n. Motor amperage for each phase.
o. Heating value of fuel in Btu/h (kW).

H. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:
a. System identification.
b. Location.
c. Coil identification.
d. Capacity in Btu/h (kW).
e. Number of stages.
f. Connected volts, phase, and hertz.
g. Rated amperage.
h. Air flow rate in cfm (L/s).
i. Face area in sq. ft. (sq. m).
j. Minimum face velocity in fpm (m/s).

2. Test Data (Indicated and Actual Values):
    a. Heat output in Btu/h (kW).
    b. Air flow rate in cfm (L/s).
    c. Air velocity in fpm (m/s).
    d. Entering-air temperature in deg F (deg C).
    e. Leaving-air temperature in deg F (deg C).
    f. Voltage at each connection.
    g. Amperage for each phase.

I. Fan Test Reports: For supply, return, and exhaust fans, include the following:
1. Fan Data:
    a. System identification.
    b. Location.
    c. Make and type.
    d. Model number and size.
    e. Manufacturer's serial number.
    f. Arrangement and class.
    g. Sheave make, size in inches (mm), and bore.
    h. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
2. Motor Data:
    a. Motor make, and frame type and size.
    b. Horsepower and rpm.
    c. Volts, phase, and hertz.
    d. Full-load amperage and service factor.
    e. Sheave make, size in inches (mm), and bore.
    f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
    g. Number, make, and size of belts.
3. Test Data (Indicated and Actual Values):
    a. Total airflow rate in cfm (L/s).
    b. Total system static pressure in inches wg (Pa).
    c. Fan rpm.
    d. Discharge static pressure in inches wg (Pa).
    e. Suction static pressure in inches wg (Pa).

J. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
1. Report Data:
    a. System and air-handling-unit number.
    b. Location and zone.
    c. Traverse air temperature in deg F (deg C).
    d. Duct static pressure in inches wg (Pa).
    e. Duct size in inches (mm).

f. Duct area in sq. ft. (sq. m).
g. Indicated air flow rate in cfm (L/s).
h. Indicated velocity in fpm (m/s).
i. Actual air flow rate in cfm (L/s).
j. Actual average velocity in fpm (m/s).
k. Barometric pressure in psig (Pa).

K. Air-Terminal-Device Reports:
1. Unit Data:
a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft. (sq. m).
2. Test Data (Indicated and Actual Values):
a. Air flow rate in cfm (L/s).
b. Air velocity in fpm (m/s).
c. Preliminary air flow rate as needed in cfm (L/s).
d. Preliminary velocity as needed in fpm (m/s).
e. Final air flow rate in cfm (L/s).
f. Final velocity in fpm (m/s).
g. Space temperature in deg F (deg C).

L. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:
1. Unit Data:
a. System and air-handling-unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.
e. Flowmeter type.
2. Test Data (Indicated and Actual Values):
a. Air flow rate in cfm (L/s).
b. Entering-air temperature in deg F (deg C).
c. Leaving-air temperature in deg F (deg C).

M. Instrument Calibration Reports:
1. Report Data:
a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.

e. Dates of calibration.

2. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

N. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.

2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

O. Prepare test and inspection reports.

END OF SECTION

SECTION 23 07 13
DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor/Outdoor supply, return, exhaust and outdoor air.

B. Related Sections:

1. Section 230716 "HVAC Equipment Insulation."
2. Section 230719 "HVAC Piping Insulation."
3. Section 233113 "Metal Ducts" for duct liners.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, [Type I] [Type II with factory-applied vinyl jacket] [Type III with factory-applied FSK jacket] [Type III with factory-applied FSP jacket]. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements,provide the following] [provide one of the following:
    a. CertainTeed Corp.; SoftTouch Duct Wrap.
    b. Johns Manville; Microlite.
    c. Knauf Insulation; Friendly Feel Duct Wrap.
    d. Manson Insulation Inc.; Alley Wrap.
    e. Owens Corning; SOFTR All-Service Duct Wrap.

    .

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements provide one of the following
    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.Eagle Bridges - Marathon Industries; 225.
    b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-03/11-70.Mon-Eco Industries, Inc.; 22-25.
2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following
    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.

b. Eagle Bridges - Marathon Industries; 225.

c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.Mon-Eco Industries, Inc.; 22-25.

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 **JACKETS**

A. Insulation system indicate with factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.

5. Vinyl Jacket: White vinyl with a permeance of 1.3 perms (0.86 metric perm) when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.

2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches (50 mm o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation,

install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches (50 mm).

1. Comply with requirements in Section 078413 "Penetration Firestopping"irestopping and fire-resistive joint sealers.

E. Insulation Installation at Floor Penetrations:

1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches (50 mm).
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
    b. On duct sides with dimensions larger than 18 inches (450 mm), place pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Impale insulation over pins and attach speed washers.
    f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.

b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches (75 mm).

5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches (450 mm) o.c.

6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.

2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.

3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.

b. On duct sides with dimensions larger than 18 inches (450 mm), space pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.

c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.

d. Do not overcompress insulation during installation.

e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.

b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and

over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches (75 mm).

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.

2. Install lap or joint strips with same material as jacket.

3. Secure jacket to insulation with manufacturer's recommended adhesive.

4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.

5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

C. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

3.7 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

B. Insulate duct access panels and doors to achieve same fire rating as duct.

C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

3.8 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below"

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.9 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. All Supply return, and Outside air ducts.

2. Exhaust ductwork connected to energy recovery unit.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
3. Factory-insulated flexible ducts.
4. Factory-insulated plenums and casings.
5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.10 DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed ductwork:

1. Mineral-Fiber Blanket: 2 inches (50 mm)

B. Exposed ductwork.

1. Mineral-Fiber Blanket: 2 inches (50 mm

END OF SECTION

SECTION 23 09 00
CONTROLS

GENERAL

A. Control equipment.

B. Software

1.2 SCOPE OF WORK

A. Extension of Germantown Municipal School District's existing Energy Management/Facility Automation System (FAS) with all wiring associated with the FAS proper as required to accommodate the new HVAC equipment. The FAS shall be natural extension of the existing Schneider-Electric/Andover Continuum automation systems utilized throughout the school system which will communicate to the central database server located at the school system's administrative operation's office. The System shall be manufactured by Schneider Electric(S-E)/Andover Controls – NO EXCEPTIONS.

B. Supply and wire required BAS sensors and field devices to meet sequence of operation for equipment. Motor starters, variable speed drives, etc. to be supplied by unit manufacturer.

C. All HVAC low voltage interlock wiring and control wiring other than wiring associated with smoke detectors shall be furnished and installed under Division 23, except as noted otherwise. See "WIRING REQUIREMENTS AND DIVISION 26 RESPONSIBILITIES" in this section.

The S-E/Andover Continuum Building Controller and associated power supply to be provided by owner. Installation, wiring, programming and graphics are to be supplied by this Section.

1.3 MANUFACTURER

A. The system shall be the Continuum Facility Automation/Energy Management and Control System manufactured by Schneider Electric(S-E)/Andover Controls. NO SUBSTITUTES.

1.4 SYSTEM DESCRIPTION

A. Provide all labor, equipment, material, design, coordination, wiring, fees, permits, etc., as required to complete the installation specified herein and as indicated on the Drawings for the Andover direct digital, networked stand-alone, microprocessor based energy management/facility automation system (hereafter referred to as FAS).

B. The system installation shall be complete in all respects. All field and panel wiring, system programming, documentation, check-out, calibration, training, and one-year parts and labor warranty is to be included.

C. The system shall provide the following functions:
1. Automatically start and stop the building equipment as required by the specifications and drawings and shall provide override via remote communication from Germantown Municipal School District's Andover front-end software.
2. Monitor selected areas for CO2 concentration and enable outside air on controlled units.
3. Monitor the temperature within the controlled spaces.
4. Provide night setback and night setup on a zoned, subzoned or unit basis.

5. Control fans as indicated on the drawings or specified herein.
6. Communicate via network connection with the Germantown Municipal School District's Operations department for monitoring, starting, and shutting down of units using the existing maintenance departments' front-end computer, software and DB Server.

1.5 SUBMITTALS

A. Submit under provisions of Division 23

B. Shop Drawings:
1. Trunk cable schematic showing Building Controller, as well as local and remote unit/terminal controller layout.
2. List of connected data points, including connected control unit and input/output device.
3. System graphics indicating monitored systems, data, point addresses, operator notations and floor plans utilizing existing front-end software.
4. System configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
5. Descriptive data and sequence of operation of operating, user and application software.

C. Product Data: Provide data for each system component and software module.

D. Manufacturer's Installation Instructions: Include for all manufactured components.

E. PROJECT RECORD DOCUMENTS
1. Submit under provisions of Division 23
2. Accurately record actual location of control components, including panels, thermostats, and sensors.
3. Revise shop drawings to reflect actual installation and operating sequences.
4. Include data specified in "Submittals" in final "Record Documents" form.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 23

B. Include interconnection wiring diagrams for completed field installed system with identified and numbered, system components and devices.

C. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

1.7 QUALIFICATIONS

A. The bidder must be a Building Automation System contractor, (hereinafter known as the contractor) engaged in the installation of electronic facility automation/ temperature control systems. Each bidder must have been in the business of temperature controls and building automation for at least five years. He must have a local office within 60 mile radius of the project site. This office must be staffed with factory authorized and trained engineers fully capable of sales and project administration, system engineering, project engineering, system start-up and calibration, owner training and servicing of the Andover system. Authorized integrator contact: Keith Miles, Mechanical Automated Control Systems, Inc.; 901-386-1521; email keithm@macsinc.com.

B. Ensure installation of components is complementary to installation of similar components in other systems.

C. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

D. Ensure system is completed and commissioned.

1.8 WARRANTY

A. Provide one (1) year warranty under provisions of Division 23.

PART 2 - PRODUCTS

2.1 MODULAR DESIGN/EXPANDABILITY

A. The system shall be of a modular design consisting of Schneider-Electric/Andover Control Continuum Products.

B. System size shall be expandable from 2 input points and 2 output points up to a minimum of 64000 input points and 32000 output points. Expansion shall be modules of 4, 8, 16, or 32. Expansion of outputs shall be in modules of 4, 8 or 16.

2.2 ENVIRONMENT

A. The FAS shall be capable of operating in an environment of 32-120 degrees F and 10-95% relative humidity. Sensors and control elements shall operate under the temperature, pressure, humidity, and vibration conditions normally encountered in the installed location. FAS system shall maintain accuracy as follows:
   1. +/- .5 degrees F for the space temperature in the 40-85 degrees temperature range.

2.3 FAS DESCRIPTION

A. The FAS units shall be as described by Schneider Electric/Andover Controls Literature.

B. The main building controller/router location shall include:
   1. Central Intelligence Unit.
   2. Power Supply.
   3. Back-up Batteries.
   4. Ethernet connectivity option.

C. Additional FAS units shall be provided by this section for remote equipment as manufactured by Schneider Electric/Andover Controls. NO SUBSTITUTIONS.

D. All FAS intra communications wiring (master to remote control units) shall be provided as described in Andover Installation Manuals by the controls contractor.

E. The FAS shall be tolerant of power failures and hold memory with batteries supplied in the Andover Units as well as flash RAM. Automatic system restart shall occur upon power restoration.

F. All input data and output control voltages shall be compatible with the Andover controls unit supplied by the owner.

2.4 PROGRAMMING

A. The FAS shall be of the fully user programmable type. All programming shall be in the English language. No "Canned" programming of any kind will be accepted. All necessary instruction manuals and user orientation training shall be supplied by the factory trained Building Automation Contractor. The Contractor shall provide software flow chart of the program to the owner.

B. The programmable control capabilities of the FAS shall include, but not be restricted to:
1. Optimum start/stop.
2. Demand limiting.
3. Time of day routines.
4. Duty cycling.
5. Scheduled occupancy routines including holidays.
6. Day/night setback.
7. Free cooling.
8. Enthalpy based economizer.
9. Lighting control.
10. IAQ/CO2 monitoring and control.
11. History logging of the data environment.
12. Custom tailored reporting for the morning report.
13. Accumulating equipment run time.
14. Static pressure control.
15. Fluid flow measurement and control alarming.
16. Programmed restart of building systems after a power failure.
17. Direct digital temperature control.
18. PID control loops.
19. Adaptive control strategies.
20. Critical condition alarming.
21. Override capability by Speech Synthesis.

2.5 CHARACTER CODE

A. Communications with the FAS shall be ASCII format.

2.6 EXTERNAL COMMUNICATION INTERFACE

A. Each Master unit shall be capable of communication through an EIA RS232C serial port. Communication may be accomplished with any RS232C compatible terminal or through Ethernet TCP/IP module, 10Base-T twisted pair.

2.7 INTERNAL USER COMMUNICATION INTERFACE

A. The FAS shall have RS422 intercommunication bus, allowing party line communication between Master Controllers. The intercommunication bus shall allow communication to any Master Controller in the network by the user from the communication port of any other Master Controller in the network.

2.8 REMOTE COMMUNICATION

A. The Owner shall supply a network connection and applicable address for high speed communication via the Schools' network.

2.9 LOCAL OPERATOR INTERACTION

A. The FAS shall offer the option of local interface/display panel to allow the operator limited access to change control parameters such as setpoint, start/stop times and on/off of selected control points without the need for the standard operator terminal.

B. The interface/display panel shall also provide the ability to display status report and alarms and be capable of presenting status information in full alpha-numeric form. The display feature shall be fully user programmable to allow customization of these operator functions based on the needs of the individual installation. A system password shall protect the displays.

2.10 APPROVALS

A. FAS shall be UL and CSA approved as an Energy Management System. (UL 916)

2.11 COMPONENTS

A. Space sensors for Class Rooms and offices shall be Part No. TTS-SE-1 or TTS-LCD-4-2 as manufactured by Schneider Electric/Andover. Unit shall utilize a Type III, 10K ohm thermister. Unit will also incorporate override capability, temperature setpoint adjustment, and service tool jack. Limits will be remotely programmable as per guidelines established by Germantown Municipal School District. Common areas shall utilize similar sensor less the setpoint adjustment.

B. Outdoor air sensor with 10k Type III thermistor sensor element, sun and wind shield and weatherproof. Equal to Precon model ST-03. Sensor shall be mounted on northern, shaded building exposure.

C. CO2 sensor shall provide a 0-10VDC output representing a concentration of 0-2,000 ppm. Unit shall have automatic background calibration. Equal to GE model 5001.

D. Humidity sensor shall provide a 0-10VDC output representing a relative humidity of 0 – 100%. Accuracy shall be a minimum of 5%. Unit shall be manufactured by Schneider Electric/Veris Industries and shall incorporate additional features as required by the sequence of operation.

PART 3 - INSTALLATION

3.1 GENERAL

A. The complete installation shall comply with applicable laws and ordinances, utility company regulations, and applicable requirements of the following:
   1. NFPA - National Fire Protection Association
   2. UL - Underwriter's Laboratories
   3. NEC - National Electric Code
   4. NEMA - National Electric Manufacturer's Association

5. OSHA - Occupational Safety and Health Act
6. Standard Building Code.

B. The Contractor shall comply with all requirements for permits, licenses, fees, and codes. Permits, licenses, fees, inspections and arrangements required for the work under this contract shall be obtained by the contractor, at his expense, and made available at the completion of the work.

C. The Contractor shall comply with the requirements of the applicable utility companies serving this project. Make all arrangements with the utility companies for proper coordination of the work.

D. Basic Materials and Methods
1. Conduits shall be continuous where runs are exposed. All fittings are to be same manufacturer as conduit compatible with conduit material.
2. Conduits shall be sized appropriately for number of conductors per NEC and per local electrical code requirements.
3. Conduits shall be hacksaw cut square and reamed smooth, and threads shall be full length so that conduit ends will butt in couplings.
4. Conductors shall be 98% copper. Conductor sizes 10-12 AWG shall be solid wire, Series No. 8 AWG and larger shall be stranded.
5. Where voltages are below 50 volts, Class II, plenum rated wire shall be used.
6. All boxes shall be secured with bushings and double locknuts.
7. Where conduits are exposed, the Contractor shall run conduit parallel and at right angles to building lines and group in banks where possible. This applied to vertical and horizontal runs.
8. Conduit Bends shall be made using tools specifically designed for this purpose to prevent kinks or flattened out areas.
9. All control and circuit wiring in cabinets, boxes, gutters, etc. shall be neatly tied using nylon cable ties and mounting brackets.
10. Conductors 600V shall not be bent to a radius less than ten diameters or thickness.
11. Supplies or connections shall only be made from an outlet, pull, or junction box.
12. All neutral wire shall have a white or gray color, and all other shall have a black or color-coded insulation. All wiring shall be identified at all terminations and in all junction boxes.

3.2 WIRING REQUIREMENTS AND DIVISION 26 RESPONSIBILITIES.

A. All job site power wiring and connections to equipment shall be furnished and installed under Division 26 -- ELECTRICAL. This includes, but is not limited to, 120 volt power, to each Local Control and Data Acquisition Panel. Power for the FAS Master Control Panel shall be from a dedicated emergency circuit.

B. All line voltage wiring and all low voltage control wiring installed in inaccessible areas and low voltage control wiring installed below finished ceilings or exposed shall be installed in conduit. All wiring in mechanical rooms or attic shall be in conduit. Low voltage wiring installed above accessible ceilings may be installed using U.L. listed plenum rated wiring without conduit except as noted. All FAS control conduit and cable paths shall be supplied and installed by division 26.

C. Conduit requirements by Division 26 shall include the following: All thermostat, and sensor rough-ins with conduit from thermostat/sensor locations to above nearest/adjacent main corridor accessible ceiling. From this location, there must be a path to each corresponding Local Control Panel (Local Control Panels to be in near proximity to each unit). An additional conduit will continue from this control panel to units. A conduit shall also be required from each AHU to corresponding condensing unit. Note: All temperature sensor rough-ins to be vertical. See additional sensor rough-in locations below.

D. All smoke detectors, installation and wiring is to be provided by others. As a matter of clarification, that wiring which interfaces the fire alarm system to the HVAC system shall be provided and terminated by Division 26 as part of the fire alarm system.

E. Division 26 shall provide two 1” conduits from the BAS master to above ceiling space of nearest main corridor.

F. Division 26 shall coordinate work with BAS and General Contractor, provide all conduits and cable support systems.

G. All conduit shall be a minimum of ¾”.

H. All empty conduits shall be provided with pull strings.

3.3 ACCEPTANCE PROCEDURE

A. Submittal data, relevant to point index, FAS functions, FAS setpoints, limits, sequences, interlocks, power fail restarts, logs, software routines, etc., for systems operation and data base, shall be forwarded to Architect. Approved software packages shall be installed in Master Controller and debugged. Prior to on-line operation, complete demonstration and readout of computer real-time responsibilities of surveillance and command shall be performed in presence of Architect. This demonstration, having satisfactorily met previously approved submittals, shall with Architect's written acceptance, allow commissioning of computer for on-line operations.

B. Submittal data, relevant to valve schedules, and other pertinent equipment information requiring acceptance prior to field installation, shall be forwarded to Architect. Upon receipt of acceptance, the Contractor shall proceed with installation, setup, calibration, and checkout of various control and monitoring systems.

C. Upon successful completion of system, Architect shall inspect and accept operation of building automation system, and accessories. Upon receipt of detailed punchlist from the Architect, the Contractor shall correct each item and demonstrate corrected operation to the Architect.

3.4 OPERATOR INSTRUCTION

A. During system commissioning, at such time as acceptable performance of FAS hardware and software has been established, Building Automation Contractor shall provide on-site field instructions to Owner's operating personnel during normal working hours. Building Automation Contractor shall also provide classroom instruction to the Owner's operating personnel.

B. The Contractor shall give instruction to the Owner's personnel on operation of all equipment associated with the FAS. The Operator's orientation of the automation system shall include instructions on the overall operational program, equipment functions, both individually and as part of total integrated system, command advisories, and appropriate operator intervention.

SECTION 23 11 23
NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.
6. Service meters.
7. Concrete bases.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 PERFORMANCE REQUIREMENTS

A. Natural-Gas System Pressure within Buildings: see plans

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Piping specialties.
2. Corrugated, stainless-steel tubing with associated components.
3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
4. Pressure regulators. Indicate pressure ratings and capacities.
5. Service meters. See plans. Coordinatw with local utility and pay for all incurred cost
6. Dielectric fittings.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.

B. Qualification Data: For qualified professional engineer.

C. Welding certificates.

D. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

D. Protect stored PE pipes and valves from direct sunlight.

1.9 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

1.10 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

B. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Section 083113 "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
    a. Material Group: 1.1.
    b. End Connections: Threaded or butt welding to match pipe.
    c. Lapped Face: Not permitted underground.
    d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
    e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.
5. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
    a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

2.2 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.

4. Corrugated stainless-steel tubing with polymer coating.
5. Operating-Pressure Rating: 0.5 psig (3.45 kPa).
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.
8. Maximum Length: 72 inches (1830 mm.)

B. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F (540 deg C) complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.4 MANUAL GAS SHUTOFF VALVES

A. General Requirements for Metallic Valves, NPS 2 (DN 50) and Smaller: Comply with ASME B16.33.

1. Threaded Ends: Comply with ASME B1.20.1.
2. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.
5. Service Mark: Valves 1-1/4 inches (32 mm) to NPS 2 (DN 50) shall have initials "WOG" permanently marked on valve body.

B. General Requirements for Metallic Valves, NPS 2-1/2 (DN 65) and Larger: Comply with ASME B16.38.

1. Flanged Ends: Comply with ASME B16.5 for steel flanges.
2. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
3. Service Mark: Initials "WOG" shall be permanently marked on valve body.

C. Cast-Iron, Lubricated Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Flowserve.
   b. Homestead Valve; a division of Olson Technologies, Inc.
   c. McDonald, A. Y. Mfg. Co.
   d. Milliken Valve Company.
   e. Mueller Co.; Gas Products Div.
   f. R&M Energy Systems, A Unit of Robbins & Myers, Inc.
2. Body: Cast iron, complying with ASTM A 126, Class B.
3. Plug: Bronze or nickel-plated cast iron.

4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig (862 kPa).
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.5 PRESSURE REGULATORS

A. General Requirements:
1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 (DN 50) and smaller; flanged for regulators NPS 2-1/2 (DN 65) and larger.

B. Line Pressure Regulators: Comply with ANSI Z21.80.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Actaris.
b. American Meter Company.
c. Eclipse Combustion, Inc.
d. Fisher Control Valves and Regulators; Division of Emerson Process Management.
e. Invensys.
f. Maxitrol Company.
g. Richards Industries; Jordan Valve Div.
2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.

2.6 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Capitol Manufacturing Company.
   b. Central Plastics Company.
   c. Hart Industries International, Inc.
   d. Jomar International Ltd.
   e. Matco-Norca, Inc.
   f. McDonald, A. Y. Mfg. Co.
   g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   h. Wilkins; a Zurn company.
2. Description:
   a. Standard: ASSE 1079.
   b. Pressure Rating: 125 psig (860 kPa).
   c. End Connections: Solder-joint copper alloy and threaded ferrous.

2.7 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to NFPA 54 to determine that natural-gas utilization devices are turned off in piping section affected.

3.3 OUTDOOR PIPING INSTALLATION

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Install underground, natural-gas piping buried at least 36” below finished grade. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

1. If natural-gas piping is installed less than 36 inches (900 mm) below finished grade, install it in containment conduit.

C. Install underground, PE, natural-gas piping according to ASTM D 2774.

D. Steel Piping with Protective Coating:

1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
3. Replace pipe having damaged PE coating with new pipe.

E. Install fittings for changes in direction and branch connections.

3.4 INDOOR PIPING INSTALLATION

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Verify final equipment locations for roughing-in.

L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches (75 mm) long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

P. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.

1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.

2. In Floors: Install natural-gas piping with welded or brazed joints and protective coating in cast-in-place concrete floors. Cover piping to be cast in concrete slabs with minimum of 1-1/2 inches (38 mm) of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.

3. In Floor Channels: Install natural-gas piping in floor channels. Channels must have cover and be open to space above cover for ventilation.

4. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.

a. Exception: Tubing passing through partitions or walls does not require striker barriers.

5. Prohibited Locations:

a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.

b. Do not install natural-gas piping in solid walls or partitions.

Q. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

R. Connect branch piping from top or side of horizontal piping.

S. Install unions in pipes NPS 2 (DN 50) and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

T. Do not use natural-gas piping as grounding electrode.

U. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

W. Install sleeve seals for piping penetrations of concrete walls and slabs.

X. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.5 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.

B. Install underground valves with valve boxes.

C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

D. Install earthquake valves aboveground outside buildings according to listing.

E. Install anode for metallic valves in underground PE piping.

3.6 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.

2. Cut threads full and clean using sharp dies.

3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.

4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.

5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.

2. Bevel plain ends of steel pipe.

3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

3.7 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches (1800 mm) of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.8 LABELING AND IDENTIFYING

A. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for piping and valve identification.

3.9 PAINTING

A. Comply with requirements in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for painting interior and exterior natural-gas piping.

3.10 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Test, inspect, and purge natural gas according to [NFPA 54] [the International Fuel Gas Code] and authorities having jurisdiction.

C. Natural-gas piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION

SECTION 23 31 13

METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Double-wall rectangular ducts and fittings.
3. Single-wall round and flat-oval ducts and fittings.
4. Double-wall round and flat-oval ducts and fittings.
5. Sheet metal materials.
6. Duct liner.
7. Sealants and gaskets.
8. Hangers and supports.
9. Seismic-restraint devices.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

B. Welding certificates.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Lindab Inc.
    b. SEMCO Incorporated.
    c. Sheet Metal Connectors, Inc.
    d. Spiral Manufacturing Co., Inc.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials

involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 DOUBLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Lindab Inc.
2. McGill AirFlow LLC.
3. SEMCO Incorporated.
4. Sheet Metal Connectors, Inc.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension) of the inner duct.

C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on static-pressure class unless otherwise indicated.

1. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
3. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Inner Duct: as noted on plans

E. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K) at 75 deg F (24 deg C) mean temperature.
2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
3. Coat insulation with antimicrobial coating.
4. Cover insulation with polyester film complying with UL 181, Class 1.

2.4 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60 (Z180).
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

D. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.5 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. CertainTeed Corporation; Insulation Group.
   b. Johns Manville.
   c. Knauf Insulation.
   d. Owens Corning.
2. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.

2.6 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Sealant: Modified styrene acrylic.
3. Water resistant.
4. Mold and mildew resistant.
5. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
6. Service: Indoor and outdoor.
7. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).
8. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
9. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
10. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.

8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.
1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:
1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and shall be rated for 10-inch wg (2500-Pa) static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.7 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:
1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round and flat-oval ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm).

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL KITCHEN HOOD EXHAUST DUCT

A. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hood.

B. Install fire-rated access panel assemblies at each change in direction and at maximum intervals of 20 feet (6)m in horizontal ducts, and at every floor for vertical ducts, or as indicated on Drawings. Locate access panel on top or sides of duct a minimum of 1-1/2 inches (38 mm) from bottom of duct.

C. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.

3.4 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg (500 Pa) and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg (500 Pa): Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet (5 m).

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.6 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
    a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

C. Duct system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.9 DUCT CLEANING

A. Clean duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.10 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

END OF SECTION

SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Control dampers.
5. Fire dampers.
6. Flange connectors.
7. Turning vanes.
8. Duct-mounted access doors.
9. Flexible connectors.
10. Flexible ducts.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

B. Source quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60 (Z180)
2. Exposed-Surface Finish: Mill phosphatized.

B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

C. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.3 BACKDRAFT AND PRESSURE RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Greenheck Fan Corporation.
   2. Nailor Industries Inc.
   3. Pottorff.
   4. Ruskin Company.

B. Description: Gravity balanced.

C. Maximum Air Velocity: 1250 fpm (6.4 m/s)

D. Maximum System Pressure: see schedule

E. Frame: compatible with mounting location

F. Blades: Multiple single-piece blades with sealed edges.

G. Blade Action: Parallel.

H. Blade Seals: Neoprene, mechanically locked.

I. Return Spring: Adjustable tension.

2.4 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:
   1. Manufacturers: Subject to compliance with requirements, provide products by the following
      a. Air Balance Inc.; a division of Mestek, Inc.
      b. Nailor Industries Inc.
      c. Pottorff.
      d. Ruskin Company.
   2. Standard leakage rating.
   3. Suitable for horizontal or vertical applications.
   4. Frames:
      a. Frame: Hat-shaped, 0.094-inch- (2.4-mm-) thick, galvanized sheet steel.
      b. Mitered and welded corners.
      c. Flanges for attaching to walls and flangeless frames for installing in ducts.
   5. Blades:
      a. Multiple or single blade.
      b. Parallel- or opposed-blade design.
      c. Stiffen damper blades for stability.
      d. Galvanized-steel, 0.064 inch (1.62 mm) thick.
   6. Blade Axles: Galvanized steel.

2.5 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following

B.
   1. Greenheck Fan Corporation.
   2. Nailor Industries Inc.
   3. Pottorff.

4. Ruskin Company.

C. Low-leakage rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

D. Blades:
   1. Multiple blade
   2. Opposed-blade design.
   3. Galvanized-steel.

E. Blade Axles: 1/2-inch- (13-mm-) diameter; galvanized steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
   1. Operating Temperature Range: From minus 40 to plus 200 deg F (minus 40 to plus 93 deg C).

F. Bearings:
   1. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
   2. Thrust bearings at each end of every blade.

2.6 FIRE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following
   1. Greenheck Fan Corporation.
   2. Nailor Industries Inc.
   3. Pottorff.
   4. Ruskin Company.

B. Type: Static;rated and labeled according to UL 555 by an NRTL.

C. Closing rating in ducts up to 4-inch wg (1-kPa) static pressure class and minimum 2000-fpm (10-m/s) velocity.

D. Fire Rating: see drawings for wall ratings.

E. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.

F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

G. Mounting Orientation: Vertical or horizontal as indicated.

H. Blades: Roll-formed, interlocking, 0.024-inch- (0.61-mm) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.

I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

J.

2.7 SMOKE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Greenheck Fan Corporation.
   2. Nailor Industries Inc.
   3. Pottorff.
   4. Ruskin Company.

B. General Requirements: Label according to UL 555S by an NRTL.

C. Smoke Detector: Integral, factory wired for single-point connection.

D. Rated pressure and velocity to exceed design airflow conditions.

E. Mounting Sleeve: Factory-installed, 0.039-inch- (1.0-mm) thick, galvanized sheet steel; length to suit wall or floor application.

F. Damper Motors: two-position action.

G. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 230900 "Instrumentation and Control for HVAC."

3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.

4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 150 in. x lbf (17 N x m).

5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F (minus 40 deg C).

6. Nonspring-Return Motors: For dampers larger than 25 sq. ft. (2.3 sq. m), size motor for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 300 in. x lbf (34 N x m).

7. Electrical Connection: [115 V, single phase, 60 Hz] <Insert values>.

H. Accessories:

1. Test and reset switches remote mounted.

2.8 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by the following

B.

1. Ductmate Industries, Inc.

2. METALAIRE, Inc.

3. SEMCO Incorporated.

4.

C. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

D. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

E. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

F. Vane Construction: Double wall.

2.9 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by the following

B. :

1. Ductmate Industries, Inc.
2. Greenheck Fan Corporation.
3. Nailor Industries Inc.
4. Pottorff.

C. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2 (7-2M), "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:
   a. Double wall, rectangular.
   b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
   c. Vision panel.
   d. Hinges and Latches: 1-by-1-inch (25-by-25-mm)butt or piano hinge and cam latches.
   e. Fabricate doors airtight and suitable for duct pressure class.
2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3.

2.10 FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by the following] [provide products by one of the following:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; vapor-barrier film.

1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
2. Maximum Air Velocity: 4000 fpm (20 m/s).
3. Temperature Range: Minus 10 to plus 160 deg F (Minus 23 to plus 71 deg C).
4. Insulation R-value: [Comply with ASHRAE/IESNA 90.1]

2.11 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install fire and smoke dampers according to UL listing.

H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. Upstream from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. At each change in direction and at maximum 50-foot (15-m) spacing.
8. Upstream from turning vanes.
9. Upstream or downstream from duct silencers.
10. Control devices requiring inspection.
11. Elsewhere as indicated.

I. Install access doors with swing against duct static pressure.

J. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches (200 by 125 mm).
2. Two-Hand Access: 12 by 6 inches (300 by 150 mm).
3. Head and Hand Access: 18 by 10 inches (460 by 250 mm).
4. Head and Shoulders Access: 21 by 14 inches (530 by 355 mm).
5. Body Access: 25 by 14 inches (635 by 355 mm).
6. Body plus Ladder Access: 25 by 17 inches (635 by 430 mm).

K. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

L. Install flexible connectors to connect ducts to equipment.

M. For fans developing static pressures of 5-inch wg (1250 Pa) and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

N. Connect terminal units to supply ducts with maximum 12-inch (300-mm) lengths of flexible duct. Do not use flexible ducts to change directions.

O. Connect diffusers to ducts with maximum 48-inch lengths of flexible duct clamped or strapped in place.

P. Install duct test holes where required for testing and balancing purposes.

Q. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch (6-mm) movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION

SECTION 26 01 00

GENERAL PROVISIONS, ELECTRICAL

PART 1 – GENERAL

1.1 CONTRACTOR'S RESPONSIBILITY

A. Contractor agrees to assume responsibility for liability, workmanship, and quality of materials concerning work sublet to others. Before contract is sublet, submit in writing the names of proposed subcontractor and obtain written approval.

1.2 CODES AND FEES

A. All work shall be installed in accordance with the applicable provisions of the local codes, the National Electrical Code, and the National Electrical Safety Code.

B. All electrical materials shall have Underwriters' approval where applicable, and shall be so labeled where UL labeling is customary.

C. All electrical equipment shall conform to applicable NEMA Standards whether specified hereinafter or not, and to other applicable Standards which may be specified hereinafter.

D. Make all arrangements with electric utility company for their services and metering work, PAY ALL CHARGES, AND INCLUDE THE COST IN CONTRACT PRICE.

E. The Contractor shall be responsible for obtaining local permits, payment of fees and notification for inspection by code authorities consistent with the schedule of work. The contractor shall be responsible for obtaining state permits, payment of fees and notification for inspection by code authorities as required by the project.

1.3 EQUIPMENT LISTS, SHOP DRAWINGS, SAMPLES AND SUBMITTALS

A. Submit under provisions of DIVISION 01 and General Conditions.

B. Submit to the Architect for approval, within 30 days after receipt of Notice to Proceed with the work, a complete list of materials, equipment and accessories proposed for use, including complete descriptions and specifications of any proposed substitutions, manufacturer's shop drawings, and roughing-in work. Submit five (5) copies of all items for approval and furnish additional copies if required for installation purposes. Electronic submittals are acceptable in PDF format.

C. Submission material and all shop drawings for the various items of equipment shall indicate section number and shall be marked with the respective mark number or identification of the equipment shown on the drawings or specified. The shop drawings shall list all ratings, capacities, accessories, and other pertinent data to show that the proposed item is as called for and as specified.

D. Shop drawings shall show sizes and details of required concrete and steel machine foundation, locations of anchor bolts, physical dimensions of equipment, capacity characteristics of equipment, and all other work pertinent to details. Concrete foundations are specified under "Concrete Work" section, but steel racks or stands for mechanical apparatus shall be furnished and installed as part of the mechanical work.

1.4 QUALITY CONTROL

A. Comply with Section GENERAL CONDITIONS.

B. Qualifications: Where specific qualifications are specified in individual specification section, provide required data with Subcontractor list.

1.5 GUARANTEE

A. Comply with Section GENERAL CONDITIONS

PART 3 – EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Install all equipment in accordance with applicable manufacturer's drawings and recommendations.

B. Identification of circuits and equipment: Identification designations shall correspond to those indicated on electrical drawings and as specified in corresponding articles describing the equipment.

3.2 TEMPORARY LIGHTS AND POWER

A. Provide temporary lights and power. Lights shall be one pigtail socket and lumens equivalent to a 150W incandescent lamp for each 500 sf building space, minimum one per room. Power outlets shall be provided as coordinated with construction. Temporary service connections and electrical charges shall be paid by the Contractor.

3.3 TEST, INSPECTIONS, ADJUSTMENTS, AND CLEANUP

A. Wiring, 600 volts and less: Make insulation tests with a "Megger", demonstrate that neither short circuits nor ground faults exist, and that wiring complies with NEC. Provide a copy of the insulation tests in the Close-Out documents.

B. Furnish suitable testing equipment, give the Engineer and all applicable authorities ample advance notice of all proposed tests and readiness of work for inspections, and conduct each test in their presence, as approved. Do not conceal electrical work until all necessary inspections have been made and all required tests have been approved by the Owner's Representative and all applicable authorities.

C. Put entire electrical system in operation, test all equipment, remedy all defects, and make all necessary adjustments. Demonstrate that the entire system functions satisfactorily, as specified, as indicated, and as approved.

D. After electrical system has been tested and before any field painting is commenced, clean up all electrical work thoroughly. Remove all foreign matter which has accumulated in all fixtures, equipment, and enclosures. Clean all fixture glassware and reflectors, and clean and polish all other surfaces that are not to be painted so that they present a new and acceptable appearance.

3.4 PROTECTION AND CLEANING

A. Work shall be protected at all times. Conduit openings shall be closed with caps or plugs until permanent connections are made. Fixtures and equipment shall be covered, if necessary, to protect against dirt, water, chemical or mechanical damage or defacement. The installation of fixtures liable to damage shall be coordinated with installing UL fire protective barriers and ceiling systems.

B. Electrical equipment rooms shall be cleaned up prior to energizing equipment and shall not be used for storage or other purposes after power is applied to the electrical equipments.

3.5 OPERATING INSTRUCTIONS

A. Furnish the services of personnel with experiences in the operation of an electrical system to instruct the Owner's personnel in the proper operation and maintenance of all equipment, for a period of not less than five working days.

B. Furnish and deliver to the Owner three sets of operating instructions for all equipment installed under this contract, including shop drawings, piping diagrams, wiring diagrams, maintenance recommendations and information concerning replacement parts.

C. All floor mounted electrical equipment shall be provided with 4" thick housekeeping pads which are 4 inches larger than the equipment.

END OF SECTION

SECTION 26 05 00

BASIC MATERIALS AND METHODS, ELECTRICAL

PART 1 – GENERAL

1.1 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

1.2 O&M MANUAL

A. The preliminary O&M Manuals shall be submitted thirty (30) days after final submittal approval.

B. Provide an electronic copy in searchable Adobe PDF format.

1.3 ELECTRICAL WIRING FOR EQUIPMENT OF OTHER SECTIONS

A. General:

1. All electrical wiring of every description required to operate all equipment furnished by other Sections shall be done by the Electrical Section, except as otherwise specified hereinafter. Read carefully all other Sections in which electrically operated equipment is specified, and include in the electrical work all electric wiring required for the proper operation of the equipment, whether indicated on the electrical drawings or not. Coordinate the Electrical section work with that of all other Sections that furnish equipment requiring electrical connections.
2. All control devices required to operate the equipment shall be furnished by the Section that furnishes the equipment, unless otherwise specified. All control devices which are not factory mounted on the equipment and require electrical connections ONLY shall be installed by the Electrical Section. All control devices which are not factory mounted on the equipment and require piping, linkage, remote bulb, or other mechanical connections as well as electrical connections shall be installed by the Section that furnishes the equipment involved, ready for electrical connections.
3. Outlet locations indicated on the electrical drawings for motors, controls, and other electrically operated items of other Sections are APPROXIMATE ONLY, as the actual wiring requirements are not necessarily identical for the various makes of each item of equipment involved. However, the Electrical Section shall locate all outlets and arrange all wiring to properly serve the equipment ACTUALLY INSTALLED, generally as indicated on the electrical drawings, but EXACTLY in accordance with rough-in sheets and/or wiring diagrams furnished by the other Sections involved.
4. The necessary wiring diagrams shall be furnished by the Section that furnishes the equipment involved, and after these are approved, do all wiring accordingly.

B. Wiring NOT Included: Wiring which is factory installed on equipment.

C. Wiring Included: Generally equipment of other Sections requiring wiring, includes but shall not be limited to the following items:
1. Plumbing: water heater.
2. Door installation: automatic door equipment.
3. Food service: equipment connections.
4. Special construction: equipment connections.
5. Special type wire (other than type MTW): If any of this is required for other Divisions, that wire shall be furnished by the other Divisions and installed under this Division.

PART 2 – PRODUCTS

2.1 HANGERS, SUPPORTS, AND SLEEVES

A. Securely attach all hangers, supports, and devices to the building structure with anchors suitable for the types of building construction involved. Provide all necessary pipe, angle iron, "Unistrut", "Kindorf", or other suitable steel auxiliary supports for the electrical work.

B. Hangers or supports for conduits and raceways shall be standard conduit or raceway straps, or other suitable clamping devices. Trapeze hangers may be used for groups of suspended horizontal conduits, with each conduit clamped to each trapeze bar. Perforated strap iron hangers will not be permitted.

C. Maximum hanger or support spacing for all conduits shall be as required by the Codes. Support non-concrete encased underground conduits by laying with full length bearing on firm trench bottoms. Support each riser conduit at each building floor level within one foot of floor, one foot of boxes, and every ten feet for vertical and horizontal runs; each run shall have at least one support.

D. Adequately support all boxes, gutters, panelboards, switches, starters, fixtures, and other devices, and equipment. Where supporting method is indicated or detailed, provide supports accordingly; OTHERWISE, supports shall be as required by the Codes, and as approved.

E. Provide all necessary sleeves for conduits and other electrical items passing through concrete and masonry construction, where electrical items are not installed prior to concrete placing and masonry laying. Sleeves through concrete walls, concrete columns, and concrete beams shall be IPS steel pipe or rigid steel conduit, flush with finished concrete surfaces. Sleeves for all exposed conduits passing through floors (except slabs on ground) where water on floor can pass through the opening shall be galvanized IPS pipe or galvanized rigid steel conduit extending two inches above finished floor, and flush with slab below. Other sleeves may be sheet metal or plastic.

2.2 CONDUIT AND FITTINGS, EXCEPT UNDERGROUND DUCTS

A. Conduits: These shall be zinc coated rigid steel, zinc coated steel electrical metallic tubing (hereinafter referred to as "thin wall conduit"), ANSI Specification C80.5 rigid aluminum, Carlon Schedule 40 Certainteed PVC Schedule 40 or Cantex PVC Schedule 40 as approved UL listed heavy wall rigid PVC, as applicable. In each case where the conduit type is indicated, specified, or required by the Codes, install only the indicated, specified, or Code required type; OTHERWISE, conduit usage shall be as follows:
   1. Embedded in concrete: rigid steel coated with bituminous compound or PVC coated.
   2. Conduit below grade shall be PVC encased in concrete as indicated.
   3. For supporting fixture, outlet boxes, and other devices and equipment which are not directly anchored to the building structure: rigid steel or rigid aluminum conduit, with all joints and connections threaded.
   4. Flexible connections: flexible steel conduit ("Greenfield"), in short lengths only, at each motor connection and other location requiring flexibility; of liquid tight type where exposed to weather or excessive moisture.
   5. PVC conduit shall not be used in return air ceilings or plenums.
   6. Rigid metal conduit shall be used for service conductors entering and inside building.
   7. Rigid metal conduit shall be used for fire pump service wiring and all runs between controller and pump and other equipment. All conduit within a fire pump room shall be rigid metal conduit except flexible connections to motors may be liquid tight type flexible steel conduit.
   8. All other locations: thin wall or rigid steel, as applicable.
   9. DO NOT INSTALL ALUMINUM CONDUIT UNDERGROUND, IN CONTACT WITH GROUND, OR EMBEDDED IN CONCRETE.
   10. MC Cable is unacceptable. All homeruns shall be EMT.
   11. Minimum 0.75” conduit except switch legs may be 0.5” conduit.

B. Conduit Fittings: For metallic conduit, fittings shall be zinc coated steel, cast aluminum, or cast zinc. For PVC conduit, fittings shall be of the same materials and make as those of the conduit. All fittings exposed to weather shall be weatherproof type.

C. Installation:

1. General: ream ends of all conduits after cutting. Prior to wire pulling, keep all open conduit ends plugged, and swab out all trapped conduits in which water or moisture has collected. Where conduits are concealed in walls, install these conduits so that the exposed wall faces will not be marred.
2. PVC conduits: solvent weld all joints between PVC materials, with cement furnished by the conduit manufacturer. Provide suitable adapters where PVC conduits are coupled to metallic conduits. Provide a rigid steel elbow at the base of each exposed riser from below ground and below floor to above ground and above floor.
3. Conduit routing, general: see TYPE OF SYSTEM, METHOD OF WIRING hereinbefore for locations where concealed and exposed conduits are required and/or permitted. Where conduit routings are detailed or dimensioned install conduits accordingly; OTHERWISE, install concealed conduits with the shortest practicable path, and install all exposed conduits in straight, level, and plumb lines, parallel with or at right angles with beams, walls, ceilings, and other building lines.
4. Branch circuit conduit routings: except where detailed or dimensioned, the indicated branch circuit conduit routings are generally diagrammatic, and are intended to show the required circuitry from panelboards to outlets. However, if necessitated by job conditions, deviations from the indicated routings may be made, provided that regardless of the actual installed arrangement of the conduits: each outlet marked with the same circuit number is connected to the same corresponding numbered circuit; outlets are switched and controlled as indicated; and no home run is brought into any switch box unless otherwise indicated.
5. Thin wall conduit: Use compression type fittings with proper tools for all joints and terminations. Point screw type fittings are allowed with proper installation methods.

2.3 UNDERGROUND DUCTS

A. General: Where indicated on the electrical drawings as "duct" or "ducts", underground conduits shall be PVC type, with concrete encasement.

B. Duct Materials and Joints:
1. PVC conduit: This shall be Carlon Type EB or as approved, UL listed.
2. Fittings: These shall include couplings, elbows (except the riser elbows specified below), adapters, and other necessary types, all of the same material and make as those of the PVC conduit.
3. Joints between PVC materials shall be solvent welded type, made with cement furnished by the PVC conduit manufacturer.
4. Riser elbows: Provide a galvanized rigid steel conduit elbow at the base of each duct riser from below-ground and below-floor to above-ground and above-floor, coupled to the horizontal end of the PVC conduit with a suitable adapter.
5. Supports and spacers: Provide these as required to securely hold conduits in proper position prior to and during concrete placing, with required spacing between adjacent conduits.

C. Concrete Encasement: This shall be as detailed; if not detailed, concrete shall be at least 3" thick below, above, and on each side of the duct assembly. (Concrete by Concrete Section, with 5/8" maximum size aggregate).

D. Grounding Conductor: For each run of one or more PVC conduits in an underground duct assembly, provide a single stranded copper grounding conductor, buried directly in the ground above the concrete encasement, and connected to the above-ground metallic conduit system at each end of the duct run.

2.4 PULL BOXES, JUNCTION BOXES, AND WIRING GUTTERS

A. General: Pull boxes, junction boxes, and wiring gutters shall be of the types and minimum sizes indicated, or as required for the conditions involved where types and sizes are not indicated. Before installation, check proposed locations of boxes and gutters with the architectural, structural, and mechanical drawings, and locate each box and gutter so that it will be accessible in the finished project.

B. Underground Boxes: These shall be Hope HD6000 galvanized cast iron strictly watertight submersible type, with wide flanges on box top, neoprene cover gasket, cover bolted on with stainless steel bolts, and threaded hubs for all conduit connections.

C. Above Ground Boxes and Gutters: These shall be galvanized steel of at least Code gauge for each size involved, and of weatherproof construction where exposed to weather.
   1. Where indicated, boxes for under ground conduits shall be above ground and encased in concrete pedestals, as detailed.

2.5 OUTLET BOXES

A. General: Outlet boxes and covers therefor shall be steel or cast ferrous metal with zinc or other suitable metallic rustproof coating, or cast aluminum, all of the proper sizes and types to accommodate the conduits, conductors, connections, devices, fixtures, architectural conditions, and structural conditions involved.

B. Special Box Requirements:
   1. Exposed-to-weather outlet boxes shall be cast metal, with threaded hubs and gasketed covers, all strictly weatherproof.
   2. Floor boxes for floor outlet devices shall be Steel City Series 88, with floor adjusting rings and appropriate type floor plates for attaching the outlet devices thereto (does not apply to underfloor duct system).
   3. Floor boxes for extensions from under floor conduits up to equipment connections and outlets above floor shall be Steel City Series 88, with floor adjusting rings and Series P90 floor plates; provide these ONLY where indicated, instead of stubbing conduits directly up above floor.

C. Installation:
   1. Before installation, check proposed location of each outlet box with the architectural, structural, and mechanical drawings, and locate each outlet box so that it will be accessible and interference free in the finished project.
   2. Set each concealed box flush with finished surfaces, and so that exposed finished surfaces will not be marred.
   3. Install each wall switch on the knob side of the door involved. Before placing each wall switch box, verify the applicable door swing with the architectural drawings, and locate the wall switch box accordingly.
   4. Where equipment is served by exposed flexible cords, locate the outlet box as near as practicable to the equipment connection point, to minimize flexible cord length.

2.6 WIRE, JOINTS, AND SPLICES, 600 VOLTS AND LESS

A. Lighting and power wire shall be copper only: Types shall be as follows:

   1. Feeders shall be copper as indicated on single line diagram.
   2. High temperature and other special conditions: types NEC approved for the conditions involved.
   3. Exposed flexible cords: Type S, with grounding conductor.
   4. Direct earth burial: Type USE, with neoprene jacket.

5. All other lighting and power wire: No. 8 and larger, Type THWN stranded; No. 10 and smaller, Type THWN/THHN solid.

B. Control wire shall be Type MTW copper, stranded.

C. Signaling, sound, communications, alarm, indicating, and other special system wire shall be copper, of the types specified hereinafter with the equipment, or as indicated, or as recommended by the equipment manufacturers if neither indicated nor specified.

D. Wire Sizes: Where sizes are neither indicated nor otherwise specified wire sizes shall be:
1. Branch circuit wire: No. 12.
2. Control wire: No. 14, or as recommended by the control manufacturer.
3. Special system wire: as recommended by the manufacturer of the equipment involved.
4. Home runs shall be 12 gauge if the distance from the panelboard to first outlet is less than 100 feet; 10 gauge if distance is over 100 feet.

E. Identification:
1. General: All wires shall be identified as required by NEC.
2. Control and special systems wire: these shall be color coded throughout, or identified at each terminal and junction point with a suitable permanently attached tag or label.

F. Joints and Splices: Make these with suitable solderless connectors, in the various boxes, gutters, and similar locations, but not in any conduit. Leave enough wire slack to permit at least one splice or joint to be remade in case of fault.
1. Branch circuit, control, and special system wire joints: use Ideal, Buchanan, 3M, or similar tool-applied to twist-on type connectors.
2. All other wire joints: use Ilsco tin plated aluminum type pressure connectors, or suitable brass, bronze, or copper pressure type connectors.
3. Insulate all joints and splices with suitable insulating sleeves or caps integral with the connectors or separate therefrom, or with vinyl plastic insulating tape.

2.7 ELECTRICAL IDENTIFICATION AND NAMEPLATES

A. Conductors identified by wire markers shall be branch circuits in the panel or panelboard and at the point of termination. The text shall be of black, non-smear ink. Text shall be pre-printed lette

B. Disconnects, panelboards shall be identified with name plates with 1.5” black lettering with white background. Provide 1.5” white lettering with red background on all equipment served by generator.

C. Each panelboard shall be included with a label listing the following:
1. Source info (fed from _____)
2. Voltage/Phase
3. Current/Phase

D. Junction boxes and pull boxes shall be identified with the circuit numbers and panel designation in permanent marker or label.

E. All conduits shall be labeled with circuit numbers labeled with permanent marker at conduit entry into panelboard.

2.8 FUSES

A. General: Provide fuses of the indicated types and sizes, in place, for each device requiring fuses. Unless otherwise indicated, fuses shall be dual element non-renewable delay type. Fuses shall be Bussman, and Littlefuse.

1. Spare Fuses: Furnish three spare fuses of each size and type required for the electrical system, deliver these to the Owner's representative in a suitable clearly labeled box, and obtain signed receipt for delivery. Include this receipt in the Close-Out documents.

2.9 DISCONNECT SWITCHES, MOTOR STARTERS, AND SEPARATE CIRCUIT BREAKERS

A. General: Except as otherwise specified below, Electrical Section shall provide disconnect switches, circuit breakers, and motor starters for all motors and other electrically operated equipment, regardless of who furnishes and/or installs that equipment. Types and locations of these devices shall be as indicated, or as required where types and/or locations are not indicated.
   1. These devices which are located on other equipment shall be as specified under the corresponding headings; these devices NOT located on other equipment shall be as specified below, and shall be separately mounted.
   2. Separately mounted disconnect switches, circuit breakers, and motor starters shall be Square D, Allen-Bradley, ITE, or as approved. Enclosure types shall be: NEMA 3R for devices exposed to weather; NEC required type for devices in other special locations; and NEMA 1 type for devices in other locations. Each circuit breaker and each disconnect switch, including those integral with motor starters, shall have padlocking means.
   3. All terminals for disconnect switches, circuit breakers and motor starters shall be rated and marked for 75 degrees C terminations.

B. Disconnect Switches: These shall be: non-fused heavy duty type safety switches where overcurrent protection is not required; and fused heavy duty type safety switches or circuit breakers (as indicated) where overcurrent protection is required; except that other suitable properly rated switches may be used for fractional hp motors and other small loads.

C. Circuit Breakers: These shall be molded case type. Breakers shall be quick make, quick break type with trip indications shown and with common trip handle on all multipole breaker.

D. Manual Motor Starters: These shall have neon motor running pilot lights and proper sized overload protective devices for the motors involved; and shall be surface mounted in equipment rooms and unfinished areas, and flush mounted in finished area. Where manual motor starters are not indicated, small manually controlled motors shall be controlled directly by the panelboard circuit breakers.

E. Magnetic Motor Starter: Each motor of 1/8 hp or larger shall be provided with thermal overload protection. Polyphase motors shall have overload protection in each ungrounded conductor. The overload-protection device shall be provided either integral with the motor or controller, unless otherwise specified, the protective device shall be of the manually reset type. Magnetic starters shall be NEMA size and type including the NEMA withstand ratings, with the automatic-control device actuating the pilot-control circuit. Each magnetic starter shall have a built in control circuit transformer to supply 120 volts to the control circuit. Each magnetic starter shall be provided with a three-position selector switch marked MANUAL-OFF-AUTOMATIC. Connections to the selector switch shall be such that only the normal automatic regulatory control devices will be bypassed when the switch is in the Manual position; all safety control devices, such as low or high-pressure cutouts, high-temperature cutouts, and motor-overload protective devices, shall be connected in the motor-control circuit in both the Manual and the Automatic positions of the selector switch. Two auxiliary contacts shall be a part of the starters. Control circuit connections to any MANUAL-OFF-AUTOMATIC switch or to more than one automatic regulatory control device shall be made in accordance with approved wiring diagram. All controls shall be 120 volts or less unless otherwise indicated. All motors with a rating of 50 hp and above shall have autotransformer reduced voltage starters; motors less than 50 hp shall be line voltage starters.

F. Identification of Separately Enclosed Devices: Identify each separately enclosed circuit breaker, disconnect switch, magnetic motor starter, and manual motor starter, by attaching to

the device cover a metal or plastic nameplate clearly and permanently lettered with the description and location of the equipment controlled by the device.

G. Devices Furnished by Other Sections or Others:
1. 3/4 hp and small single phase roof mounted fans: If the disconnect switches for these are furnished with and factory mounted on the equipment; Electrical Section shall connect to fan motors and/or switches, as required. Verify that disconnects are furnished by others.

2.10 DEVICES

A. General:
1. Wiring devices shall be Hubbell, Leviton, or other makes as approved or as specified below or on drawings. Type of wiring devices required for this project shall be as indicated on the drawings, or suitable for the application involved if type is not indicated; qualities, ratings, and other requirements of wiring devices shall be as specified below. All wiring device types specified below may not necessarily be required for this project.
2. Receptacle configurations shall conform to NEMA standards unless otherwise noted.
3. Exposed finish shall be: for each device with a plastic plate, same color as that of plate; for devices with stainless steel plates, brown; and for all other devices, brown or black. Hospital grade, isolated ground receptacles and emergency devices shall be marked by symbol on the face. Coordinate device and plate color requirements with architect.

B. Devices: Qualities, ratings, and other requirements shall be: (All models are based on Hubbell – other manufacturers are Leviton or as approved)
1. Wall switches: 20A 120-277VAC, single or double pole, 3 or 4 way, as applicable; Hubbell 1221 series. Where indicated as WEATHERPROOF, the above specified switch, Hubbell 7420. Wall switches with occupancy sensors as shown on drawings.
2. Momentary contact switches: 20A 120-277 volt, SPDT, three position with center off; Hubbell 1557 series.
3. Door switches: Hubbell RDS50.
4. Duplex receptacles: (Commercial) 20A 125 volt, 2 pole, 3 wire grounding: Hubbell 5362. Where indicated as WEATHERPROOF the above specified duplex receptacle Hubbell 5206WO, double lift spring door cover.
5. Ground fault circuit interrupter receptacles: (Commercial) 20A 125 volt feed through duplex 5ma sensitivity type with test and reset buttons; Hubbell GF5362. Where indicated as WEATHERPROOF, the above specified receptacle with Hubbell CWP26H spring door cover.
6. Single Receptacle: (Commercial) 20A 125 volt, 2 pole, 3 wire grounding Hubbell 5361. Single receptacles: 30A, 125 volt, 2 pole, 3 wire grounding; Hubbell No. 9308.
7. Single receptacles: 20A, 250 volt, 2 pole 3 wire grounding; Hubbell 5461.
8. Flush floor receptacles: 20A 125 volt, 2 pole, 3 wire grounding; above specified single receptacle with Steel City 889 and P-90-2 receptacle and floor plates.
9. Standing floor receptacles: 20A 125 volt, 2 pole, 3 wire grounding; above specified duplex receptacle in Steel City SFH-40 or equal outlet fitting.
10. Other devices not specified above; as indicated on the drawings.

C. Device Plates: Unless otherwise specified or inapplicable to the devices involved, plates shall be: emergency circuit devices as selected by Architect, plastic; isolated ground receptacles, as selected by Architect. In finished areas device plate colors shall be as selected by Architect, and unfinished areas, brown plastic for flush devices, and zinc coated steel for surface devices.
1. Identification of Emergency System Receptacles: Emergency system receptacles shall be red in color.
2. Identification of Data Processing Equipment Receptacles: These shall be engraved or hot stamped "Data Processing Equipment Only".

PART 3 – EXECUTION

3.1 INSTALLATION

A. Run exposed conduit, trays, and other wireways parallel to the principal parts of the building. Wireways shall be run concealed when provisions are made in floors, walls, ceilings, and chases through all finished areas. Fire stop all openings around conduit which penetrates floors and walls with approved non-combustible materials, slabs on grade are accepted.

B. Conduits and other raceways shall be kept as close as possible to ceilings, walls, columns, etc., and shall be installed in such an orderly manner as to take up a minimum of space and allow a maximum of headroom, per applicable codes.

C. Circuiting: Circuit numbers shown on drawings indicate specific panelboard to which each branch circuit shall be connected, and specific outlets which shall be connected to each branch circuit, and unless otherwise indicated these circuit numbers do not necessarily indicate actual number of circuit breaker in each panel to which each branch circuit shall be connected. Connect each outlet marked with same circuit number to same numbered branch circuit, and connect each branch circuit to indicated panelboard. In each individual panelboard:
   1. Balance active circuits on panelboard busses, and leave spare circuit breakers equally divided among panelboard busses, as nearly as practicable.
   2. Connect each ungrounded wire of each 3 and 4 wire common neutral circuit to a different panelboard bus.
   3. Group conveniently at top of panelboard all breakers used for switching lights not having wall or other switches, and neatly paint handles of all such breakers with white durable quick drying automobile touch up or other similar type lacquer for each identification as light switches. This does not apply to any panelboard in which ALL circuit breakers serve as lighting switches.

D. Provide templates, layouts drawings, and supervision to ensure correct placement of anchors and conduit projecting in concrete.

E. Painting shall be done to repair scratches to surfaces, electrical equipment nameplates shall be protected from paint.

F. Qualifications: Where specific qualifications are specified in individual specification section, provide required data with Subcontractor list.

3.2 TYPE OF SYSTEM, WIRING METHOD

A. Electrical system characteristics: These shall be as indicated. In addition, whether indicated or not, provide low voltage (less than 120 volts) wiring for controls and other purposes, as required for the complete electrical system.

B. Enclosures: Regardless of voltage or use, install wiring in conduits and metal or other enclosures, unless otherwise indicated or otherwise specified.

C. Finished Areas: Conceal conduits below floors, within slabs, within walls, within pipe chases, above suspended ceilings, and within other building construction, in offices, rest rooms, and other finished areas, unless otherwise indicated.

D. Unfinished Areas: Install above-floor conduits exposed in areas where pipe chases or suspended ceilings are not indicated or concealing is otherwise impractical, in mechanical and electrical equipment rooms, manufacturing areas, warehouse or storage areas, and other unfinished areas.

E. Flexible Cords: Exposed flexible cords approved for the purpose involved shall be used to connect equipment where indicated or specified, and where equipment is factory furnished

with or factory arranged for flexible cord connections only. However, in each such case, install the supply outlet as near as practical to the equipment served thereby, and use the shortest practical length of exposed flexible cord between the equipment and the outlet. If a receptacle is used as an outlet, the receptacle and the cord plug shall be 3 or 4 wire (as applicable) grounding twist-lock type.

F. Ground electrical equipment and conductors as required by NEC and other applicable electrical codes.
   1. Panelboards served by individual transformers: ground panelboard neutral busses to building grounding system.
   2. All metallic cable sheaths, cable shields, metal conduit, transformer cases, cabinets and pedestals shall be made electrically secure to form a continuous system and shall be grounded.
   3. The neutral shall only be grounded at the panelboard or service grounding device. Grounding conductors shall be continuous between the service and the driven grounding electrode or other grounding electrode as permitted in Part H of NEC Article 250.
   4. All conduits shall have code sized green equipment grounding conductors with diameter based on the largest circuit in each conduit.

3.3 EXCAVATION AND BACKFILL

A. Excavate and backfill as required for the electrical work. Cut bottoms of trenches to the proper lines and grades to provide firm and continuous support for the underground electrical work, and to provide 24 inch MINIMUM depth from finished grade to tops of all exterior underground electrical work. Sheet and brace excavations as required to protect personnel and adjacent structures.

B. After the underground electrical work has been installed and approved, place all backfill in 8 inch maximum thickness loose layers, and compact each layer to at least the density of the adjacent undisturbed site soil, using pneumatic or other suitable power tampers. Mass backfilling (backfilling without tamping) is prohibited.

C. Warning tape for buried electrical work: install detectable warning tape directly over every device by burying tape as close to the surface as possible but no less than six inches beneath finished grade. Tape shall be Reef Industries, Inc., "Terra Tape D", or equal as approved, composition metallized foil-plastic film laminate bearing imprint describing the type of buried electrical work. All materials shall be specifically formulated for prolonged use underground.

3.4 FIRE WALL PENETRATIONS

A. Four hour fire walls shall not be penetrated with conduit runs. Conduit runs shall be routed under the floor in these areas. UL listed approved fire stops shall be provided for all two hour wall penetrations.

3.5 FEEDER, STARTER, SWITCH, PROTECTIVE DEVICE, AND OTHER ELECTRICAL DEVICE SIZES

A. Capacities of feeders, motor starters, circuit breakers, switches, protective devices, and other electrical devices indicated to be furnished and installed by Electrical Section for electrically operated equipment, regardless of who furnishes and/or installs that equipment, are based upon the average horsepower and/or electrical ratings. **HORSEPOWER AND/OR ELECTRICAL RATINGS OF ELECTRICALLY OPERATED EQUIPMENT INDICATED ON ELECTRICAL DRAWINGS SHALL NOT LIMIT SIZES OF THE ELECTRICALLY OPERATED EQUIPMENT AND CAPACITY OF THE ELECTRICAL WORK.**

   1. Equipment electrical requirements are based on the specified manufacturer and model. Alternate equipment and model revisions result in electrical load variations and is the responsibility of the contractor. Before commencing electrical work for electrically

operated equipment, Electrical section shall: check horsepower and/or electrical rating of each individual electrically operated equipment items, regardless of who furnishes and/or installs that equipment; and adjust sizes of all applicable feeders, motor starters, circuit breakers, switches, protective devices, and other electrical devices furnished by Electrical Section, as required to provide proper protection and satisfactory operation of the electrically operated equipment actually installed. This includes increasing to next larger size, or decreasing to next smaller size, all feeders, circuit breakers, starters, switches, protective devices, and other electrical devices involved, as required to match capacities of corresponding electrically operated equipment actually installed, except that no sizes shall be decreased without approval.

B. Switches, circuit breakers, motor starters, protective devices, and other electrical devices furnished by other Sections and by others for installation and/or wiring by Electrical Section, are specified elsewhere to have adequate capacities to serve the electrically operated equipment for which they are furnished. However, BEFORE installing and/or wiring each of these devices, Electrical Section shall check each individual device's electrical rating with the horsepower and/or electrical rating of the corresponding electrically operated equipment actually installed, regardless of who furnishes and/or installs the devices and equipment. Electrical Section shall not install and/or wire any device that is found to be the incorrect size, and shall see to it that correctly sized devices are furnished by the applicable Section and other applicable persons in all cases.

C. The intent and requirement of the above is to obtain a coordinated electrical system and all of the above shall be done by Electrical Section as part of the contract, at no extra cost to the Owner.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING

PART 1 – GENERAL

1.1 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Submit shop drawings for final approval.

C. Clearly detail shapes, general construction, and installation details.

D. Submit manufacturer's installation instructions.

E. Submit samples of the following for final approval.

PART 2 – PRODUCTS

2.1 GROUNDING CABLES

A. Materials:
   1. Grounding conductors shall be tinned soft drawn annealed copper, size and type as follows:
      a. Grounding for stress relief cones and splices shall be No. 4 AWG, solid, soft drawn annealed.
      b. All other grounding required minimum No. 4 AWG solid soft drawn annealed unless otherwise specified.
   2. Grounding conductors shall be tinned soft drawn annealed copper, size and types as follows:
      a. From primary riser pole to 3-phase transformer No. 2 AWG bare stranded.

B. Joints and splices: Make these with suitable copper compression connectors, in manholes and pull boxes, but not in any conduit. Leave enough wire slack to permit at least one splice or joint to be remade in case of damage.

2.2 INSTALLATION OF GROUNDING SYSTEM

A. Underground Distribution:
   1. Ground:
      a. On site, outdoor electrical equipment to driven ground rods.
      b. Interrupted metallic raceways, with ground conductors connected to metallic raceway at each end.
      c. Transformer and secondary neutral; to driven ground rods including:
         (1) Cable shielding.
         (2) Metallic raceways.
         (3) Hardware.
         (4) Grounding conductors.

B. Pull Boxes and Manholes:
   1. Ground:
      a. On site pull boxes and manholes to the grounding system including:
         (1) Cable shielding.
         (2) Metallic raceways.
         (3) Hardware.
         (4) Ground conductors.

b. Interrupted metallic raceways, with ground conductor connected to metallic raceways at each end.

PART 3 – EXECUTION

3.1 FIELD TESTING OF GROUNDING ELECTRODE

A. The ground rod electrode in the transformer pad shall have a resistance to ground test performed. The test shall be made with a self-contained direct reading meter such as "Vibroground" or "Groundohmer".

B. The maximum resistance to ground shall not exceed 25 ohms with all grounding leads disconnected from the electrode at temperatures above 32 degrees Fahrenheit and soil moisture content above 20 percent.

C. If the resistance to ground of the existing electrode exceeds 25 ohms install additional grounding electrodes as necessary to obtain the specified resistance. Additional electrodes shall be minimum 3/4 inch diameter by eight foot in length, copper-clad steel.

D. Where rock is encountered and the electrodes cannot be vertically driven their full length install a grounding trench system consisting of an 18 inch minimum depth trench and place within the trench a single conductor No. 2/0 AWG stranded bare copper wire connected to the electrode. The length of wire shall be such that the specified resistance can be obtained and the minimum length shall be 100 feet.

E. The grounding trench shall be located in an area and position such that surface activities will not disturb the system. Location of the trench shall be approved by the Engineer.

END OF SECTION

SECTION 26 09 26

PANELBOARDS

PART 1 - GENERAL

1.1 SCOPE

A. The Contractor shall furnish and install the panelboards as specified and as shown on the contract drawings.

1.2 REFERENCES

A. The panelboards and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA and UL as follows:
   1. UL 67 - Panelboards
   2. UL 50 - Cabinets and boxes
   3. NEMA PB1
   4. Fed. Spec. W-P-115C
   5. Circuit breaker - Type I class I
   6. Fusible switch - Type II class I

1.3 SUBMITTAL - FOR REVIEW/APPROVAL

A. The following information shall be submitted to the Engineer:
   1. Breaker layout drawing with dimensions indicated and nameplate designation
   2. Component list
   3. Conduit entry/exit locations
   4. Assembly ratings including:
      a. Short-circuit rating
      b. Voltage
      c. Continuous current
   5. Cable terminal sizes
   6. Product data sheets

B. Where applicable, the following additional information shall be submitted to the Engineer:

   1. Key interlock scheme drawing and sequence of operations

1.4 SUBMITTAL FOR CONSTRUCTION

A. The following information shall be submitted for record purposes:
   1. Final as-built drawings and information for items listed in Paragraph 1.04, and shall incorporate all changes made during the manufacturing process
   2. Installation information
   3. Seismic certification and equipment anchorage details as specified

1.5 QUALIFICATIONS

A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this

requirement.

1.6 REGULATORY REQUIREMENTS

A. The panelboards shall be UL labeled.

1.7 DELIVERY, STORAGE AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.8 OPERATION AND MAINTENANCE MANUALS

A. Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets, instruction bulletins and renewal parts lists where applicable, for the complete assembly and each major component.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Square D.

B. Eaton / Cutler-Hammer products.

C. Siemens

D. General Electric

2.2 RATINGS

A. Panelboards rated 240 Vac or less shall have short-circuit ratings as shown on the drawings or as herein scheduled, but not less than 10,000 amperes RMS symmetrical.

B. Panelboards rated 480 Vac shall have short-circuit ratings as shown on the drawings or as herein scheduled, but not less than 14,000 amperes RMS symmetrical.

C. Panelboards shall be labeled with a UL short-circuit rating. When series ratings are applied with integral or remote upstream devices, a label or manual shall be provided. It shall state the conditions of the UL series ratings including:
   1. Size and type of upstream device
   2. Branch devices that can be used
   3. UL series short-circuit rating

2.3 CONSTRUCTION

A. Interiors shall be completely factory assembled. They shall be designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.

B. Trims for branch circuit panelboards shall be supplied with a hinged door over all circuit breaker handles. Doors in panelboard trims shall not uncover any live parts. Doors shall have a semi flush cylinder lock and catch assembly. Door-in-door trim shall be provided. Both hinged trim and trim door shall utilize three point latching. No tools shall be required to install or remove trim. Trim shall be equipped with a door-actuated trim locking tab. Equip locking tab with provision for a screw such that removal of trim requires a tool, at the owners option. Installation shall be tamper resistant with no exposed hardware on the panelboard trim.

C. Distribution panelboard trims shall cover all live parts. Switching device handles shall be accessible.

D. Surface trims shall be same height and width as box. Flush trims shall overlap the box by 3/4 of an inch on all sides.

E. A directory card with a clear plastic cover shall be supplied and mounted on the inside of each door. Provide all information on directory card as indicated in specifications.

F. All locks shall be keyed alike.

G. Provide a pad-lockable handle lock hasp. The pad lockable lock hasp allows the handle to be locked in the ON or OFF position. (Trip-free operation allows the circuit breaker to trip when the handle lock holds the circuit breaker handle in the ON position.) The hasp can be mounted on either side of the handle. The hasp will accommodate up to three padlocks with 1/4 inch (6.4mm) shackles. One per circuit breaker.

2.4 BUS

A. Main bus bars shall be copper sized in accordance with UL standards to limit temperature rise on any current carrying part to a maximum of 65 degrees C above an ambient of 40 degrees C maximum. Aluminum bus bars are acceptable where aluminum conductors are being utilized.

B. A system ground bus shall be included in all panels.

C. Full-size (100%-rated) insulated neutral bars shall be included for panelboards shown with neutral. Bus bar taps for panels with single-pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral busing shall have a suitable lug for each outgoing feeder requiring a neutral connection. 200%-rated neutrals shall be supplied for panels designated on drawings with oversized neutral conductors.

D. Provide provisions for isolated ground as indicated on the drawings.

2.5 BRANCH CIRCUIT PANELBOARDS

A. The minimum short-circuit rating for branch circuit panelboards shall be as specified herein or as indicated on the drawings. Panelboards shall be fully rated. Panelboards shall be Cutler-Hammer type Pow-R-Line 1a, Pow-R-Line 2a, Pow-R-Line 3a, or equivalent.

B. Bolt-on type, heavy-duty, quick-make, quick-break, single- and multi-pole circuit breakers of the types specified herein, shall be provided for each circuit with toggle handles that indicate when unit has tripped.

C. Circuit breakers shall be thermal-magnetic type with common type handle for all multiple pole circuit breakers. Circuit breakers shall be minimum 100-ampere frame and through 100-ampere trip sizes shall take up the same pole spacing. Circuit breakers shall be UL listed as type SWD for lighting circuits.
   1. Circuit breaker handle locks shall be provided for all circuits that supply exit signs, emergency lights, energy management, and control system (EMCS) panels and fire alarm panels.

D. Circuit breakers shall have a minimum interrupting rating of 10,000 amperes symmetrical at 240 volts, and 14,000 amperes symmetrical at 480 volts, unless otherwise noted on the drawings.

2.6 DISTRIBUTION PANELBOARDS - CIRCUIT BREAKER TYPE

A. Distribution panelboards with bolt-on devices contained therein shall have interrupting ratings as specified herein or indicated on the drawings. Panelboards shall be fully rated. Panelboards shall be Cutler-Hammer type Pow-R-Line 3a or Pow-R-Line 4B. Panelboards shall have molded case circuit breakers as indicated below.

B. Where indicated, provide circuit breakers UL listed for application at 100% of their continuous ampere rating in their intended enclosure.

C. Provide shunt trips, bell alarms, and auxiliary switches as shown on the contract drawings.

D. Breakers feeding fire alarm and security systems shall have lock-on breaker, with appropriate warning labels on associated panels.

2.7 ENCLOSURE

A. Enclosures shall be at least 20 inches wide made from galvanized steel. Provide minimum gutter space in accordance with the National Electrical Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided.

B. Enclosures shall be provided with blank ends.

C. Where indicated on the drawings, branch circuit panelboards shall be column width type.

2.8 NAMEPLATES

A. Provide an engraved nameplate for each panel section, as detailed in specifications.

2.9 FINISH

A. Surfaces of the trim assembly shall be properly cleaned, primed, and a finish coat of gray ANSI 61 paint applied.

2.10 LABELING (PANEL SCHEDULES)

A. All circuit directories shall include room numbers and descriptions.
B. All circuit directories shall be typewritten. Handwritten directories are not acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractors shall install all equipment per the manufacturer’s recommendations and the contract drawings.

END OF SECTION

SECTION 26 55 00

LUMINAIRES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

A. Provide all labor, materials, equipment and services to achieve a luminaire installation complete with lamps, completely wired, controlled and securely attached to supports, as indicated on the drawings, as specified herein or both.

B. Type of luminaire shall be as indicated and as specified. Where luminaire type has been omitted either on “Lighting Fixture Schedule” or on floor plans or details, Contractor shall request clarification from the Architect prior to submitting bids.

C. Luminaires shall be selected from the fixture schedule not only by catalog number but with consideration to mounting, number, and type of lamps and reference notes all as contained in the “Lighting Fixture Schedule” and in accordance with these Specifications.

1.3 STANDARDS

A. All luminaires shall be listed by and carry the Underwriters Laboratories (U.L.) label.

B. Luminaires shall be labeled with the Underwriters Laboratories (U.L) label appropriate to luminaires’ location (Damp Location, Wet Location, etc.)

C. All luminaires shall meet all required codes and regulations for the application.

D. All luminaires shall be new, clean, and undamaged.

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 260100.

B. Submit product data for each catalogued luminaire indicating pertinent photometric and physical characteristics.

C. Submit complete detailed shop drawings by the manufacturer for each custom luminaire type.

D. Submittals shall indicate name of project, fixture type, and all necessary data for review.

1.5 SUBSTITUTIONS

A. Equality will be based on upon the following characteristics of the proposed alternate product:
   1. Photometric performance
   2. Construction quality, including materials and finish
   3. Ease of installation and maintenance
   4. Appearance
   5. Manufacturer's performance record of support in correcting defects and delivery problems.
   6. Delivery schedule.

B. If deemed necessary in the opinion of the Architect, proposed alternate product may be required to be tested by independent authorities or testing laboratories to confirm performance and construction. If independent tests are required, all costs associated with those test will be paid in advance by the business entity requesting alternate product approval.

C. It shall be the Contractor's responsibility to inform the Architect of any differences between the specified luminaire and the proposed substitution. Failure to do so shall be grounds for rejection of the proposed substitute at any time before or after the bids are received.

D. Final determination of equality shall be the responsibility and judgment of the Architect.

E. Modifications required to any building equipment or system due to the substitution of a luminaire type shall be designed and constructed at the Contractor's expense.

1.6 INTERFACE

A. Confirm compatibility and interface of luminaire with ceiling system prior to ordering luminaires. Report discrepancies to the Architect and defer ordering until clarified.

B. Coordinate luminaire voltages with all circuitry prior to ordering luminaires. Report discrepancies to the Architect and defer ordering until clarified.

C. Coordinate installation of luminaires with other trades to provide a total system that is neat and orderly in appearance. Confirm absence of conflicts with all walls, structure, ducts, pipes, or other equipment prior to ordering luminaires. Report discrepancies to the Architect and defer ordering until clarified.

PART 2 - PRODUCTS

2.1 LUMINAIRE SCHEDULE

A. Refer to the "Lighting Fixture Schedule" for individual luminaire descriptions and manufacture type.

2.2 GENERAL MATERIALS

A. Recessed luminaires shall have trims which fit neatly and tightly to the surfaces in which they are installed. Where gaskets are required, all gasketing material shall be concealed.

B. Luminaires shall be free of light leaks and shall be designed to provide adequate cooling of electrical components.

C. All painted luminaire components shall be painted after fabrication.

D. Wiring channels and lampholder mountings shall be rigid and accurately made.

E. Lampholders shall hold lamps securely against normal vibrations.

2.3 RECESSED LUMINAIRES

A. Recessed fluorescent, LED, incandescent, and high intensity discharge (HID) luminaires: Prewired type with junction box and flexible conduit forming an integral part of the assembly.

B. Supply recessed luminaire complete with trim type required for ceiling system installation. Before ordering, confirm ceiling construction details and architectural finish for each area.

C. Provide integral encapsulate ballasts for recessed high intensity discharge luminaires.

D. Recessed fluorescent, LED, incandescent, and high intensity discharge (HID) luminaires installed in non-accessible ceilings shall be bottom access type, i.e., luminaire component shall be removable from below for access to junction box.

E. Fixtures flush mounted in fire-rated ceiling shall be furnished with the followings nonstandard features:
   1. Fixture housing shall not be less than twenty gauge steel.
   2. Aluminum radiator shall be provided for ballast mounting.
   3. Ballast mounting provisions shall provide for mounting with four bolts; other type mounting are not acceptable.

2.4 FLUORESCENT LUMINAIRES

A. Fluorescent fixtures shall be constructed of not less than 20 gauge steel or 16 gauge rigid construction aluminum and suitable for continuous row mounting where indicated. Hinged doors for support of diffuser shall be gasketed on all sides to prevent light leaks.

B. Reflective surfaces which are painted shall be baked white enamel of minimum average reflectance of 85%. Paint coverage shall be complete without raw or unpainted surfaces or edges.

C. Fluorescent luminaries shall conform to NEMA standards including references to luminaire dimensions and temperature ratings.

D. Lenses and diffusers shall be of 100% virgin acrylic of the pattern indicated and shall be of 0.125” minimum thickness for 2’x4’ and smaller panels and of 0.156” minimum thickness for large panels unless otherwise shown. Minimum thickness shall be defined as the measurement from the base side of the panel to the top of the prism. Lens shall be supported within hinged door frame in not less than six points and in such a manner to prevent vibration of the lens.

2.5 PHOTO CONTROL FOR LIGHTING

A. Photo control shall be self-contained turn lock type head with three EEI-NEMA twist type blades and receptacle with weatherproof housing, photocell, relay, and lightning arrester for surge protection. Unless indicated the dual voltage type responding between 105 and 277 volts shall be used. Rating of contacts shall be 1800 volt amps, for operating minimum 1000 watt lamp load Photocell shall be Tork 2100 Series or equal. Receptacle and mounting shall be included. Cover system in this article is intended for protection of CPVC piping in low-hazard occupancy applications. It also is used to improve the appearance of other piping. See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers. See Section 016000 "Product Requirements."

2.6 DIGITAL LIGHTING TIMERS

A. Timer shall be a Tork 7-Day Digital Time (Model EW101B) or an approved equal digital, astronomic timer with emergency reserve power supply.

2.7 HIGH INTENSITY DISCHARGE LUMINAIRES

A. Reflector cones shall be of uniform gauge aluminum free of spinning marks or other defects and shall incorporate an integral trim flange. Finish is to be of color specified and shall be specular and of the Alzak process with low iridescence. Color shall be uniform.

B. All luminaire types using Alzak reflector cones shall be supplied by the same manufacturer unless specifically called out in the “Lighting Fixture Schedule”.

C. Luminaires with an adjustable lamp shall have an aiming stop which can be permanently set so that the lamp shall remain correctly positioned after service or relamping.

D. All concealed interior and exterior surfaces of the luminaire housing are to be painted matte black.

E. All visible surfaces shall be of color and texture as specified in “Lighting Fixture Schedule”.

F. All ballasts shall be of high power factor, UL listed and labeled, constant wattage auto-transformer type for voltage and lamp type specified.

G. Luminaries installed in outdoor or unheated spaces shall be equipped with ballasts which will start specified lamps at -20 degrees F. (Cold Weather Ballasts)

H. All 150 watt high pressure sodium luminaires to be ballasted for 55 volt lamps unless otherwise noted.

I. Provide all metal halide luminaires with factory installed tempered glass shield.

PART 3 - EXECUTION

3.1 GENERAL

A. Install the fixtures where indicated on the architectural ceiling plan. Fixture counts shall not be altered without approval from the engineer.

B. Recessed fixtures mounted in gyp-board ceiling systems shall be provided with the appropriate flange kit as required for proper installation.

C. For lighting fixtures installed in suspended ceiling earthquake clips shall not be used. For seismic design the fixtures shall be bolted to the ceiling grid. Seismic bracing shall be provided for all surface mounted lighting fixtures. See drawings for details.

D. All luminaires weighing more than 20 pounds shall be directly suspended from the building structure.

E. Supply plaster frames, trim rings, and backboxes to other trades as required.

F. Coordinate with other Divisions of these Specifications to avoid conflict between luminaires, supports, fittings, mechanical equipment, piping, structure, etc.

G. Pendant mounted fixtures shall have stem supported by a fixture and stud mounted in the outlet box.

3.2 RECESSED LUMINAIRES

A. Install recessed luminaires to permit removal from below, to gain access to outlet or prewired fixture box.

B. Connect recessed luminaire to boxes with flexible conduit and fixture wire. Maximum fixture whip shall not exceed 8 feet and shall not be used to extend to additional fixtures. Fixture whips shall be no smaller than #14 AWG.

C. Support recessed fluorescent luminaires from the building structure by installing ceiling system suspension wire or fixture chains on two (2) diagonal corners of each luminaire. Ceiling system hold-down clips are not acceptable. Note only applicable in seismic zones.

3.3 ADJUSTING AND CLEANING

A. Align luminaires one week prior to final acceptance. Replace broken lenses or damaged reflectors. Clean all open reflectors with soft cloths. Remove fingerprints and other blemishes. Refer to lighting fixture schedule for lamping requirements.

END OF SECTION

SECTION 283100

INTELLIGENT ADDRESSABLE FIRE ALARM DETECTION SYSTEM

1.1 SECTION INCLUDES

A. This section of the specifications includes the furnishing, installation, and connection of the microprocessor controlled, addressable reporting fire alarm equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, fire alarm control panel, auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

B. The fire alarm system shall comply with requirements of NFPA standard No. 72 for protected premises signaling systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

1.2 SCOPE

A. A new addressable reporting, microprocessor controlled fire detection system shall be installed in accordance with the specifications and drawings. The system shall be Simplex per campus standards and be furnished with all components necessary to interface with owner's campus panel in the main building.

B. Basic Performance:
1. Alarm, trouble and supervisory signals from all intelligent addressable reporting devices shall be encoded onto a Class B (NFPA Style 4), or Class A (NFPA Style 6, 7) Signaling Line Circuit (SLC).
2. Initiation Device Circuits (IDCs) shall be wired Class B (NFPA Style B) or Class A (NFPA Style D).
3. Notification Appliance Circuits shall be wired Class B (NFPA Style Y) or Class A (NFPA Style Z).
4. Built-in Horn Strobe Synchronization w/ selective silence.
5. Digitized electronic signals shall employ check digits or multiple polling.
6. A single ground or open on the system Signaling Line Circuit (SLC) shall not cause system malfunction, loss of operating power or the ability to report an alarm.
7. Alarm signals arriving at the main FACP shall not be lost following a power failure (or outage) until the alarm signal is processed and recorded.

C. Basic System Functional Operation: When a fire alarm condition is detected and reported by one of the system initiating devices the following functions shall immediately occur:
1. The System Alarm LED shall flash.
2. A local piezo electric signal in the control panel shall sound.
3. A 80-character, backlit LCD display shall indicate all information associated with the Fire Alarm condition, including the type of alarm point and its location within the protected premises.
4. Printing and history storage equipment shall log the information associated with each new Fire Alarm Control Panel condition, along with time and date of occurrence.
5. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed, and the associated System Outputs (alarm Notification Appliances and/or Relays) shall be activated.

1.3 SUBMITTALS

A. General:

1. Two copies of all submittals shall be submitted to the Architect/Engineer for review.
2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent equipment (compatible UL-Listed) from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
3. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:
1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
3. Show remote annunciator(s) layout, configurations, and terminations.

C. Manuals:
1. Submit simultaneously with the shop drawings, complete operating and maintenance manual listing the manufacturer's name(s) including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Certifications:
1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

1.4 GUARANTEE

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of all maintenance, labor and materials required to correct any defect during this one-year period shall be included in the submittal bid.

1.5 MAINTENANCE

A. Maintenance and testing shall be on a semi-annual basis or as required by the local AHJ. A preventive maintenance schedule shall be provided by the Contractor that shall describe the protocol for preventive maintenance. The schedule shall include:
1. Systematic examination, adjustment and cleaning of all detectors, manual fire alarm stations, control panels, power supplies, relays, and water flow switches and all accessories of the fire alarm system.
2. Each circuit in the fire alarm system shall be tested semi-annually.
3. Each smoke detector shall be tested in accordance with the requirements of NFPA 72 Chapter 7.

1.6 APPLICABLE SPECIFICATIONS:

A. The specifications and standards listed below form a part of this specification. The system shall fully comply with these standards.
1. National Fire Protection Association (NFPA) - USA:

a. No. 70 National Electrical Code (NEC)
b. No. 72 Central Station Signaling Systems
c. No. 72 Protective Signaling Systems
d. No. 72 Automatic Fire Detectors
e. No. 72 Notification Appliances for Protective Signaling Systems.
f. No. 72 Testing Procedures for Signaling Systems.
g. No. 101 Life Safety Code

B. Underwriters Laboratories Inc. (UL) - USA:
1. No. 268 Smoke Detectors for Fire Protective Signaling Systems
2. No. 864 Control Units for Fire Protective Signaling Systems
3. No. 268ASmoke Detectors for Duct Applications.
4. No. 521 Heat Detectors for Fire Protective Signaling Systems
5. No. 464 Audible Signaling Appliances.
6. No. 38 Manually Actuated Signaling Boxes.
7. No. 346 Waterflow Indicators for Fire Protective Signaling Systems.
8. No. 1971Visual Notification Appliances for the hearing impaired.

C. Local and State Building Codes

D. All requirements of the Authority Having Jurisdiction (AHJ).

1.7 APPROVALS

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:
1. * UL Underwriters Laboratories Inc.
2. * FM Factory Mutual Systems
3. * CSFM California State Fire Marshal
4. * MEA NYC Materials and Equipment Acceptance
5. * ULC Underwriters Laboratories of Canada

2.1 EQUIPMENT AND MATERIAL, GENERAL

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All Equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D. Equipment should be manufactured by an ISO 9001 Certified Company.

2.2 CONDUIT AND WIRE:

A. Conduit:
1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements. Conduit is not required in the industrial area – provide appropriate wiring supports per manufacturer recommendation.

2. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.
4. Wiring for 24 volt control, alarm notification, emergency communication and similar power limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Conduit shall not enter the Fire Alarm Control Panel, or any other remotely mounted Control Panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
6. Conduit shall be 3/4-inch (19.1 mm) minimum.

B. Wire:
1. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.
2. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
3. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).
4. Wiring used for the multiplex communication loop shall be twisted and shielded and installed in conduit unless specifically accepted by the fire alarm equipment manufacturer. The system shall permit use of IDC and NAC wiring in the same conduit with the communication loop.
5. All field wiring shall be completely supervised.

C. Terminal Boxes, Junction Boxes and Cabinets:

D. All boxes and cabinets shall be UL listed for their use and purpose. All junction boxes shall be painted red.

E. The Fire Alarm Control Panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the Main Power Distribution Panel as FIRE ALARM. Fire Alarm Control Panel Primary Power wiring shall be 12 AWG. The Control Panel Cabinet shall be grounded securely to either a cold water pipe or grounding rod.

2.3 MAIN FIRE ALARM CONTROL PANEL

A. The FACP shall be a Simplex system as approved by GMSD and shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: addressable detectors, addressable modules, printer, annunciators, and other system controlled devices. No other systems are allowed.

B. System Capacity and General Operation
1. The control panel shall provide, or be capable of expansion to 318 addressable detectors and 318 monitor or control modules (636 addressable devices).
2. The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit, 80-character Liquid Crystal Display, individual, color coded system status LEDs, and an alphanumeric keypad for the Field Programming and control of the Fire Alarm System.
3. All programming or editing of the existing program in the system shall be achieved

without special equipment and without interrupting the alarm monitoring functions of the Fire Alarm Control Panel.

4. The FACP shall provide the following features: Maintenance Alert to warn of excessive detector dirt or dust. Detector sensitivity read/test information and System Status Reports to display or print. Smoke Detector Alarm Verification. Pre-signal, meeting NFPA 72 requirements. Rapid manual station reporting (under 3 seconds). Periodic Detector Test, conducted automatically by the control panel every two hours. March time, temporal (ANSI Cadence) and California Code coding options. Walk Test will check for two detectors set to same address.
5. The main CPU shall contain Form-C relay contacts rated at 2.0 amps/30VDC for the following: Alarm, Trouble, Supervisory.
6. The CPU shall contain two Class B or A (NFPA Style Y or Z) programmable Notification Appliance Circuits.

C. Central Microprocessor

1. The Microprocessor shall communicate with, monitor, and control all external interfaces with the control panel. It shall include EPROM for system program storage; non-volatile memory for building-specific program storage; and a "watch dog" timer circuit to detect and report microprocessor failure.
2. The Microprocessor shall contain and execute all programming for specific action to be taken if an alarm condition is detected by the system. Such programming shall be held in non-volatile programmable memory and shall not be lost if both the system primary and secondary power failure occurs.
3. he Microprocessor Unit shall also provide a Real- Time Clock for time annotation of system displays, printer, and history file.
4. The Microprocessor Unit shall contain flash memory capabilities for easy upload/download for upgrades of software.
5. All clock, date and history files shall be maintained during power loss.

D. Display

1. The Display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.
2. The Display shall include status information and custom alphanumeric labels for all Addressable Detectors, Addressable Modules and Software zones.
3. The Display shall provide an 80-character backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide 9 Light-Emitting-Diodes (LEDs), consisting of and not limited to the following: AC POWER, FIRE ALARM, SUPERVISORY, SYSTEM TROUBLE, MAINTENANCE, ALARM SILENCED, DISABLED, BATTERY, and GROUND.
4. The Display shall provide a 25-key touch key-pad with control capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.
5. The Display shall include the following operator switches: ACKNOWLEDGE/STEP ALARM SILENCE, DRILL, and SYSTEM RESET (also serving as a lamp test switch).

E. Signaling Line Circuit Interface

1. The SLC Interface shall provide power to, and communicate with, all of the Addressable Detectors and Addressable Modules over a single pair of wires. This SLC Loop shall be capable of NFPA Style 4, Style 6, or Style 7 operation.
2. The SLC interface shall receive information from all Addressable Devices. This information shall be processed to determine whether normal, alarm, or trouble conditions exist for each detector. This information may also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.
3. The Signaling Line Circuit shall be capable of distances of 10,000 feet (@ 12 AWG, twisted). For retrofit applications, the system shall support up to 3,000 feet of untwisted,

unshielded wire. (Loop 1 only)

F. Serial Interfaces
   1. An EIA-232 interface between the Fire Alarm Control Panel and UL Listed Electronic Data Processing (EDP) peripherals shall be provided. The EIA-232 interface shall allow the use of printers, or for an interface to an off-line PC programmer.
   2. An EIA-485 port shall be available for the serial connection of optional remote led-type annunciators. EIA-485 in terminal mode shall allow serial connection of optional LCD, English language remote system displays. LED (per zone or point) annunciators shall also be provided. The maximum distance to the furthest annunciator shall be 3,000 feet. The system shall support a maximum of 32, remote annunciators on a single twisted, shielded pair. The maximum distance to the furthest annunciator shall be 6,000 feet.
   3. A PS2/PC keyboard connection shall be provided to support the connection of a PC keyboard for local programming of the fire alarm system.

G. Enclosures:
   1. The control panel shall be housed in a UL listed cabinet suitable for surface or semi-flush mounting. Cabinet and front shall be corrosion protected.
   2. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.
   3. An optional semi-flush trim ring shall be available for a neat cabinet dress.

H. All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL standard 864.

I. Optional plug-in modules shall be provided for NFPA 72 auxiliary and remote station fire alarm systems as well as a Digital Alarm Communicator Transmitter for NFPA 72 Central Station systems. The DACT shall meet all current UL requirements for delayed AC fail reporting and shall be capable of reporting individual signals for all 636 points.

J. Optional modules shall provide eight Form-C relays rated at 5.0 amps (Relays shall track programmable software zones) and Municipal box connection and reverse polarity connection.

K. Power Supply:
   1. The Power Supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.
      a. 240 VAC, 50 Hz version shall be available where required.
   2. It shall provide a minimum of 6.0 amps of usable Notification Appliance power.
   3. It shall provide a battery charger for 24 or 60 hours of standby using dual-rate charging techniques for fast battery recharge.
   4. It shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults on sensitive addressable modules.
   5. It shall be power-limited using fuse-less, quick-acting electronic circuitry meeting the latest UL requirements.

L. Operators Controls
   1. Acknowledge Switch:
      a. Activation of the control panel Acknowledge switch in response to new Alarms and/or Troubles shall silence the local panel piezo electric signal and change the Alarm and Trouble LEDs from flashing mode to steady-ON mode. If multiple Alarm or Trouble conditions exist, depression of this switch shall advance the 80-character LCD display to the next Alarm or Trouble condition.
      b. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
   2. Signal Silence Switch: Activation of the Signal Silence Switch shall cause all programmed

Notification Appliances and relays to return to the normal condition after an alarm condition. The selection of Notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit, auto-silence timers, and an option to silence horns and keep strobes flashing.

3. System Reset Switch: Activation of the System Reset Switch shall cause all electronically latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition. Holding the RESET switch shall perform a Lamp Test function.

4. Drill (Evacuate) Switch: Press and hold of the Drill switch shall activate all Silenceable Notification Appliance circuits. The Drill function shall latch until press of Signal Silence or Reset.

M. Printer: A printer may be connected to provide hard-copy printout of all changes in status of the system and shall time-stamp such printouts with the current time-of-day and date. The printer shall communicate with the control panel using an interface complying with Electrical Industries Association standard EIA-232D.

N. Field Programming
1. The system and its respective devices (i.e. smoke detectors and modules) shall be programmable, configurable and expandable in the field without the need for special tools or electronic equipment and shall not require field replacement of electronic integrated circuits.
2. All programming may be accomplished through the standard FACP built-in keypad. As well through using a PC keyboard (connection provided on UNIMODE-9600 main circuit board.)
3. All field-defined programs shall be stored in non-volatile memory and shall not be lost if AC mains and/or battery is lost.
4. The programming function shall be enabled with a password that may be defined specifically for the system when it is installed. Two levels of password protection shall be provided in addition to a key-lock cabinet. One level is used for status level changes such as zone disable or manual on/off commands. A second (higher-level) is used for actual change of program information.
5. Program edit shall not interfere with normal operation and fire protection. If a fire condition is detected during programming operation, the system shall exit programming and perform fire protection functions as programmed.
6. A special program check function shall be provided to detect common operator errors.
7. An Auto-Program (self-learn) function shall be provided to quickly program initial functions within several seconds. During this operation, smoke detectors connected to the Signaling Line Circuit shall be automatically installed without labor intensive operator key commands and the using additional electronic equipment to program each individual detector.
8. For flexibility, an optional off-line programming function, with batch upload/download, shall also be available.

O. Specific System Operations
1. Alarm Verification: The Fire alarm control panel shall have the ability to alarm verify addressable smoke detectors.
2. Point Disable: Any device in the system may be Enabled or Disabled through the system keypad.
3. Point Read: The system shall be able to display or print the following point status diagnostic functions: a. Device Status, b. Device Type, c. Device Label, d. Device Zone Assignments and e. Program Parameters

4. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.
5. Device Sensitivity Reports: Upon command from the operator, the detectors sensitivity can be read and results printed
6. System History Recording and Reporting: The Fire Alarm Control Panel shall contain a History Buffer that will be capable of storing up to 1,000 system alarms, troubles, or operator actions.
7. Automatic Detector Maintenance Alert: The Fire Alarm Control Panel shall automatically interrogate each Addressable Smoke Detector and shall analyze the detector responses over a period of time. If any addressable Smoke Detector in the system responds with a reading that is below or above normal limits, then the system will enter the Trouble Mode, and the particular detector will be annunciated on the system display, and printed on the optional printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.
8. Software Zones: The FACP shall provide 99 software zones. All addressable devices may be field programmed, to be grouped into these zones for control activation and annunciation purposes. Systems that utilize limited programmability, such as general alarm operation, are unacceptable.

2.4 SYSTEM COMPONENTS:

A. Programmable Electronic Sounders
1. Electronic sounders shall operate on 24 VDC nominal.
2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones (Temporal Pattern) with an output sound level of at least 90 dBA measured at 10 feet from the device.
3. Shall be flush or surface mounted as shown on plans.

B. Strobe Lights:
1. Shall operate on 24 VDC nominal.
2. Shall meet the requirements of the ADA (Americans with Disabilities Act) as well as UL Standard 1971.

C. Audible/Visual Combination Devices:
1. Shall meet the applicable requirements of Section A listed above for audibility.
2. Shall meet the requirements of Section B listed above for visibility.

D. Addressable Manual Pull Box
1. Addressable Manual Stations shall be provided to connect to the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loops. Up to 159 addressable manual stations may be connected to each SLC loop.
2. The Manual Pull Box shall, on command from the Control Panel, send data to the panel representing the state of the manual switch. Manual Fire Alarm Stations shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
3. All operated stations shall have a positive, visual indication of operation that cannot be reset without the use of a key.
4. Manual Stations shall be constructed of LEXAN (or polycarbonate equivalent) with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches or larger.
5. Stations shall be suitable for surface mounting, or semi-flush mounting as shown on the plans, and shall be installed in accordance with ADA and local codes.
6. The Manual Station shall provide address-setting means using decimal switches. Addressable manual stations that use binary address setting methods, such as a dip

switch, are much more difficult to install and are subject to installation error, and are not allowable substitutes.

E. Addressable Photoelectric Detectors
   1. Smoke detectors shall be addressable and shall connect with two wires to the Fire Alarm Control Panel Signaling Line Circuit. Up to 318 addressable detectors may connect to two separate SLC loops.
   2. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density.
   3. The detectors shall be low profile ceiling-mount and shall include a twist-lock base.
   4. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a switch) or initiated remotely on command from the control panel.
   5. The detectors shall provide address-setting means on the detector head using decimal switches. Because of the possibility of installation error, systems that use binary jumpers on dipswitches to set the detector address are not acceptable. The detectors shall also store an internal identifying code that the control panel shall use to identify the type of detector.
   6. The detectors shall provide an alarm and power LED. The LED shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel. The LED is placed into steady illumination by the control panel indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED.

F. Addressable Photoelectric Detectors with Fixed Thermal Sensor
   1. Smoke detectors shall be addressable and shall connect with two wires to the Fire Alarm Control Panel Signaling Line Circuit. Up to 318 addressable detectors with fixed thermal sensors (135 degree F) connect to two SLC loops.
   2. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density.
   3. The detectors with fixed thermal sensors shall alarm at a fixed temperature of 135 degree F.
   4. The detectors shall be ceiling-mount and shall include a twist-lock base.
   5. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a switch) or initiated remotely on command from the control panel.
   6. The detectors shall provide address-setting means on the detector head using decimal switches. Because of the possibility of installation error, systems that use binary jumpers on dipswitches to set the detector address are not acceptable. Systems that require a special programmer to set the detector address (including temporary connection at the panel) are labor intensive and not acceptable. The detectors shall also store an internal identifying code that the control panel shall use to identify the type of detector.
   7. The detectors shall provide an alarm and power LED. The LED shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel. The LED is placed into steady illumination by the control panel indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED.

G. Addressable Ionization Smoke Detectors
   1. Smoke Detectors shall be low profile addressable and connect with two wires to the Fire Alarm Control Panel Signaling Line Circuit. Up to 318 addressable detectors may connect to two SLC loops.
   2. The detectors shall use the dual-chamber ionization principal to measure products of combustion.
   3. The detectors shall be low profile ceiling-mount and shall include a twist-lock base.

4. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself, by activating a switch, or may be activated remotely on command from the control panel.
5. The detectors shall provide address-setting means on the detector head using decimal switches. Because of the possibility of installation error, systems that use binary jumpers or dipswitches to set the address are not acceptable. They shall also store an internal identifying code that the control panel shall use to identify the type of detector.
6. The detectors shall provide an alarm and power LED. The LED shall flash under normal conditions. The LED is placed into steady illumination by the control panel, indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect a remote alarm LED.

H. Addressable Monitor Module
1. Addressable Monitor modules shall be provided to connect one supervised IDC (zone) of conventional Alarm Initiating Devices (any N.O. dry contact device) to the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loop.
2. The monitor module shall mount in a 4-inch square, 2-1/8" deep electrical box.
3. The IDC (zone) may be wired for Style D (Class A) or Style B (Class B) operation. The Monitor module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Fire Alarm Control Panel shall use to identify the type of device. Modules that use binary jumpers or dip-switches are subject to installation errors and are not acceptable. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor module is operational and in regular communication with the control panel.
4. For difficult to reach areas, the Monitor Module shall be available in a miniature package and shall be no larger than 2-3/4"W x 1-1/4"H x 1/2"D. This version does not support Style D operation or include an LED.

I. Addressable 2-Wire Smoke Detector Monitor Module
1. Addressable 2-Wire Smoke Detector Monitor Modules shall be provided to connect one supervised IDC (zone) of two-wire conventional smoke detectors to the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loop.
2. The monitor module shall mount in a 4-inch square, 2-1/8" deep electrical box.
3. The monitor module shall provide terminal connections for a resettable external supply voltage to provide power to the IDC (zone) of two-wire smoke detectors.
4. The IDC (zone) may be wired for Style D (Class A) or Style B (Class B) operation. The monitor module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Fire Alarm Control Panel shall use to identify the type of device. Modules that use binary jumpers or dip-switches are subject to installation errors and are not acceptable. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor module is operational and in regular communication with the control panel.

J. Addressable Dual-Circuit Monitor Module
1. Addressable Dual-Circuit Monitor Modules shall be provided to connect two supervised IDCs (zones) of conventional Alarm Initiating Devices (any N.O. dry contact device) to the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loop.
2. The-monitor module shall mount in a 4-inch square, 2-1/8" deep electrical box.
3. The IDCs (zones) may be wired for Style B (Class B) operation only. The Monitor module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Fire Alarm Control Panel shall use to identify the type of device. Modules that use binary jumpers or dip-switches are subject to installation errors and are not acceptable. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor module is operational and in regular

communication with the control panel.

K. Addressable Control Module
1. Addressable Control Modules shall be provided to supervise and control the operation of one conventional Notification Appliance Circuit (NAC) of compatible, 24 VDC powered, polarized Audio/Visual appliances or audio speakers.
2. The Control Module shall mount in a standard 4-inch square, 2-1/8" deep electrical box or to a surface mounted backbox.
3. The NAC shall wire in a Class B (Style Y) or Class A (Style Z) fashion. Each control module shall support up to 1 Amp of Inductive or 2 Amps of Resistive Audible/Visual signals.
4. Audio/Visual power shall be provided by a separate supervised power Loop from the main Fire Alarm Control Panel or from a supervised, UL listed Remote Power Supply.
5. The Control Module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Control Panel shall use to identify the type of device. Modules that use binary jumpers or dip-switches are subject to installation errors and are not acceptable. An LED shall be provided that shall flash under normal conditions, indicating that the Control Module is operational and is in regular communication with the control panel.
6. A magnetic test switch shall be provided to test the module without opening or shorting its NAC circuit wiring.

L. Addressable Relay Module
1. Addressable Relay Modules shall be provided to allow a compatible control panel to switch discrete contacts by code command.
2. The Relay Module shall mount in a standard 4-inch square, 2-1/8" deep electrical box or to a surface mounted backbox.
3. The Relay Module shall provide two isolated sets of Form-C contacts for fan shutdown and other auxiliary control functions.
4. The Relay Module contact ratings shall support up to 1 Amp/30 VDC of Inductive load or 2 Amps/30VDC (coded) of Resistive load (up to 3 Amps in non-coded applications). The relay coil shall be magnetically latched to reduce wiring connection requirements and to insure that 100% of all auxiliary relays or may be energized at the same time on the same pair of wires.
5. The Control Module shall provide address-setting means using decimal switches and shall also store an internal identifying code that the Control Panel shall use to identify the type of device. Modules that use binary jumpers or dip-switches are subject to installation errors and are not acceptable. An LED shall be provided that shall flash under normal conditions, indicating that the Control Module is operational and is in regular communication with the control panel.
6. A magnetic test switch shall be provided to test the module without opening or shorting its NAC circuit wiring.

M. Isolator Module
1. Isolator Modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop. The Isolator Module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC Loop. At least one isolator module shall be provided for each floor or protected zone of the building.
2. If a wire-to-wire short occurs, the Isolator Module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the Isolator Module shall automatically reconnect the isolated section of the SLC loop.
3. The Isolator Module shall not require any address setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an Isolator Module after its normal operation.
4. The Isolator Module shall mount in a standard 4-inch deep electrical box or in a surface

mounted backbox. It shall provide a single LED that shall flash to indicate that the Isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

N. Waterflow Switches (System Sensor WFD Series)
   1. Flow switches shall be integral, mechanical, non-coded, non-accumulative retard type.
   2. Flow switches shall have an alarm transmission delay time that is conveniently adjustable from 0 to 60 seconds.
   3. Flow switches shall be located a minimum of one (1) foot from a fitting that changes the direction of the flow and a minimum of three (3) feet from a valve.

O. Sprinkler and Standpipe Valve Supervisory Switches:
   1. Each sprinkler system water supply control valve riser or zone control valve, and each standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
   2. Each Post Indicator Valve (PIV) or main gate valve shall be equipped with a supervisory switch.
   3. Mount switch so as not to interfere with the normal operation of the valve and adjust to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
   4. The mechanism shall be contained in a weatherproof aluminum housing that shall provide a 3/4-inch tapped conduit entrance and incorporate the necessary facilities for attachment to the valves.
   5. Switch housing to be finished in red baked enamel.
   6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.
   7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.

P. Serial, LED-Type, Remote Annunciation
   1. The annunciator shall communicate with the fire alarm control panel via an EIA 485 (ACS mode) communications loop and shall annunciate all zones in the system. Up to 32 annunciators may be connected to the EIA 485 communications loop.
   2. The annunciator shall need no more than four wires to connect to the FACP.
   3. The annunciator shall provide a red Alarm LED per zone, and a yellow Trouble LED per zone. The annunciator will also have an "ON-LINE" LED, local piezo sounder, local acknowledge/lamp test switch, and custom zone/function identification labels.
   4. The annunciator switches may be used for System control such as, Global Acknowledge, Global Signal Silence, and Global System Reset.

Q. Serial, LCD-Type, Remote System Display
   1. The annunciator shall communicate with the fire alarm control panel via an EIA-485 (Terminal Mode) communications loop and shall include a 80-character, backlit, LCD display which mimics the integral fire alarm control panel LCD display. Up to 32 annunciators may be connected to the EIA-485 communications loop.
   2. The annunciator shall require no more than four wires on the communication loop (two for communication, two for supervision) and two additional wires for power.
   3. In addition to the LCD, English language display, the annunciator shall also include a Power LED, Alarm LED, Trouble LED and Supervisory LED.
   4. A local piezo sounder shall also be included on the annunciator.
   5. Switches for Acknowledge/Lamp Test, Silence, Drill and Reset shall be included on the annunciator protected from unauthorized usage by a key switch (keyed alike to the host FACP).

2.5 BATTERIES

A. Shall be 12 volt, Gell-Cell type (two required).

B. Batteries (two required) shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.

C. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks refilling, spills and leakage shall not be required.

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.
B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.
C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

3.2 TEST

A. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.
    1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
    2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
    3. Verify activation of all flow switches.
    4. Open initiating device circuits and verify that the trouble signal actuates.
    5. Open and short signaling line circuits and verify that the trouble signal actuates.
    6. Open and short Notification Appliance Circuits and verify that trouble signal actuates.
    7. Ground all circuits and verify response of trouble signals.
    8. Check presence and audibility of tone at all alarm notification devices.
    9. Check installation, supervision, and operation of all addressable smoke detectors using the Walk Test.
    10. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
    11. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying the controls performance by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.3 FINAL INSPECTION

A. At the final inspection, a manufacturer-trained representative shall demonstrate that the system functions properly in every respect.

3.4 INSTRUCTION

A. Provide instruction as required for operating the system. "Hands-on" demonstrations of the

operation of all system components and the entire system including program changes and functions shall be provided. The Contractor and/or the Systems Manufacturer's representatives shall provide a typewritten "Sequence of Operation" to the Owner if required.

END OF SECTION

SECTION 31 10 00

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Clearing, grubbing, removal and disposal of vegetation, rocks, roots and debris within the limits of the work except objects designated on the drawings to remain.

B. Preserve from injury or defacement all vegetation and objects to remain.

1.02 RELATED WORK

A. Section 31 40 00: Excavating, Filling and Grading

1.03 LIMITS OF WORK

A. Rights-of-way area established by Engineer.

B. Construction area including the area bounded by lines five feet outside the construction lines established by Engineer.

C. Approved borrow pit areas.

D. Designated stockpiles of construction material other than borrow material.

1.04 PROTECTION

A. Protect living trees not marked for removal and outside the construction area. Treat cut or scarred surfaces of trees or shrubs with a paint prepared especially for tree surgery.

B. Protect bench marks and existing structures, roads, sidewalks, paving and curbs against damage from vehicular or foot traffic.

C. Maintain designated temporary roadways, walkways and detours, for vehicular and pedestrian traffic.

PART 2 - PRODUCTS

(Not applicable)

PART 3 - EXECUTION

3.01 PREPARATION

A. Maintain benchmarks, monuments and other reference points. Re-establish if disturbed or destroyed at no cost to Owner.

3.02 CLEARING AND GRUBBING

A. Clear rights-of-way, borrow pit and other stockpile areas of objectionable material to the ground surface except for trees and stumps.

B. Cut trees and stumps outside the construction area marked for removal by the Engineer to within six inches of the ground surface.

C. Remove low hanging, unsound or unsightly branches on trees or shrubs designated to remain.

D. Grub construction area of protruding obstructions except sound undisturbed stumps and roots six inches or less above the ground which will be a minimum of 5' below subgrade or embankment slope provided undercutting, topsoil stripping or other corrective measures are not stipulated.

E. Grub borrow pit and stockpile areas of all objectionable material. Strip overburden over the material to be obtained in stockpile areas.

F. Perform clearing and grubbing well in advance of construction or material removal activities.

3.03 BACKFILLING AND SURFACE PREPARATION

A. Backfill and compact all depressions resulting from clearing and grubbing with suitable materials in accordance with Section 02210.

1. Backfill embankment areas to natural ground elevation.
2. Backfill excavation areas below finished subgrade to finished subgrade.

B. Perform backfilling a satisfactory distance ahead of construction operations.

C. Prepare areas designated on the drawings to receive erosion control matting to smooth surfaces that have been shaped, fertilized, and seeded.

3.04 DEBRIS REMOVAL

A. Promptly remove cleared debris from site.

B. Obtain permission from applicable regulatory authority for disposal of debris to waste disposal site.

END OF SECTION

SECTION 31 23 00

TRENCHING, BACKFILLING AND COMPACTION

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included

1. Excavation for piped utility material.
2. Provide necessary sheeting, shoring and bracing.
3. Prepare trench bottom with appropriate materials.
4. Dewater excavation as required.
5. Place and compact granular beds, as required, and backfill.

1.02 PRECAUTIONS

A. Notify utility companies when necessary to disturb existing facilities and abide by their requirements for repairing and replacing.

B. Protect all vegetation and other features to remain.

C. Protect all benchmarks and survey points.

PART 2 - PRODUCTS

2.01 BEDDING AND BACKFILL MATERIALS

A. Class I Material: Angular, 1/4 to 1 inch graded stone including a number of fill materials that have regional significance such as crushed stone, cinders, slag, and crushed shells.

B. Class II Material: Coarse sands and gravels with a maximum particle dimension of 1-1/2 inch including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry.

C. Class III Material: Fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures.

D. Class IV Material: Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits.

E. Class V Material: Organic soils, as well as, soil containing frozen earth, debris, rocks larger than 1-1/2 inches and other foreign material. Whenever encountered in the trench Class V Material shall be removed and disposed of as excess excavation. Class V Material shall not be used for pipe bedding or backfill.

F. Class A Material: Continuous concrete cradle constructed in conformity with details shown on drawings, consisting of Class "B" concrete, 3000 psi minimum comprehensive strength at 28 days.

G. Class B Material: Sand or a natural sandy soil, all passing a 3/8" sieve with not more than 10% passing a No. 200 sieve; or stone, gravel, chert or slag.

H. Class C Material: Natural ground or compacted embankment at a depth of at least 10% of the outside vertical pipe diameter.

PART 3 - EXECUTION

3.01 PREPARATION

A. Install barriers and other devices to protect areas adjacent to construction.

B. Protect and maintain all benchmarks and other survey points.

3.02 EXCAVATION TRENCHES

A. Perform in such a manner as to form a suitable trench in which to place the pipe and so as to cause the least inconvenience to the public.

B. Maximum width at the crown of the pipe - 2'-0" plus the nominal outside diameter of the pipe.

C. Cut pavement along neat, straight lines with either a pavement breaker or pavement saw.

D. Trench depth: As shown on the plans.

E. Align trench as shown on the plans unless a change is necessary to miss an unforeseen obstruction. If an unforeseen obstruction is encountered, do not proceed without the direction of the Architect.

F. For pressure lines, shape the bottom of the trench to provide uniform bearing of the pipe on undisturbed earth throughout its entire length. Dig bell holes to aid in securing uniform support of the pipe.

G. For gravity lines, fill the bottom of the trench with granular material as specified herein as shown on the Plans.

H. When unstable soil is encountered at the trench bottom, remove it to a depth required to assure support of the pipeline or to a depth directed by Architect and backfill to the proper grade with Class I material.

I. Unless otherwise directed by Project Engineer, all areas requiring undercut shall be underlain by a heavy weight, non-woven geotextile filter fabric sufficient to encapsulate all bedding material as shown on the plans.

J. No more than 50 feet of trench will be excavated ahead of backfilling operations.

3.03 SHEETING SHORING, AND BRACING

A. When necessary or when required by local, State or Federal safety requirements, furnish, put in place, and maintain such sheeting, bracing, etc., as may be required to support the sides of the excavation and to prevent movement which can in any way damage adjacent pavement or other structures, damage or delay the work of construction or endanger life or health.

B. Take care to prevent voids outside the sheeting.

C. If voids are formed, immediately fill and ram to correct voids.

D. Devise plans for performing this work subject and submit to the Architect.

E. Unless adjacent facilities will be injured, remove all sheeting, shoring and bracing after backfill has been placed to within of 18 inches of the final surface grade.

F. If adjacent facilities will be injured by the removal of sheeting, cut shoring off at the top of the pipe and leave the lower section in the trench.

3.04 DISPOSAL OF EXCAVATED MATERIAL

A. Satisfactorily dispose of all excess excavated material that cannot be used or is not suitable for trench backfill.

3.05 UNAUTHORIZED EXCAVATION

A. All excavation outside or below the proposed lines and grades shown on the plans.

B. Backfill areas of unauthorized excavation with the type material necessary (earth, rock or concrete) to insure the stability of the utility or structure involved.

C. Unauthorized excavation or backfill to replace same shall be at Contractor's expense.

3.06 REMOVAL OF WATER

A. Keep excavated areas free of water while work is in progress.

B. Dewatering shall be performed as required by ground conditions at no additional cost to the Owner.

C. Take particular precautions to prevent the displacement of structures or pipelines as a result of accumulated water.

3.07 OBSTRUCTIONS

A. Obstructions shown on the plans are for information only and do not guarantee their exact locations nor that other obstructions are not present.

B. When utilities or obstructions are not shown on the plans but are present at the location of a proposed utility route, the Contractor may request to relocate the pipeline if necessary to avoid disturbing the utility or obstructions.

C. Exercise due care in excavating adjacent to existing obstructions and do not disturb same.

D. In the event obstructions are disturbed, repair or replace as quickly as possible to the condition existing prior to their disturbance.

E. If required by the Conditions of the Contract, pay for the repair or replacement work performed by the forces of the utility company or other appropriate party.

F. If replacement or repair of disturbed obstructions is not performed after a reasonable period of time, the Owner may have the necessary work done and deduct the cost of same from payments to the Contractor.

3.08 GRAVITY SEWER BEDDING

A. Always maintain proper grade and alignment during the bedding and tamping process.

1. Any pipe dislodged during this process shall be replaced by the Contractor at his expense.
2. Dig bell holes to assure uniform support of the pipe.

B. Unless shown otherwise on the Plans Bedding for PVC, Closed Profile PVC, Open Profile PVC, DI, and RCP Sewers as follows:

1. Bed all PVC pipe regardless of size in compacted Class I angular material from 6" below the pipe up to 6 inches above the top of the pipe, with minimum 6 inch side bedding.
2. Bed all RCP and DI pipe in Class I angular material from 6" below the pipe to the top of the pipe, with minimum 6 inch side bedding.

3.09 BEDDING FOR PRESSURE LINES

A. Unless shown otherwise on the pans:

1. Bed in a trench cut in natural ground.

2. Dig bell holes to assure uniform support throughout the entire length of pipe.

3. Excavate the trench in such a manner as to form a suitable bed in which to place the pipe.

3.10 INITIAL BACKFILLING

A. Do not begin backfilling before the Soils Engineer has inspected the grade and alignment of the pipe, the bedding of the pipe, and the joints between the pipe. If backfill material is placed over the pipe before an inspection is made, reopen the trench in order for an inspection to be made.

B. The initial backfill shall be mechanically tamped in lifts not exceeding eight inches loose to a minimum of 90% Standard Proctor density, ASTM D698, to a point 18" above the top of the pipe. Compaction testing shall be conducted along the completed initial backfill at 50' maximum intervals, or more frequently as conditions may warrant.

3.11 FINAL BACKFILLING

A. After the backfill has reached a point 18" or more above the top of the pipe, perform final backfilling depending on the location of the work and danger from subsequent settlement.

B. Backfilling in Unimproved Areas:

1. Dispose of and replace all soft or yielding material which is unsuitable for trench backfill with suitable material.
2. Deposit backfill to the surface of the ground by dragline, bulldozer, or other suitable equipment in such a manner so as not to disturb the pipe.
3. Backfill shall be compacted to at least 90% Standard Proctor density, ASTM D698. Backfilling shall be performed in lifts not exceeding eighteen inches, loose. Compaction testing shall be conducted along every third lift at 50' maximum intervals, or more frequently as conditions may warrant.
4. Neatly round sufficient surplus excavated material over the trench to compensate for after settlement.
5. Dispose of all surplus excavated material.
6. Prior to final acceptance, remove all mounds to the elevation of the surrounding terrain.
7. Contractor shall maintain backfilled trench until warrantee period of project is expired.

C. Backfilling Beneath Driveways and Streets where Rigid and Non-Rigid Type Surfacing is to be Replaced:

1. Use Class II granular material. If detailed on the Plans as such, a low strength flowable concrete backfill shall be used. In this case, delete Items C-2, 3 and 4 below:
2. Carefully deposit in uniform layers, not to exceed 24" thick.
3. Compact each layer with tools suitable for that purpose in such a manner so as to not disturb the pipe.
4. Backfill shall be compacted to a minimum Relative Density of 70%, ASTM D4253 and D4254.

D. Backfilling of Shoulders Along Streets and Highways:

1. Backfilling methods and materials for shoulders along streets and highways shall be in accordance with the requirements of governing local, county, or state departments maintaining the particular roadway or highway.
2. Replace with similar materials, all shoulders which may be damaged or destroyed as a result of pipe trenching.
3. Backfill shall be compacted to at least 95% Standard Proctor, ASTM D 698. Fill shall be placed in loose lifts not exceeding 9". Compaction testing shall be conducted along each lift at 50' maximum intervals, or more frequently as conditions may warrant.

E. Crushed Stone for Pavement Maintenance and Shoulder Replacement:

1. Where possible, salvage and reuse all base material that is removed during construction.
2. Wet and thoroughly compact crushed stone and blade to tie into the existing surface prior to final acceptance.

F. Backfilling Under Proposed Areas to be Paved:

1. Carefully deposit in-situ excavated material which meets the requirement of Classes I, II, III or IV materials specified in Part 2.01 of this Section in loose lifts not exceeding 12".
2. Compact each lift to at least 95% Standard Proctor, ASTM D698.
3. Compaction testing shall be required for every second lift at 50' maximum intervals, or more frequently, as conditions may warrant.

END OF SECTION

SECTION 31 31 16
TERMITE CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Chemical soil treatment.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Field-applied termiticide for concrete slabs and foundations.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.

B. Soil Treatment: By the square yard of treated soil. Includes applying toxicant to designated soil, re-treating when directed, warranty, annual inspections.

1.04 REFERENCE STANDARDS

A. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act; 1947 (Revised 2001).

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.

C. Test Reports: Indicate regulatory agency approval reports when required.

D. Manufacturer's Instructions: Indicate caution requirement.

E. Manufacturer's Certificate: Certify that toxicants meet or exceed specified requirements.

F. Certificate of compliance from authority having jurisdiction indicating approval of toxicants.

G. Record and document moisture content of soil before application.

H. Maintenance Data: Indicate re-treatment schedule .

I. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing this type of work and:
   1. Having minimum of three (3) years documented experience.
   2. Approved by manufacturer of treatment materials.
   3. Licensed in the State in which the Project is located.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year installer's warranty against damage to building caused by termites.
   1. Include coverage for repairs to building and to contents damaged due to building damage. Repair damage and, if required, re-treat.
   2. Inspect annually and report in writing to Owner. Provide inspection service for one years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 CHEMICAL SOIL TREATMENT

A. Toxicant Chemical: EPA (Title 7, United States Code, 136 through 136y) approved; synthetically color dyed to permit visual identification of treated soil.

B. Manufacturers:
   1. Bayer Environmental Science Corp: www.backedbybayer.com/pest-management/#sle
   2. FMC Professional Solutions: www.fmcprosolutions.com/#sle.

3. Syngenta Professional Products: www.syngentaprofessionalproducts.com/#sle.
4. Substitutions: Refer to Section 01 25 13 Product Substitution Procedures and Section 01 25 33 Product Substitution Request Form.

C. Toxicant Chemical: EPA approved; synthetically color dyed to permit visual identification of treated soil.

D. Diluent: Recommended by toxicant manufacturer.

2.02 MIXES

A. Mix toxicant to manufacturer's instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.

B. Verify final grading is complete.

3.02 APPLICATION - CHEMICAL TREATMENT

A. Comply with requirements of U.S. EPA and applicable state and local codes.

B. Spray apply toxicant in accordance with manufacturer's instructions.

C. Apply toxicant at following locations:
1. Under Slabs-on-Grade.
2. At Exterior Side of Foundation Surface.

D. Under slabs, apply toxicant immediately prior to installation of vapor barrier.

E. At foundation walls, apply toxicant immediately prior to finish grading work outside foundations.

F. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.

G. Re-treat disturbed treated soil with same toxicant as original treatment.

H. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

3.03 PROTECTION

A. Do not permit soil grading over treated work.

END OF SECTION

SECTION 31 40 00

EXCAVATING, FILLING AND GRADING

PART 1 - GENERAL

1.01 SUMMARY

A. Each bidder will be furnished a copy of a site grading plan that is believed to accurately represent the existing grades. The Contractor shall inspect and reviewed the existing site grades and include in his bid proposal necessary unit price funding to bring the site to the grade level shown on architectural site and floor plans, sheets A-100 and A-101.

See unit price requests on the Bid Form, Section 00301.

B. Work Included

1. Grade and fill the site to the elevations shown on the Drawings, as specified herein, and as needed to meet the requirements of the Construction Documents.

C Related Work

1. Section 31 23 00: Trenching, Backfilling and Compaction

1.02 QUALITY ASSURANCE

A. Testing Laboratory and Soils Engineer:

1. Soils compaction testing of in-place soil, and filled and compacted areas will be performed by Testing Laboratory as approved by Project Engineer in accordance with those standards listed herein.

1.03 PROTECTION

A. Protect excavations and grounds from water ponding and water damage. Construct and maintain temporary drainage. Pump, if required to keep excavations free of water. Maintain site in well drained condition at all times.

B. Protect, maintain and restore bench marks, monuments, and other reference points affected by this work. If bench marks, monuments or other permanent reference points are displaced or destroyed, points shall be re-established and markers reset under supervision of a licensed surveyor who shall furnish Project Engineer with certification of his work.

C. Protect utilities and other construction designated to remain to place.

1.04 LINES AND GRADES

A. It is imperative that lines and grades established on drawings, except for allowance for installation of fill aggregate, concrete, and topsoil established below, be met when this work is completed.

1.05 SUBMITTALS

A. Submit one copy of permits and notices obtained from local jurisdiction before commencing work.

B. Obtain and submit certification of adequacy of site grading and filling from Testing Laboratory, signed and sealed by a qualified Soils Engineer, as approved by Project Engineer stating that work is in accordance with Contract Documents, and that soils are capable of supporting the structure to be constructed under the Contract.

C. If bench marks and other permanent reference points are displaced, obtain and submit certification, signed and sealed by a licensed surveyor, of proper re- establishment of bench marks and reference points.

PART 2 - PRODUCTS

2.01 GRANULAR FILL

A. (Under building slabs) Washed Natural gravel or crushed stone not more than 3/4 inch in its largest dimension and ranging down, but with less than 5 percent passing a No. 200 sieve.

2.02 EARTH FILL

A. Clean earth (free from organic material, cinders, ice and rocks over 2 inches in their longest dimension) consisting of either low plasticity clay having a plasticity index of less than 30, or a cohesionless soil with less than 15 percent passing a No. 200 sieve.

B. On-site earth removed during cutting operations may be used if it meets the above requirements.

PART 3 - EXECUTION

3.01 DISPOSITION OF ABANDONED UTILITIES

A. If abandoned underground utility lines and electric conduit are uncovered (verify with respective utility company) in the course of grading, then that part uncovered shall be removed and capped off at points of removal as well as at property lines.

3.02 REMOVAL AND STORAGE OF TOPSOIL

A. Remove sufficient topsoil from areas to be covered by construction, excavated, filled or graded to provide the amount required in topsoil replacement.

B. Remove topsoil to entire depth.

C. Mow grass, weeds and other annual-type growth, and brush close to ground.

D. Scrape or rake area to remove brush, roots, loose grass, weeds and rocks before stripping topsoil.

E. Topsoil to be stored for reuse shall meet requirements established above.

F. Store topsoil in area designated by Project Engineer. Store so as to prevent erosion and mixture with debris and other materials.

3.03 SITE EXCAVATION AND PROOF-ROLLING

A. Proof-roll these areas with a loaded rubber-tired dump truck having a single axle load of approximately 40,000 pounds. Operate the truck at a normal walking speed so that the Soils Engineer may observe the ground while walking beside the truck.

B. The Soils Engineer shall inspect the areas for soft spots.

3.04 REMEDIAL WORK

A. During the course of proof-rolling and inspection, as the Soils Engineer finds soft spots, he will direct cutting out of soft spots and backfilling with specified, compacted earth fill.

3.05 GENERAL SITEWORK

A. Fill and grade to attain elevations indicated +/- 0.1' less allowances for placement of aggregate, concrete, walks, drives and parking areas, and topsoil.

B. Inside of building lines, fill with specified earth fill and allow for placement of indicated depth of granular fill and indicated thickness of concrete, unless noted otherwise on the Contract Drawings.

C. Outside of building, in areas designated to receive topsoil, grade, or fill and compact specified earth, to bring areas to finished grade +/- less 6" for placing topsoil.

D. Where exterior walks are indicated, allow for placement of 4" of granular fill and 4" of concrete and finish +/- 0.1'.

E. Where drives are indicated to join the building, allow for placement of base as shown on the Drawings.

3.06 GRADING

A. Grade to uniform levels and slopes, without abrupt changes. Make transitions from levels to slopes with roundings of large radius.

B. Finish areas to a reasonably true and even plane at required elevations, less allowances for items specified above.

C. Along the lines indicating the limits of work, taper finish grade to the existing grade at a slope matching the natural contour. Perform all of this work within the limit lines.

3.07 FILLING

A. When excavation is complete, place washed granular fill base for concrete slabs. Roll and tamp granular fill to thoroughly compact it.

B. Outside of building in areas to be paved or covered by construction, fill as specified above within building lines.

C. Outside of building in areas where no construction or paving is shown, place specified earth fill in loose lifts of 12" and thoroughly compact.

3.08 COMPACTION DENSITIES

A. For all compaction, except those areas where there will be no construction or pavement:

1. Compact to a density of 95% Standard (ASTM D-698).

B. For areas where no construction will be placed, compact to a density of 90 percent at optimum moisture content (ASTM D 1557, Modified Proctor Method).

3.09 COMPACTION TESTING

A. While filling and compacting operations are in progress, Soils Engineer shall make density tests at random depths and at random locations to determine adequacy of compaction. If compaction tests do not meet specified densities, take action to compact to required densities and pay for retesting to prove compaction densities.

3.10 PLACING OF TOPSOIL

A. Place topsoil in areas disturbed by construction and not covered by paving, buildings and other hard-surfaced materials.

B. Scarify sub-grade to a depth of 3" and spread topsoil uniformly to bring finished grade to elevations indicated after topsoil has been lightly compacted with roller. Topsoil shall be 6" thick.

C. Level and slope topsoil as indicated so that finished grades are +/- 0.1' elevations indicated.

3.11 CLEANUP

A. After all other work of this section is complete, leave area clean and free of any debris.

END OF SECTION

SECTION 32 84 00
UNDERGROUND IRRIGATION SYSTEM

PART 1 - GENERAL

1.01 PROJECT DESCRIPTION

A. The Contractor shall provide all materials, labor, tools, equipment and other items required for the execution and completion of the irrigation work for areas of the project as herein specified and indicated on the drawings.

B. The completed system shall be fully operational including all valves. The system shall apply an even amount of water to the coverage areas as per the plans and equipment manufacturer's specifications.

1.02 GUARANTEE AND MAINTENANCE

A. All materials shall be new, and fully guaranteed for one year to be without defect, and of commercial quality or better. The installed system is guaranteed by the Contractor for one year from date of written acceptance to give uniform distribution and even coverage.

B. Maintenance of the System: (i.e., raising and lowering of heads, cleaning and adjustment of heads, raising and lowering of trenches, and assurance that the system will give full and adequate coverage.) Maintenance of the system shall be provided by the Contractor at no charge until the completion and written acceptance of the installation as part of the contract. This maintenance shall include draining and winterizing the system for one season in the winter, as well as starting up the system in the spring.

1.03 SUBMITTALS

A. Design of System: The irrigation system has been designed specifically for the use of certain sprinkler equipment meeting this specification. Pipe sizes have been determined by computation of pressure losses in the piping and equipment based on column demand and required operation.

B. The system design is based on the operating pressure of the specified sprinkler equipment. The positioning and placement of the sprinklers have also been determined by the operating characteristics of the specified sprinklers. Therefore, substitution shall not destroy the operation and intent of design of the irrigation system.

C. Substitutions: In view of the foregoing, the following procedure must be used to obtain approval of substitute equipment. The bidder desiring to make a substitution for the specified equipment shall submit the following to the Owner's Representative:
   1. Actual samples of each type of irrigation equipment proposed as a substitute.
   2. Manufacturer's catalog sheet showing full specification of each sprinkler/equipment proposed as a substitute, i.e., discharge in GPH or GPM, minimum allowable operating pressure at the sprinkler, maximum allowable spacing and distance of throw.
   3. No approval by the Owner's Representative of a substitution for the specified equipment will be obtained before a bid is submitted.

D. Deliver four (4) copies of submittals to Owner’s Representative within ten (10) working days from date of Notice to Proceed. Index sections for different components and label with specification section number and name of component. Furnish submittals for components on material list. Indicate which items are being supplied on catalog cut sheets when multiple items are shown on one sheet. Owner’s Representative. Incomplete submittals will be returned without review.

E. Materials List: Include rotary spray and dripline irrigation components, control zone components, and other components shown on drawings and installation details or described herein. Quantities of materials need not be included.

F. Manufacturers' Data: Submit manufacturers' catalog cuts, specifications, and operating instructions for equipment shown on materials list.

1.04 SPECIAL REQUIREMENTS

A. The Contractor shall verify pressure and volume of supply as provided by the existing public water system. The Contractor shall guarantee the operation of the system. Upon completion of the project, each sprinkler on the system shall have sufficient pressure and volume of water for optimum performance and coverage.

B. Do not willfully install the sprinkler system as indicated on the drawings when it is obvious in the field that unknown obstructions or grade differences exist that might not have been considered in the engineering, or if discrepancies are discovered. All such obstructions or discrepancies shall be brought to the attention of the Owner's Representative. In the event this is not done, the Contractor must assume full responsibility for revisions if necessary.

C. Comply with all local and state codes, ordinances, safety orders, and regulations of all legally constituted authorities having jurisdiction over this work.

D. The Contractor shall make sufficient provisions that the owner's property will not be damaged by any construction operation.

E. The Contractor shall schedule all work so that there is no conflict with the visitors or staff of the Owner.

PART 2 - PRODUCTS

2.01 QUALITY

A. Provide and install specified equipment and materials, delivered new to the site in unopened containers and confirmed to be without flaws or defects.

2.02 POLYVINYL CHLORIDE PIPE AND FITTINGS

A. PVC pipe shall be manufactured in accordance with standards noted herein.
   1. Marking and identification: PVC pipe shall be continuously and permanently marked with the following information:
      Manufacturer's name, pipe size, type of pipe and material SDR number, ASTM standard number, and the NSF (National Sanitation Foundation) seal.
   2. All PVC piping and sleeves shall be as noted in the schedule. All backflow preventer piping shall be Schedule 40 PVC or Type K copper as per codes.
   3. All PVC threaded nipples shall be Schedule 80 PVC.

B. PVC pipe fittings shall be Schedule 40 solvent weld, and shall be compatible with PVC pipe furnished.

2.03 SWING JOINTS

A. Swing joints shall be manufactured O-ring style.

2.04 SPRINKLER HEADS AND NOZZLES

A. Sprinkler heads shall be supplied in accordance with the specifications, details, and legend on the drawing.

B. Sprinkler heads with a 3/4" and above inlet shall be connected to the lateral line by manufactured O-ring style swing joints.

C. All pop-up sprinklers in established turf areas shall be installed with the top of the cap at finished grade.

2.05 DRIP IRRIGATION SYSTEM COMPONENTS

A. Drip System Components
   1. General Information
      a. Provide flexible dual-layered pressure-compensating inline dripline as identified on the plans, with emitter spacing and dripline row spacing as indicated on construction drawings.
      b. Provide compression fittings as recommended by the manufacturer that are compatible with inline emitter tubing as indicated on construction drawings.

2. Dripline with pressure-compensating inline emitters shall be equipped with 0.6 GPH emitters spaced 18” on-centers.
3. Blank Dripline Tubing shall be as identified on the plans.
4. Dripline Tubing Compression Fittings

B. One on-surface dripline operation indicator shall be installed on each drip irrigation zone to provide visual verification of drip zone operation.

C. Drip Irrigation Accessories shall be as shown on the plans or as recommended by the manufacturer.

2.06 CONTROL VALVES & VALVES BOXES

A. All irrigation control valves shall be electric. All valves for rotary sprinklers shall be plastic, globe configuration, commercial grade, and have a flow control adjustment stem. Drip irrigation zones shall be controlled by the control zone model indicated in the plans.

B. Plastic, 12" standard or multi-valve boxes shall be installed flush with the finished grade for each valve location shown on the drawings. Each valve box lid shall be lockable and accessible only with a valve box key. Valve box top will have a valve number that corresponds to number in controller.

C. Manufacturer's specifications and installation instructions for control valves shall become a part of these specifications.

D. All control valves shall be installed with a minimum of 2" horizontal clearance of the valve box, and the valve stem shall have a 4" to 6" vertical clearance of the valve box lid.

2.07 ELECTRIC IRRIGATION CONTROLLER

A. The irrigation controller shall be fully automatic and energized by 120v electric power supplied by the owner as per local electrical codes. The controller shall send a 24v current to the control valve via control wire pairs.

B. Connect only one control valve hot wire to one wire terminal position at the controller.

2.08 WIRE

A. Type UF, 14 gauge, solid strand copper, which is Underwriters Laboratory approved for direct burial.

B. All wire splices shall be made with an epoxy resin splice kit with a locking cap.

PART 3 - EXECUTION

3.01 INSTALLATION GENERAL

A. Verify construction site conditions and note irregularities affecting work of this section. Report irregularities in writing to Owner’s Representative prior to beginning work. Commencement of work implies acceptance of existing site conditions.

B. Utility Locates ("Call Before You Dig")
1. Arrange and coordinate Utility Locates with local authorities prior to construction.
2. Repair underground utilities that are damaged during construction. Make repairs at no additional cost to contract price.

C. Staking: Should a discrepancy in the plans become apparent during installation, such discrepancy shall be brought to the attention of the Owner’s Representative.

3.02 IRRIGATION LAYOUT

A. Stake out irrigation system. Items staked include rotary sprinkler heads and valves, and drip system manifold/header pipe and tubing, sleeves, control zone assemblies, flush valves, air relief valves, and check valves.

B. Irrigation System Layout Review: Irrigation system layout review will occur after staking has been completed. Notify Owner’s Representative one week in advance of review. Modifications will be identified by Owner’s Representative at this review.

3.03 EXCAVATION, BACKFILL, AND SAFETY PRECAUTIONS

A. All excavation in this contract shall be unclassified and is to include earth, loose rock, rock or any combination thereof, in wet or dry state. The Contractor may use a vibratory plow to pull irrigation pipes in to the ground for the system.

B. It shall not be necessary for the Contractor to remove any turf or sod prior to trenching or pulling.

C. All trenches shall be backfilled with the materials removed and shall conform to adjacent grades without dips, sunken areas, humps, or other irregularities.

D. The Contractor shall take precautions to avoid accidental injury to persons and pedestrians in the project area. At no time shall equipment or materials be stored on walkways. Materials, pipes and other items shall be stored in one designated, and approved, storage area away from pedestrian traffic.

E. All suitable backfill material shall be loaded into the trench in four-inch lifts. Each lift shall be tamped or flooded in order to prevent after settling. The Contractor may leave a three-inch soil layer over trenches to accommodate for initial settling. After initial settling, and prior to establishment of the surface treatment, all excavated areas shall be hand raked to leave the soil grade in as good or better condition than before excavation.

F. Should settlement of the grade over irrigation trenches occur, the Contractor shall be required to remove surface vegetation, refill soil to proper grade, and replace the surface treatment without extra cost to the owner. In turf areas where excavated settling is less than one inch, the Contractor may bring the settled area back to grade with a sand top-dress process. The Contractor shall perform this work as necessary during the guarantee period.

G. Existing trees and shrubs shall not be damaged. Route all trenches outside of tree drip lines to minimize damage to existing tree roots. When necessary, the Contractor shall excavate under or around any major tree roots. Major tree roots shall not be cut.

H. It is understood that the piping layout is diagrammatic and piping shall be routed around existing underground pipes or utilities in such a manner as to avoid damage to these elements. The Contractor shall have all existing pipes and utility lines located within the work area prior to any trenching. Any damage and subsequent repair of streets, walks, pipes, and utility lines shall be the responsibility of the Contractor.

I. For drip irrigation system’s on-grade dripline lateral pipe, downstream PVC manifold, and supply header pipe, secure to finish grade with approved tubing stakes. Install and test prior to installation of landscape fabric and mulch.

3.04 PIPE INSTALLATION

A. Main Line Pipe: The piping between the source of water supply and the electric control valves which is under constant pressure is hereinafter referred to as the "main line" in this project.

B. Lateral Line Pipe: The piping on the discharge side of the control valves which connects the sprinkler heads to the valve is hereinafter referred to as the "lateral line".

C. Lateral lines: The Contractor shall maintain at least 18" of fill over all lateral line pipes.

D. All lumber, rubbish, and large rocks shall be removed from the excavated trenches. Snake the pipe in the trenches to allow for expansion and contraction. Wedging or blocking of pipe will not be permitted. Do not glue and install PVC pipe when temperature is 32 degrees F. or below.

E. Install a continuous strip of metal detector tape on the top side of all mainline piping.

3.05 PVC PIPE AND FITTING ASSEMBLY

A. Cleaning: All foreign matter or dirt shall be removed from inside and outside of pipe before gluing, and piping shall be kept clean by approved means during and after installation of pipe.

B. All glue joints shall be made using PVC primer and PVC medium bonded cement as recommended by the manufacturer.

C. Flush pipes with water within twenty-four hours of installation to remove excess glue that may collect at pipe joints and fittings.

D. All threaded fittings on the main line side of the control valves shall be made watertight. Apply thread sealant in manner recommended by component, pipe and sealant manufacturers and in accordance with accepted industry practices.

3.06 Dripline Tubing and Fittings:

A. Use only fittings for dripline tubing connections or transitions as recommended by the Manufacturer's representative for the specific site and system conditions.

B. Dripline Insert Fittings:
   1. Install dripline tubing and fittings in manner recommended by manufacturer and in accordance with accepted industry practices.

D. Dripline Compression Fittings:
   1. Install dripline tubing and fittings in manner recommended by manufacturer and in accordance with accepted industry practices.

3.07 INSTALLATION OF DRIPLINE IRRIGATION COMPONENTS

A. Control Zone Kit Assembly:
   1. Flush mainline pipe before installing Control Zone Kit assembly.
   2. Locate where shown on drawings. Connect control wires to remote control valve wires using specified wire connectors and waterproof sealant. Provide connectors and sealant per manufacturer's recommendations.
   3. Install a maximum of four (4) Low Flow or Medium Flow Control Zone Kits per standard rectangular valve box. Install a maximum of one (1) Medium Flow Commercial Control Zone Kits per standard rectangular valve box.
      a. Locate valve boxes at least 12" from, and align with, nearby walls or edges of paved areas.
      b. Group Control Zone Kit assemblies together where practical. Align grouped valve boxes in uniform patterns. Allow at least 12" between valve boxes.
      c. Brand controller letter and station numbers on valve box lid in 2" high letters.

B. Lateral Piping and Dripline Tubing:
   1. Install lateral piping and dripline tubing at locations and in grid patterns as indicated on drawings and installation details, and in strict accordance with manufacturer recommendations.
   2. Thoroughly flush PVC lateral piping, supply headers, and dripline tubing immediately upon installation.

C. Flush Point Assembly:
   1. Install in flush header or at ends of each dripline zone segment as shown and directed on drawings and installation details. Install at least 12 inches from and align with adjacent walls or edges of paved areas.

3.08 FINAL ADJUSTMENT

A. The system shall be completely flushed to remove any and all debris from the lines prior to mounting the sprinkler heads onto the swing joints.

B. After all sprinkler heads have been properly mounted, install all sprinkler nozzles and adjust for proper radius and arc of throw.

C. Adjust each control valve flow stem to the proper operating position for the valve zone flow demand. This position is found by turning the flow control stem down until the spray of the sprinklers are slightly reduced.

3.09 PRESSURE TESTING PROCESS

A. Once the mainline and irrigation valves have been installed, the Contractor shall center load the mainline piping leaving all mainline connections and joints exposed and visible for inspection.

B. The Contractor shall mount a water pressure gauge on the backflow preventer for verification of the pressure test process. The Contractor shall isolate the mainline and increase the mainline static water pressure to 120 psi with a hydrostatic water pressure pump. The mainline shall remain pressurized for four hours under the Owner's Representative's supervision without any leaks or mainline pressure drop.

C. If any pressure drop occurs during the testing process, the Contractor shall repair the leak and repeat the test process.

D. The Owner's Representative shall notify the Contractor upon successful completion of the test process. Upon notification of completion of testing, the Contractor may completely backfill and cover the mainline.

3.10 PRELIMINARY INSPECTION

A. Upon completion of all previous items, the Owner’s Representatives shall inspect the system. The Contractor shall be present to operate the system as required.

3.11 FINAL INSPECTION

A. At the final inspection the Contractor shall provide an "as built" drawing showing to scale accurate locations of materials and trenches as installed. The Contractor shall indicate system installation modifications with a red pen on a print of the original scaled irrigation drawing. Where modifications are indicated, the Contractor shall provide at least two (2) exact measurements from its location to a known object or system element.

B. Contractor to supply three (3) copies of an Operations and Maintenance Manual.

3.12 GUARANTEE AND MAINTENANCE

A. The Contractor shall guarantee for one (1) year all materials, and workmanship within the system as these specifications call for in Section 1.02. The Contractor will not be responsible for the condition of any materials damaged by others.

B. During the guarantee and maintenance period, the Contractor shall return to the site at the request of the owner to repair any elements or materials in the system that have failed, fallen out of adjustment, or have broken due to work performed during installation. The Contractor shall provide all labor and materials to bring the system back to a full and correct operational condition.

C. The Contractor shall also make any repairs to the turf or shrub areas where the finished grade has changed due to settling trenches.

D. At the end of the guarantee and maintenance period, the Owner’s Representative shall inspect the system to make sure that the guarantee and maintenance provisions have been complied with.

E. The Contractor shall supply eight (4) irrigation heads of each type and nozzles for future requirements. Contractor shall also supply three (1) QC valve and three (3) swivel elbows.

3.13 WINTERIZATION AND SPRING START-UP

A. Winterize irrigation system in fall following completion, or partial completion, of irrigation system construction. Start-up irrigation system in spring following completion, or partial completion, of irrigation system construction. Repair any damage caused in improper winterization at no additional cost to Owner. Coordinate winterization and start-up with landscape maintenance personnel.

3.14 CLEANUP

A. Remove from site machinery, tools, excess materials, and rubbish upon completion of work.

END OF SECTION

SECTION 32 92 00
SEEDING AND SODDING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Work Included:

This section shall cover the work of furnishing sowing and establishing an acceptable growth of grass from seed, as well as covering the work of furnishing and planting solid grass sodding in various locations throughout the limits of work.

B. Related Work Described Elsewhere:

Excavating, filling and grading - Section 31 40 00.

1.02 QUALITY ASSURANCE:

A. Qualifications of Workmen:

Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the best methods for their installation and who shall direct all work performed under this Section.

B. Applicable Documents:

The following specifications and standards of the issues listed and referred to in this Section form a part of this Specification to the extent required by reference thereto.

1. U.S.A. Standard for Nursery Stock, American Association of Nurserymen, Inc., 1973.

C. Approvals and Rejection of Materials and Work:

1. The selection of all materials and execution of all preparations required under the Drawings and Specifications shall be subject to the approval of the Landscape Architect.
2. If in the opinion of the Landscape Architect, Engineer or Architect, and as determined by Owner any seeded areas that do not show a uniform or healthy stand of grass, the contractor shall re-seed.
3. The Landscape Architect, Engineer or Architect shall have the right to reject any and all materials, any and all work, which in his opinion does not meet the requirements of the Specifications or Drawings at any stage of the operations. All rejected materials shall be removed from the site and shall not be discarded on adjacent sites.
4. All seeding, sodding, and related operation shall be continuous operations.

D. Maintenance of Site During Planting:

Sidewalks, roads and other pavement adjacent to planting operation shall be kept clean and free from obstructions, mud and debris at all times. Wheels of vehicles used in work shall be cleaned if necessary. Flushing of streets or disposal of dirt or debris into sewers or drainage ditches will not be permitted. Dust shall be controlled by approved means to the satisfaction of the Landscape Architect, Engineer or Architect.

1.03 PLANT AVAILABILITY:

All sod specified shall be located and certified available to be installed following completion of the related work.

1.04 PRECAUTIONS:

Locate underground utilities and drainage lines on the site with flags or similar markings prior to excavating or driving stakes. Take proper precautions to prevent damaging or disturbing these improvements. Planting Contractor is responsible for damage or dislocation by his company.

1.05 GUARANTEE:

A. One year after final completion of project, lawn shall be solid color, well matted, and reasonably free from weeds.

B. Inspection for Beginning of Guarantee Period:
   1. Inspection of the planting work, to determine its completion for beginning the guarantee period, will be made by the Landscape Architect, Engineer or Architect, and given approval in writing upon notice requesting such inspection by the Contractor.
   2. All planting must be alive, healthy, and a uniform stand of grass in order to be considered complete.

C. Final Inspection and Replacements:

Inspection of the planting to determine its final acceptance will be made at the conclusion of the guarantee period by the Landscape Architect, Engineer or Architect. No grassing shall be accepted unless the area shows a uniform, healthy stand of grass.

1.06 PRODUCT HANDLING:

A. Delivery and Storage:
   1. Insofar as is practicable, sod shall be laid the day of delivery. In the event that this is not possible, the Planting Contractor shall protect the sod not laid by placing it in a shaded area.
   2. Sod that cannot be laid immediately on delivery shall be kept well watered and shall not remain unplanted for longer than 48 hours after delivery to the site.

PART 2 - PRODUCTS

2.01 GENERAL:

A. All materials shall be in accordance with the Turfgrass Producers International (TPI) Guideline Specifications to Sodding and shall have a normal growth habit and be sound, healthy, vigorous and free from insect infestation.
   1. The quality and health of all materials shall be in accordance with the Tennessee Department of Transportation Specifications 802.00.

2.02 SEED:

A. Seed shall meet the requirements of the Tennessee Department of Agriculture and no "Below Standard" seed will be accepted.
   1. Seed shall be furnished in new bags that are sound and not mended.
   2. Each bag of seed shall bear the growers guarantee of analysis.
   3. Wet. moldy or otherwise contaminated seed shall be rejected.
   4. Seed Mixture:
      a. Seed mix shall contain 40 lbs. per acre of Common Bermuda and shall be sown between May 1 through September 1. Weed seed content shall not exceed 0.25%.

B. At the discretion of the Landscape Architect, Engineer or Architect, samples may be taken for testing. Sampling and testing will be in accordance with the requirement of the Tennessee Department of Agriculture.

2.03 SOD:

A. Sod shall be cleanly cut in strips having a reasonably uniform thickness if not less than 2 1/2 inches and a uniform width of 12 inches and length of 24 inches.

B. Sod shall consist of live, dense, well rooted growth of common bermuda free from Johnson grass, nut grass and other obnoxious grasses and weeds.

2.04 MISCELLANEOUS MATERIALS:

A. Topsoil:

Fertile, friable, natural topsoil of a loamy character without admixture of clay, hardpan, mulch, marl, shell or fine sand and capable of sustaining vigorous plant growth. It shall contain a normal amount (5-8%) of decomposed organic matter and shall be free of stones, lumps, plants or their root, or seeds, sticks and other extraneous matter and shall contain no substance or material inhibitory to plant growth. The results of soil tests by the Contractor shall show that topsoil pH is between 5 and 7 and that topsoil is free of excessive soluble salts at time of use.

B. Fertilizer:
   1. Commercial Fertilizer: Commercial Fertilizer shall be 13-13-13. Fertilizer shall be a standard commercial fertilizer containing the specified percentages by weight of nitrogen, phosphoric acid, and potash.
      a. The fertilizer shall be furnished in standard containers with the name, weight, and guaranteed analysis of the contents clearly marked. The container shall insure proper protection in handling and transporting the fertilizer.
      b. All commercial fertilizer shall comply with local, state, and federal fertilizer laws.
   2. Agriculture Limestone: Agriculture limestone shall contain not less than 85% of calcium carbonate and magnesium carbonate combined and shall be crushed so that at least 85% will pass the No. 10 mesh sieve.

C. Mulch Material:
   1. All mulch material shall be air-dried and reasonably free to noxious weeds and weed seeds or other materials detrimental to plant growth on the project or on adjacent agriculture lands.
   2. Hay shall be stocks of approved grasses, sedges, or legumes seasoned before bailing or loading.
   3. Straw shall be stocked of rye, oats, wheat, or other approved grain crops. Both hay and straw shall be suitable for spreading with standard mulch blower equipment.
      a. When seeding with mulch is specified, the mulch material shall be spread evenly over the seeded area at the approximate rate of 100 pounds per 1,000 square feet immediately following the seeding operation.
      b. All portions of the seeded areas shall be covered with a uniform layer of mulch so that approximately 25% of the ground is visible.
      c. Water mulch and seedbed thoroughly, and immediately, after completion of mulching. Soil shall be moistened to a depth of one (1) inch.
   4. Water:
      Water shall be in accordance with Tennessee Department of Highways Standard Specifications for roads and bridges Section 802.00.

PART 3 - EXECUTION

3.01 SEEDBED PREPARATION AND SEEDING METHOD:

A. The seedbed shall be prepared in the following manner and sequence.
   1. Each area to be seeded shall be scarified, disked, harrowed, raked, or otherwise worked until it has been loosened and pulverized to a depth of not less than 1 1/2" (inches). This operation shall be performed only when the soil is in a tillable and workable condition. All construction material debris, rocks, etc., shall be removed from the seed beds.
   2. Fertilizer at the rate of not less than 10 pounds of grade 13-13-13 per 1,000 square feet (435 lbs. per acre) and agricultural limestone at the rate of not less than 92 pounds per 1,000 square feet (4,000 pounds per acre) shall be distributed evenly over the seedbed unless other rates are specified in the proposal or on the plans.
   3. The limestone and fertilizer shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of approximately 1/2 inch.
   4. Broadcast half the seed with a mechanical spreader and then broadcast the remaining half of the seed at right angles to the first seeding pattern, using the mechanical spreader.
   5. Cover seed to a depth of 1/8 inch be raking or harrowing.
   6. Roll seeded area with a roller weighing a maximum of 150 pounds per foot of width.
   7. No seeding shall be done during windy weather or when the ground surface is frozen, wet, or otherwise non-tillable.

B. If in the opinion of the Landscape Architect, Engineer, or Architect any seeded areas that do not show a uniform or healthy stand of grass, the Contractor shall reseed and/or re-fertilize those areas as directed by the Landscape Architect, Engineer or Architect without any additional cost to the Owner.

3.02 SODDING METHOD:

A. The area to be sodded shall be brought to the lines and grades shown on the plans or as directed by the Landscape Architect, Engineer, or Architect. The surface of the ground to be sodded shall be loosened to a depth of not less than 1 inch with a rake or other device. The ground shall be sprinkled until saturated for a minimum depth of 1 inch and kept moist until the sod is placed.

B. Immediately before placing the sod, fertilizer and lime shall be applied uniformly to the prepared surface of the ground. Fertilizer shall be applied at the rate of 8 pounds of grade 13-13-13 or equivalent per 1,000 square feet. Agricultural limestone shall be applied at the rate of 75 pounds per 1,000 square feet.

C. Sod shall be placed as soon as practical after removal from the point of origin and shall be kept in a moist condition during the interim. The sod shall be carefully placed by hand on prepared ground surface with the edges in close contact and as far as possible in a position to break joints.

D. Immediately after placing the sod, it shall be thoroughly wetted and rolled with an approved roller or hand tamped as approved by the Landscape Architect, Engineer, or Architect. On slopes of 2 to 1, or steeper, pinning or pegging is required to hold the sod in place.

E. The sod shall be watered as needed by the Contractor for a period of three weeks after which ammonium nitrate shall be applied at the rate of 3 1/2 pounds per 1,000 square feet and then watered. The Contractor shall not allow any equipment or material placed on any planted area and shall erect suitable barricades and guards to prevent this equipment, labor or the public from traveling on or over any area planted with sod.

3.03 CARE DURING CONSTRUCTION:

A. All seeded areas shall be cared for properly to the Landscape Architect's, Engineer's or Architect's satisfaction until acceptance of the work. Such care shall include watering and mowing the seeding areas when required by the Landscape Architect, Engineer, or Architect. When mowing is required, mower blades shall be set at sufficient height to protect the vitality of the growth.

B. Surfaces gullied, eroded areas, or any damaged areas found following seeding shall be repaired by regrading and reseeding as directed by the Landscape Architect, Engineer, or Architect.

C. The Contractor shall regrade, re-fertilize, and reseed any or all seeded areas as directed by the Landscape Architect, Engineer, or Architect to correct any unsatisfactory and unacceptable conditions as determined by the Landscape Architect, Engineer, or Architect regardless of who may have caused the unacceptable or unsatisfactory area.

D. The Contractor shall be responsible for protecting his work at all times and shall erect temporary barricades to do so.

E. If in the opinion of the Landscape Architect, Engineer, or Architect that any seeded areas do not show a uniform or healthy stand of grass, the Contractor shall reseed and/or re-fertilize those areas as directed by the Landscape Architect, Engineer, or Architect without any additional cost to the Owner.

END OF SECTION

SECTION 32 93 00

PLANTING INSTALLATION

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. QUALIFICATIONS OF WORKMEN

Provide at least one person who shall be present at all times during execution of this portion of the Work and who shall be thoroughly familiar with the type of materials being installed and the best methods for their installation and who shall direct all work performed under this section.

B. APPLICABLE DOCUMENTS

The following specifications and standards of the issues listed and referred to in this Section form a part of this Specification to the extent required by reference thereto:

1. American Standard for Nursery Stock, American Nursery and Landscape Association, Inc., ANSI Z60.1, Current Edition
2. American National Standard for Tree Care Operations, International Society of Arboriculture, ANSI A300.

1.02 PLANT AVAILABILITY

All plants specified in the Plant Schedule shall be located and certified available to be planted. Contractor shall notify Owner’s Representative at once of any unavailable plant material.

1.03 PRECAUTIONS

Locate underground utilities and drainage lines on the site with flags or similar markings prior to excavating or driving stakes. Take proper precautions to prevent damaging or disturbing these improvements. Contractor is responsible for damage or dislocation by his company.

1.04 INSPECTION AND ACCEPTANCE

A. INSPECTION

Inspection - a verification of performance for work defined by contract documents, to be conducted by the Owner's Representative on site and in the presence of the Landscape Contractor for the purpose of acceptance. Inspection shall be made within two (2) weeks of written notification from the Landscape Contractor. Failure of the Owner's Representative to inspect the work shall not void the guarantee. During inspection for initial acceptance, the Landscape Contractor should have an acceptance form to be signed by the Owner or Owner's Representative.

B. INITIAL ACCEPTANCE

The Owner’s Representative shall perform an inspection with the Contractor after the initial planting operation. Initial planting operation ends when:

1. All plants are installed, mulched, and watered as specified;
2. Stakes and guys, if specified, are in place;
3. All construction material and excess excavated material is removed and clean-up is completed.

Upon completion and re-inspection of all repairs or renewals required by the Owner’s Representative, the Owner’s Representative shall certify in writing that the work has been accepted.

Acceptance can be given for partially completed work under the contract, if approved by the Owner or Owner's Representative. If, for reasons beyond the Landscape Contractor's control, work has stopped, inspection shall be made of partially completed work. The Owner's Representative shall make a maximum of two initial inspections. Additional inspections required for approval of newly installed material or previously rejected material will be at the Contractor's expense.

C. WARRANTY

Warranty shall begin after landscape inspection and acceptance. Note: The Landscape Contractor should periodically inspect the site during the warranty period and notify the Owner or Owner's Representative in writing if proper maintenance is not being performed.

D. FINAL INSPECTION AND ACCEPTANCE

At the end of the maintenance and guarantee period and upon written request of the Contractor, the Owner's Representative shall inspect all guaranteed work for final acceptance. The request shall be received by the Owner's Representative at least 14 days before the anticipated date for final inspection. Upon completion and re-inspection of all repairs or replacements necessary in the judgment of the Owner's Representative, the Owner's Representative shall certify, in writing, that the project has received final acceptance. In no way will final acceptance of landscaping precede final acceptance of entire project.

1.05 WARRANTY PERIOD AND REPLACEMENTS

The standard warranty is for a one (1) year period, excluding bulbs and annuals, commencing on the date of initial acceptance. All plants shall be alive and in satisfactory growth at the end of the guarantee period. Plants shall be free of dead or dying branches and branch tips, and shall bear foliage of a normal density, size and color. Any material that is 25% dead or more shall be considered dead and must be replaced at no charge. A tree shall be considered dead when the main leader has died back, or when 25% of the crown is dead. Deciduous material shall be guaranteed to break dormancy if planted in dormant season. Perennials shall be guaranteed to show signs of healthy growth by May 15 - June 1. Any delay in completion of planting operations which extends the planting into more than one planting season shall extend the Warranty Period correspondingly. Replace without cost to Owner, and as a vigorous, thriving condition, as determined by the Owner's Representative during and at the end of the Warranty Period. Replacement shall closely match adjacent specimens of the same species and shall be subject to all requirements of this specification. The Contractor shall not be held responsible for failures due to neglect by the Owner, vandalism, etc., during the Warranty Period. Report such conditions to the Owner in writing. Plant material exhibiting conditions which are determined by the Owner's Representative as being unacceptable due to action during planting and maintenance operations shall be replaced at no additional cost to the Owner. Annuals and bulbs are not guaranteed.

1.06 PRODUCT HANDLING

A. DELIVERY AND TEMPORARY STORAGE

1. Insofar as is practicable, plant material shall be planted on the day of delivery. In the event this is not possible, the Contractor shall protect the stock not planted.
2. Protect plants at all times from sun or drying winds. Plants that cannot be planted immediately on delivery shall be kept in the shade, with the root mass well protected and kept well watered. Plants shall not remain unplanted for longer than three days after delivery to the site.

B. APPROVALS AND REJECTION OF MATERIALS AND WORK

The selection of all materials and execution of all preparations required under the Drawings and Specifications shall be subject to the approval of the Owner's Representative. The Owner's Representative shall have the right to reject any and all materials, any and all work, which in his opinion does not meet the requirements of the Specifications or Drawings at any stage of operations. All rejected materials shall be promptly removed from the site and shall not be discarded on adjacent sites.

C. MAINTENANCE OF SITE DURING PLANTING

Sidewalks, roads and other pavement adjacent to planting operation shall be kept clean and free of obstructions, mud and debris at all times. Wheels of vehicles used in work shall be cleaned if necessary. Flushing of streets or disposal of dirt or debris into sewers or drainage ditches will not be permitted. Dust shall be controlled by approved means to the satisfaction of the Owner's Representative.

PART 2 - PRODUCTS

2.01 PLANT MATERIALS

A. PLANTS, IN GENERAL

All plants shall be in accordance with the American Standards for Nursery Stock, and with the following additional requirements.

1. Plants shall be so trained in development and appearance as to be unquestionably superior in form, compactness, and symmetry. They shall be sound, healthy, vigorous, well-branched, and densely foliated when in leaf. Plants shall be free of disease and insect adults, eggs, pupae, or larvae. They shall have healthy, well-developed root systems and shall be free from physical damage or other conditions that would prevent thriving growth.
2. A complete list of plants, including quantities, sizes, and other requirements is included in the contract documents. In the event that discrepancies occur between quantities of plants indicated in the plant list and on the drawings, the quantities indicated on the drawings shall govern.
3. The Contractor shall furnish a written list of proposed sources of nursery stock. This list may not be altered without consent of the Owner's Representative.
4. Substitutions of plants must be authorized in writing by the Owner's Representative. If proof is submitted in writing that a plant specified is not obtainable, consideration will be given to the nearest available size or similar variety, with a corresponding adjustment of the contract price. Owner's Representative will obtain approval from the Owner or local governmental agencies, as required, prior to approving any substitutions.
5. Plants shall conform to the measurements specified except that plants larger than those specified may be used if approved by the Owner. Use of larger plants shall not increase the contract price nor allow the Contractor to use smaller than specified material on other plants. If larger plants are approved, the root ball, root spread, or container shall be increased in proportion to the size of the plant.
6. All plants shall comply with state and federal laws governing the shipping, selling, and handling of plant stock and inspection for plant diseases and pest infestations. Inspection certificates required by law shall accompany each shipment of plants and shall be filed with the Owner's Representative before acceptance. The certificate shall bear the name and address of the source of the stock.
7. Transportation and storage of plant materials shall be in conformance with the following.
    a. The Contractor shall take care to prevent injury and drying out of plants during transportation. Should the roots dry out, large branches be broken, earth balls break or be loosened, or bark be torn, the Owner's Representative may reject the injured tree(s) and have them replaced at no additional cost to the Owner.
    b. Roots of each load of bare root stock shall be adequately covered with wet soil, sawdust, wood chips, or other acceptable moisture-holding medium until planted. Loads shall be covered with an open-mesh tarpaulin, canvas, or other material to ensure that trees do not become overheated or damaged by wind during transport. Loads not protected in this manner may be rejected.
    c. Plants must be protected at all times from sun or drying winds. Those that cannot be planted immediately upon delivery shall be kept in the shade and watered well. Plants shall not remain unplanted longer than three days after delivery without permission from the Owner's Representative.
    d. Plants shall be lifted and handled with suitable support of the soil ball and shall not be lifted by the trunk or branches.
8. Plant delivery and inspection shall be in conformance with the following.
    a. The Contractor shall give the Owner's Representative notice of delivery time seven to ten days prior to delivery.
    b. Each bundle or each plant shall have a durable and legible label with plant size and name (genus, species, variety, cultivar) securely attached when delivered and in place until after acceptance. Labels shall not girdle or damage plants.

c. Plants shall be inspected by the Owner's Representative upon delivery. A Contractor's representative shall be present at all inspections. Installation shall not begin until after all plants are inspected and accepted by the Owner's Representative.
d. The Owner's Representative reserves the right to reject any plants that do not meet the standards or that have been damaged. Such approval shall not impair the right of inspection and rejection during progress of the work. The Owner's Representative shall be the sole judge of acceptability of stock at any time during the course of this contract.

2.02 TREES

A. SIZE

Caliper measurements shall be taken 6 inches above the trunk flare for trees up to 4 inches in caliper, and 12 inches above the trunk flare for trees over 4 inches in caliper. Plants shall be measured when branches are in their normal position. If a range of size is given, no plant shall be less than the minimum size, and no less than 50 percent of the plants shall be as large as the maximum size specified. Trees shall have a standard balance between height, crown spread, diameter, and root ball size according to the American Standard for Nursery Stock.

B. FORM

Tree trunks shall be straight and well-tapered. Trees with multiple leaders, unless specified, will be rejected. Damaged, cut, or crooked leaders; included bark, bark abrasions, sunscald, disfiguring knots, mold, and prematurely opened buds, or cuts of limbs over 3/4 inch diameter that are not completely callused are cause for rejection. Needled evergreens shall not have been sheared.

C. BALLED-IN-BURLAP MATERIAL

Balled-in-burlap (B&B) plants shall have firm, natural earth balls of a diameter not less than that recommended in American Standard for Nursery Stock, and of sufficient depth to include fibrous and feeding roots. Balls shall be securely wrapped with burlap and tightly bound with rope or twine, or trees may be in wire baskets lined with burlap and tightly bound with rope or twine. The trunk flare shall be within the top two inches of the soil ball. Balled-in-burlap plants with manufactured balls or balls that are dry, cracked, or broken before or during the planting operation will be rejected. Synthetic ball wrapping material will not be allowed in any case.

2.03 CONTAINER GROWN PLANT MATERIALS

All container grown plants shall be healthy, vigorous, well-rooted and established in the container with a root system sufficiently developed to hold together when removed from the container. Plants shall not be pot bound nor have kinked, circling, or bent roots. The root ball periphery shall be free of circling roots larger than 1/4 inch in diameter. The container shall be sufficiently rigid to hold the root mass shape protecting it during shipment. No root bound container grown plants will be permitted. No broken container grown root mass shall be planted.

2.04 BARE ROOTED PLANT MATERIALS

No bare rooted plant materials will be permitted.

2.05 COLLECTED PLANT MATERIALS

No collected plant materials will be permitted.

2.06 MISCELLANEOUS MATERIALS

A. TOPSOIL

Fertile, friable, natural topsoil of a loamy character without admixture of clay, hardpan, mulch, marl, shell or fine sand and capable of sustaining vigorous plant growth. It shall contain a normal amount (5-8%) of decomposed organic matter and shall be free of stones, lumps, plants or their roots, or seeds, sticks and other extraneous matter and shall contain no substance or material inhibitory to plant growth. The results of soil tests by the Contractor shall show that topsoil pH is between 5 and 7 and that topsoil is free of excessive soluble salts at time of use.

B. PLANTING SOIL MIXTURE

All topsoil used in tree and shrub beds shall be prepared and conditioned as follows: Mix one (1) part by volume of decomposed peat moss, one (1) part builder's coarse sand and one (1) part topsoil to each cubic yard of the mixture. Provide one part planting soil mix for each three parts original soil removed from tree and shrub planting pits.

C. MYCORRHIZAL INOCULANT

Plant Success Granular Premium Mycorrhizae 3-1-2 granular inoculum as manufactured by Plant Revolution, Inc., 2133 S. Hathaway Street, Santa Ana, California, 92705 or approved equal. Apply to planting mix surrounding all tree root balls and shrub root masses, as directed by the manufacturer. In groundcover areas, apply as a soil drench following planting operations.

D. FERTILIZER

1. Commercial Fertilizer 6-12-12: Fertilizer shall conform to applicable State fertilizer laws and shall be slow-release type. Fertilizer shall only be applied during maintenance, not during planting operations.
2. Lime - Shall be raw ground limestone of agricultural grade and shall be added to topsoil at an incremental rate of 2 1/2 pounds per cubic yard to correct highly acid conditions as determined by soil test by the Contractor conducted prior to the spreading or mixing of topsoil.
3. Aluminum Sulfate - Shall be unadulterated and delivered in containers with name of materials and manufacturer and net weight of contents and shall be added to topsoil at an incremental rate of 2 1/2 pounds per cubic yard to correct highly alkaline conditions as determined by soil test by the Contractor conducted prior to the spreading or mixing of topsoil.

E. MULCHING

Bark - Shall be of 100% organic decomposed shredded pine or hardwood and be free of weeds, diseases, seeds, spurs, insects and other foreign matter.

F. PEAT MOSS

Commercial organic grade, dark brown color, cured for at least one year, low in woody material, free from mineral or other foreign matter harmful to plant life.

G. STAKES

Anchoring material shall be root staking materials as manufactured by Tree Frog Environmental Products, LLC of Mount Dora, Florida or approved equal. Anchoring material shall be provided two (2) per tree, and shall be installed using the manufacturer's recommendation for root ball staking.

H. WATER

The Contractor shall make, at his expense, whatever arrangements may be necessary to insure an adequate supply of water to meet the needs of this project. Water shall be free from any harmful or objectionable organisms, seed or other materials.

PART 3 - EXECUTION

3.01 PLANTING METHODS

A. GENERAL

1. The Contractor shall be responsible for planting at correct grades and alignment.
2. The Owner's Representative shall inspect all plant materials while in their containers and in their final locations prior to digging.
3. The Contractor shall flag all underground utilities and structures prior to digging or staking.
4. Perform planting only during periods within the planting season when weather and soil conditions are suitable and in accordance with local accepted practices.
5. Plants must be protected from excessive vibrations. Plants shall not be thrown or bounced off a truck or loader to the ground. Plants shall not be dragged, lifted, or pulled by the

trunk or branches in a manner that will damage the branches or loosen the roots in the ball.

6. Trees shall be gently removed from containers before planting. Trees shall not be pulled from the container by the trunk. Trees shall be set with the top of the trunk flare at or slightly above finished grade. Any soil above the trunk flare must be carefully removed. Plants shall be set on firm soil (undisturbed or compacted) so that plant will be at the same depth one year after planting. Any repositioning of trees shall be done by supporting and moving the root ball, not lifting by the trunk.
7. Roots that are circling the bottom, sides or surface of the root mass of containerized plants shall be gently separated and directed away from the plant stem.

B. PLANTING BED AND TREE PIT PREPARATION

1. Excavation of planting beds shall be in accordance with the planting details. Excavation may be done by shovel, backhoe, or stump grinder, but a soil auger may not be used.
2. Before setting any trees or shrubs, the sides of the pits shall be scarified, and the beds and pits backfilled with the topsoil mixture to a depth of 6 inches and tamped and watered.

C. SETTING PLANTS

1. Set plants at same relationship to finish grade as they bore to the ground from which they were dug.
2. Prepare planting beds as specified and set plants plumb and oriented for desired effect as directed by the Owner's Representative.
3. Use topsoil mixture with micorrhizal inoclulant to backfill plant pits. When plant pits are approximately two-thirds full, soil shall be thoroughly watered to eliminate air pockets. After this initial watering, soil shall be installed to the top of the hole and again thoroughly watered. Backfill shall not be tamped or compacted. Fertilizer shall not be applied during the planting operation.
4. After the plant has been set, remove burlap, wire baskets, and other wrappings from at least the top half of the ball. Wraps may be left intact around the lower half of the ball if necessary to support the ball. However, all waterproof or water repellant wrappings shall be removed completely. Care must be taken to not crack or break the root ball. Turn under and bury top one-third of the burlap wrapping on the ball as shown on the details.
5. Form saucers capable of holding water about plant by placing a mound of topsoil around the edge of each filled in pit as detailed.
6. Mulch all pits with shredded bark or approved mulch material, keeping mulch 8 inches away from tree trunks. Provide 6-foot radius of mulch surrounding tree trunks unless otherwise shown on the plan.
7. Water all plants by hose immediately after planting.
8. Stake each plant as detailed.
9. All twine, rope, transit guards, plant labels, and wrappings around the trunk or branches shall be removed after planting.

D. PRUNING

The only pruning allowed at planting shall be removal of double leaders and dead, damaged, or broken branches. Pruning shall conform to American National Standard for Tree Care Operations, ANSI A300. No pruning paint or other wound dressing shall be used. Pruning shall be approved in advance by the Owner's Representative.

E. CLEAN-UP

Soil, branches, rejected plants, wrapping material, and other debris resulting from installation shall be promptly cleaned up and removed. The work area shall be kept safe and neat at all times. Under no condition shall accumulation of soil, branches, or other debris become a public hazard.

3.02 MAINTENANCE OF TREES, SHRUBS, AND GROUND COVERS

A. MAINTENANCE PERIOD

Maintenance shall begin immediately after each plant is planted and shall continue until landscape inspection and final acceptance of the entire project. The Contractor shall furnish all

labor, materials, and equipment required to protect and maintain plants in a healthy and flourishing condition, and to repair any damage to the site as specified during the maintenance period.

B. MAINTENANCE TASKS

1. The Contractor shall ensure that installed irrigation systems are functional and operational, or must provide deep watering of all trees and shrubs at least once a week, or as needed to maintain adequate soil moisture. Deep watering is the slow penetration of water throughout the entire root zone of each plant, a depth of approximately 24 inches. The watering schedule must respond to varying seasonal and soil conditions to maintain adequate, but not excessive moisture. If the soil does not adequately absorb water, the Contractor shall take actions that correct this condition without additional cost to the Owner. Watering shall cease at the first hard frost and shall resume when the ground thaws in the spring.
2. Pruning shall conform to American National Standard for Tree Care Operations, ANSI A300 and shall be done by a certified arborist or other person trained to meet these standards. Dead, broken, or damaged branches may be pruned at any time. Pruning for form shall begin the year after installation. No tree shall be topped. Any tree damaged by improper pruning shall be replaced by the Contractor.
3. Fertilizer shall be applied in late summer or early autumn during leaf fall. It is most effective at encouraging growth the following season when applied after growth ends but while soil is warm enough to take up and store the nutrients. A slow-release fertilizer shall be applied at a rate of three pounds of actual nitrogen per 1000 square feet per application and shall not exceed six pounds of actual nitrogen per 1000 square feet annually. A fertilizer ratio of 3:1:1 or 3:1:2 with a salt index of less than 50 shall be used. These ratios may be adjusted based on age and/or condition of the plant or soil and environmental conditions, when specified by the Owner’s Representative. Fertilizer shall be uniformly distributed throughout the planting bed or root zone (an area with a diameter equal to the height of the tree). Fertilizer shall be thoroughly watered in.
4. Mulch shall be raked and smoothed to retain its functional and aesthetic purposes and replaced as needed to maintain a depth of two to four inches at all times. An area of three to six inches in diameter around each tree trunk shall be kept clear of mulch.
5. The Contractor shall keep the planted area free of litter and weeds. Any tree or shrub damaged by a lawnmower, weed whip, or other equipment shall be replaced.
6. The Contractor shall secure the permission of the Owner before applying any herbicide, fungicide, or insecticide. The applicator shall comply with all regulations related to pesticide and herbicide application. The Contractor shall apply all materials in complete accordance with state, federal, and local regulations. Contractor shall notify Owner and tenants prior to application, and in conformance with any state requirements.
7. The Contractor shall reset plants to proper grade or upright position, and restore planting saucers, as required.

C. PROTECTION OF PLANTINGS

Planting areas and plants shall be protected at all times against trespassing and damage of any kind for the duration of the maintenance period. If any plants become damaged or injured, they shall be treated or replaced as directed by the Owner's Representative.

END OF SECTION

SECTION 33 05 00

SEPARATION OF PIPE UTILITIES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Location of piped utilities to separate water mains from sewer facilities.

1.02 RELATED WORK

A. Appropriate Piped Utility Sections

PART 2 - PRODUCTS

2.01 PARALLEL INSTALLATION

A. Separate water mains at least 10 feet horizontally, measured edge to edge, from any sewer facility whenever possible.

B. When local conditions prevent a horizontal separation of 10 feet, closer installations may be made if:
   1. The bottom of the water main is at least 18" above the top of the sewer facility; or
   2. The sewer is constructed of materials equivalent to water main standards and pressure tested to assure watertightness prior to backfilling.

2.02 CROSSINGS

A. Separate water mains crossing sewer facilities by at least 18" between the bottom of the water main and the top of the sewer facility whenever possible.

B. When local conditions prevent a vertical separation as described above, the following construction shall be used:
   1. Sewers passing over or under water mains should be constructed of materials equivalent to water main standards and pressure tested to assure watertightness prior to backfilling.
   2. Water mains passing under sewers shall, in addition, be protected by providing:
      a. A vertical separation of at least 18" between the bottom of the sewer and the top of the water main.
      b. Adequate structural support for the sewer to prevent excessive deflection of joints and settling on and breaking the water mains.
      c. That the length of water pipe be centered at the point of crossing so that the joints will be equidistant and as far as possible from the sewer.

2.03 SEWER FACILITIES

A. Do not install water mains or sewer facilities which pass through or contact each other.

END OF SECTION

SECTION 33 11 00

WATER DISTRIBUTION SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Installation, testing and disinfection of water lines and appurtenances.

1.02 RELATED WORK

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

A. Pipe

1. Manufactured in accordance with ANSI A-21.50 (AWWA C-151) and ANSI A-21.10 (AWWA C-110).
2. A cement lining meeting the requirements of ANSI 21.4 (AWWA C-104).
3. A minimum of 1 mil thick bituminous coating on the outside surface.
4. Clearly mark with manufacturer's name, D.I. or ductile, weight, class or nominal thickness, and coating period.
5. Unless otherwise specified, or shown on the plans, ductile iron pipe shall be Class 50 for 200 psi working pressure.

B. Fittings

1. Fittings 4" - 24": Pressure rated at 350 psi.
2. Fittings 30" - 36": Pressure rated at 250 psi.
3. Joints meeting the requirements of ANSI A-21.11 (AWWA C-111).

2.02 POLYVINYL CHLORIDE PIPE (PVC) AND FITTINGS

A. Provide PVC pipe meeting AWWA C-900.

B. AWWA C-900 Pipe:

1. PVC 1120 pipe manufactured from virgin, National Sanitation Foundation (NSF) approved compounds meeting the requirements of ASTM D-1784.
2. Pressure rated based on Dimension Ratios (DR) and pressure classes (pressure classes are working pressure ratings):

Dimension Ratio (DR)	Pressure Class (psi)
18	150

3. Outside diameter equivalent to the same outside diameter of cast iron pipe.

4. The minimum wall thickness of the bell, at any point, shall conform with the DR requirements of the pipe.
5. Furnish in standard laying lengths of twenty (20) feet.
6. Clearly mark with the manufacturer's name, nominal diameter, DR, PVC 1120, pressure class, AWWA C-900, and NSF approval seal.

2.03 SERVICE PIPE

A. Polyethylene Pipe:

1) Class 160, SDR 9, polyethylene classified PE 3406C suitable for a working pressure of 160 psi.
2) 100% non-toxic polyethylene resin compound of ultra- high molecular weight in accordance with ASTM D-1248.
3) 3/4 inch nominal diameter unless otherwise specified or shown on the plans.
4) Service pipe shall be used to connect the corporation stop with the meter yoke. Use the minimum length required to make a straight line connection including a gooseneck.

B. Copper Pipe

1. Seamless copper tubing meeting the requirements of ASTM B-88, Type K.
2. Contain not less than 99.90% copper and not more than 0.04% phosphorous.
3. Suitable for use with a working water pressure of 160 psi.
4. 3/4 inch nominal diameter unless specified or shown on the plans.
5. Service pipe shall be used to connect the corporation stop with the meter yoke. Use the minimum length required to make a straight line connection including a gooseneck.

2.04 WATER SERVICE ASSEMBLIES

A. Water Meters

1. AWWA C-700.2. 5/8" x 3/4" unless otherwise specified or shown on plans.
2. Frost proof with a cast bronze casing and a hinged cover.
3. Direct reading register, in gallons, unless otherwise specified.
4. Disc or piston operated with magnetic drive.
5. A suitable non-corrosive strainer located over the inlet to the measuring chamber.
6. The name of the manufacturer cast in the lid of the register box and the meter serial number imprinted thereon.

B. Water Main Connections

1. Tap water mains in the upper half of the pipe at a 45 degree angle or provide brass tapped couplings with AWWA threads.
2. Do not exceed the pipe manufacturer's recommended maximum tap size.
3. Use service clamps on all taps for PVC pipe.

C. Corporation Stops

1. AWWA C-800.
2. Cast of certified waterworks red brass, composed of 85% copper and 5% each of tin, lead and zinc.
3. Water tight and individually tested for leaks.
4. Waterway diameter approximately equal to the nominal size of the stop.
5. Coat or cap all threads for protection prior to installation.

D. Meter Yokes

1. Copper tubing with an integral brace and meter stop.
2. Minimum rise of 14".
3. Provide with outlets designed for the use of polyethylene or copper service pipe.

E. Service Clamps: Bronze with neoprene gasket and double straps.

F. Meter Boxes

1. Rectangular pre-cast concrete, cast iron or plastic.
2. Pre-cast concrete and cast iron meter boxes shall have a cast iron lid.
3. Depth of the meter box not less than 18 inches.
4. Of sufficient size to facilitate easy installation and removal of the water meter.
5. Where service assemblies include a pressure reducing valve, sufficiently sized for installation of the pressure reducing valve in the meter box.

G. Pressure Reducing Valves for Service Assemblies

1. Where the static pressure is greater than 80 psi, or as shown on the plans, service assemblies shall include a pressure reducing valve and all necessary fittings and appurtenances.
2. Cast bronze body provided with a strainer on the inlet end.
3. 3/4 inch nominal size with factory pre-set delivery pressure of 45 psi and field adjustable without the use of special tools or without removing the valve from the line.
4. Locate in the meter box on the downstream side of the meter.

2.05 VALVES AND VALVE BOXES

A. Valves shall be manufactured by Mueller Company.

B. Gate Valves

1. AWWA C-500.
2. Of iron body, bronze mounted, double disc, parallel seat, non-rising stem.
3. Stuffing boxes: O-ring seal type with two (2) rings in the stem located above the thrust collar.
4. 2" square wrench nut for operation of the valve.

5. Minimum design working water pressure of 200 psi for valves with diameters 2"-12" and 150 psi for valves with diameters of 14"-54", unless otherwise specified or shown on the plans.
6. Joints: ANSI A-21.11 (AWWA C-111).
7. Bonnet or body markings: Manufacturer's name, year of casting, size, pressure rating, and OPEN with direction.
8. Open by counter-clockwise operation, unless otherwise specified.

C. Butterfly Valves

1. AWWA C-504.
2. Cast iron body, rubber seated tight-closing type.
3. Cast markings: valves size, manufacturer's name, class, direction of opening, and the year of casting.
4. Class 150, suitable for working water pressure of 150 psi unless otherwise specified or shown on the plans.
5. Open by counter-clockwise operation, unless otherwise specified.

D. Main Line Pressure Reducing Valves:

1. Cast iron globe body, full bronze mounted, external pilot operated, single resilient seated type.
2. Packed with leather (or other soft material) to insure tight closure and to prevent metal friction and seating.
3. Open when the downstream pressure is less than the valve setting and close tightly when the downstream pressure exceeds the valve setting.
4. Valve opening: proportional to the delivery requirements and not influenced by changes in inlet pressure.
5. Pilot valve: arranged to allow for its removal from the main valve while under pressure and easily accessible without removal of springs, weights, or the use of special tools.
6. Suitable to operation at 200 psi working water pressure and adjustable.

E. Valve Boxes

1. Cast iron, 2 or 3 piece, screw type with shaft diameter of not less than 5".
2. Heavy roadway type equipped with a cover containing the word "WATER" in raised letters on the top.
3. Base of such size as to permit its installation without allowing it to come in contact with either the valve or the pipe.

2.06 FIRE HYDRANTS AND BLOW-OFF HYDRANTS

A. Fire hydrants shall be manufactured by Mueller Company.

B. Fire Hydrants

1. AWWA C-502.

2. Cast iron bodies, fully bronze mounted, designed for operation at a working water pressure of 150 psi.
3. Furnish with two 2-1/2" threaded brass hose nozzles and one threaded brass pumper nozzle.
4. Compression type main valve 5-1/4" or 4-1/2" in diameter faced with a suitable yielding material such as leather, rubber, or balata.
5. So designed that, when it is installed, no excavation is required to remove the main valve or the moveable parts of the drain valve.
6. Inside diameter of barrel: at least 120 percent of the hydrant valve size.
7. Inlet connection: minimum of 6" mechanical joint on all lines, unless otherwise specified or shown on the plans.
8. Equipped with safety flange located not more than 2" above ground and a two piece shaft breakaway assembly.
9. Open on counter-clockwise operation, unless otherwise specified.
10. Shop paint and mark in accordance with AWWA C-502.
11. Cast markings: manufacturer's name, size of the main valve, year of manufacture, and direction opening.
12. Field touch-up, if the surface has been marred, with paint supplied by the manufacturer of the same color and type as that used during shop painting.

C. Blow-off Hydrants

1. Post type having cast iron bodies, fully bronze mounted and designed for operation at a working water pressure of 150 psi.
2. Furnish with either two 1-1/2" or one 2-1/2" threaded brass hose nozzle.
3. Compression type main valve 2-1/8" minimum diameter faced with a suitable yielding material such as rubber, leather, or balata.
4. So designed that, when it is installed, no excavation is required to remove the main valve or the moveable parts of the drain valve.
5. Inside diameter of barrel at least 3".
6. Inlet connection: 2" mechanical joint, unless otherwise specified or shown on the plans.
7. Equipped with a safety flange located not more than 2" above the ground.
8. Open on counter-clockwise operation, unless otherwise specified.
9. Cast markings: manufacturer's name, size of the main valve, year of manufacture, and direction of opening.
10. Field touch-up, if the surface has been marred, with paint supplied by the manufacture of the same color and type as that used during shop painting.

PART 3 - EXECUTION

3.01 PREPARATION

A. Before placing pipe in the trench, field inspect for cracks or other defects, remove defective pipe from the construction site.

B. Swab the interior of the pipe to remove all undesirable material.

C. Prepare the bell end and remove undesirable material from the gasket and gasket recess.

D. Excavate trenches to the indicated lines and locations to provide uniform and continuous bearing and support of each pipe barrel on firm undisturbed earth at every point between bell holes, with an ample bell hole at each joint to facilitate proper jointing and to prevent bells from bearing on the trench bottom. Trench depths shall be as required to provide the specified MINIMUM cover over the tops of pipes; as required to permit pipes to pass under

culverts, railroads, highways, existing pipelines, and other obstructions; and as required to accommodate valves and boxes. Trench widths shall be as required for the proper laying and jointing of pipes and the proper placing and compacting of backfill, but in no case shall a trench be more than 24" wider than the inside diameter of the pipe to be laid therein. Machine or hand-cut trenches, except that in all cases prepare the final subgrade accurately with hand tools, and in special cases where required, cut the trenches entirely by hand. Where excavation is carried below proper subgrade, before laying pipe bring the trench bottom up to proper subgrade by backfilling with approved material placed in 6" maximum thickness loose layers, and thoroughly compact each layer as required to provide uniform and continuous bearing and support for the pipe barrel at every point between bell holes.

E. Bedding for pipe shall be one of the following:

1. Special Bedding - Special Bedding shall be used where trench conditions are unsuitable for pipe support as determined by the engineer.
2. Ordinary Bedding - Ordinary bedding shall be used for all pipelines, unless otherwise noted as directed.

F. Minimum cover over tops of pipes shall be as follows:

1. All pipes, except as otherwise specified below: 36" MINIMUM cover, as measured from top of pipe.
2. Hydrant leads, where they cross side ditches ONLY: 18" MINIMUM cover.
3. Hydrant leads, all other locations: 36" MINIMUM cover.
4. Customers' service lines: 36" MINIMUM cover.
5. Special Conditions: MINIMUM cover as indicated on the drawings.
6. Under the streets or roads unless concrete encased: 48" MINIMUM cover.

G. IN ALL CASES, THE SPECIFIED MINIMUM COVER OVER PIPES SHALL BE BASED UPON FINAL FINISHED SURFACES, INCLUDING PAVING, IF ANY. Where grading is involved, do not cut trenches under roads, streets, or other areas until the final finish grading has been done, unless otherwise authorized.

H. Shore and brace trenches and excavations as required, to protect personnel, adjacent structures, and adjacent property. Where required by the conditions encountered, brace trenches, and excavations with suitable close sheeting or sheet piling. Do all necessary cribbing up required for the proper operation of trenching machines.

I. Provide and maintain in proper working order all necessary dewatering equipment required to remove water from the excavations. Where quicksand or other water bearing strata are encountered, install and connect the necessary number of well points with pumping equipment of sufficient capacity to prevent rise of water in the excavation until the work has been installed properly and will be unaffected by submersion.

J. Do not install any work until excavations are free of water, mud, and loose earth. Do not install any work on frozen ground.

K. Install pipe crossing concrete driveways, sidewalks, asphalt driveways and other special conditions by tunneling or boring, or as authorized. Install pipes crossing dirt or gravel drives by open cut, unless otherwise authorized.

L. Where the trench bottom at required subgrade is found to be unstable or to include ashes, cinders, any type of refuse, vegetable or other organic material, or large pieces or fragments of inorganic material which in the Engineer's opinion should be removed, excavate and remove such unsuitable material. Before laying pipe, bring the trench bottom up to proper

subgrade by backfilling with approved material placed in 6" maximum thickness loose layers, and thoroughly compact each layer as required to provide uniform and continuous bearing and support for the pipe barrel at every point between bell holes.

3.02 INSTALLING WATERLINES

A. Lay all pipe in a straight line on a uniform grade.

B. After applying gasket lubricant, take extreme care to keep the spigot end from contacting the ground.

C. Hone the pipe with suitable tools and equipment.

D. Closely follow the manufacturer's instruction in laying and joining pipe.

E. Cut pipe for inserting valves, fittings, etc. in a neat and workmanlike manner without damaging the pipe so as to leave a smooth end at right angles to the axis of the pipe.

F. Locate waterlines in relation to other pipe utilities in accordance with Section 02605.

3.03 ANCHORAGE

A. Provide anchorage for each bend, tee, plug, deadend, and other fitting subject to blowing off of the line under pressure.

B. Unless otherwise indicated, anchorage shall consist of a 2,500 psi concrete blocking poured between firm undisturbed earth and the unbalanced sides of the items to be anchored, with sufficient earth bearing area to prevent displacement of joints under pressure. Pour concrete blocking before applying pressure test on piping and arrange it so that the pipe and fitting joints will be accessible for repair.

C. Set-Screw Type Retainer Glands: These shall be U.S., CLOW, ACIPCO, or as approved ductile iron set-screw type mechanical joint retainer glands, installed in accordance with manufacturer's directions, with set screws tightened uniformly about 80 foot pounds torque. This type of anchorage MAY be used at to any location instead of concrete anchorage subject to approval, and shall be used at the following locations:

1. Where indicated on the drawings.
2. Where concrete anchorage is not practical.

D. Anchoring Type Tees for Fire Hydrant Connections. These shall be as specified hereinbefore under DUCTILE IRON PIPE, FITTINGS, AND JOINTS. Anchor fire hydrant cut-off valves directly to the locked-on gland rings of the tee outlets.

3.04 INSTALLATION OF VALVES AND BOXES

A. Install valves with their operating stems plumb, at approximate locations indicated, but at exact locations as approved and as specified. Leave all valves in normal operating positions, free from leakage.

1. Fire Hydrant Cut-off Valves: Install these directly on the spigot outlets of the ANCHORING TYPE tees in the mains.
2. All Other Valves: Insofar as practicable, install these one pipe length from centers of tees and crosses at intersections, and at locations in runs where easy to find in the future.

3. Provide all valves three (3) to fourteen (14) inches inclusive, nominal size, and all by pass valves with screw tops adjustable metal boxes, approximately five (5) inches in diameter constructed so that removable cover will not be thrown out by travel over same. Provide boxes with approved hoods at base of lower section to relieve any strain superimposed on valve bonnett.

B. Set and support each valve box, after the prime coat is installed on the street, so that no stress or shock can be transmitted to the valve, with the box centered and plumb over the valve wrench nuts, and the box top exposed and flush with finished grade. Re-adjust boxes as required so that all boxes conform to these requirements at the time of acceptance of the system. Leave all values in normal operating position, free of leakage.

C. For each valve installed for future use, install one full length of pipe in outlet of valve, plug outer end of pipe with a standard cast iron plug, and anchor plug as specified hereinbefore.

3.05 SETTING OF HYDRANTS

A. Install hydrants at approximate locations indicated, but at exact locations as approved. Unless otherwise indicated or approved, locate hydrants at the intersections of private property lines, and between curbs and sidewalks. All hydrant leads shall be 6" pipe.

B. Set each hydrant on a 4" thick 18" square minimum size precast concrete slab, in true plumb position, with lowest nozzle not less than 12" above finished grade. Securely block or anchor hydrant to prevent if from blowing off of lead, and place at least 1/4 cubic yard of broken stone or coarse gravel around the base to at least 12" above and 12" below the drain hole for proper drainage.

C. After setting, and after testing and final cleanup of the work, finish paint each hydrant above ground line with one coat of highest quality outside paint, color as selected by the city.

3.06 BACKFILLING

A. Backfill the trenches as specified below. Testing for leaks on the surface of the pipe prior to backfilling will not be required, but other test procedures, as specified under TESTING AND STERILIZING, shall be following after backfilling trenches.

B. All Locations: After the pipework has been properly installed, thoroughly hand tamp all backfill into bell holes, around and over the pipework until a 12" cover has been tamped over the tops of the pipes.

C. Pipe Under Existing Paved Areas:

1. Immediately after laying the pipe, backfill the trench with approved sand to within 8" or 10" of the finished surface. Sand to be compacted to 98% STD. PROCTOR (ASTM).
2. Immediately place 10" of approved cement treated base to within 2" of the finished surface (See Road Repair Detail).
3. If paving can not be accomplished on the same working day, place 2" of cold tar asphalt on cement treated base and level with the existing paved surface.
4. As soon as practicable, but within five (5) working days after completion of backfill in trench, cold tar asphalt will be removed and replaced with Asphaltic Concrete (Hot Mix) compacted to 90% of maximum laboratory density. If in the process of removing the cold tar asphalt, the base is disturbed, the disturbed area will be scarified and compacted to 98% MOD. PROCTOR (ASTM). (NOTE) WATER JETTING IS NOT PERMITTED.

D. Pipe Under Proposed Areas to be Paved:

1. Immediately after laying pipe, HAND TAMP approved fill material to an elevation of 12" above top of pipe, making certain that fill material is compacted around haunches of pipe. Area 12" above pipe to be compacted to 98% Std. Proctor (ASTM).
2. At which time part (1) is completed, the contractor has the following options regarding backfill on the remaining trench:
   a. If the area is to receive gravel base immediately after backfill operations are complete, backfill is to be placed in 6" lifts and compacted to 98% Std. Proctor (ASTM) for the remainder of the backfill operation.
   b. If the area is not to receive gravel base immediately and trenches have ample time to settle and dry prior to placing gravel base, water jetting may be utilized after part (1) has been completed and proper approval granted. (NOTE) Gravel base WILL NOT be placed over trenches that have not properly settled, have excessive moisture or have moderate to excessive pumping.

E. Paragraph, B, C, and D, above apply principally to backfill for open trenches. For all pipes in tunneled holes, and for all mains in bored holes without casings, backfill only with sand, and thoroughly tamp or otherwise place all backfill in an approved manner to prevent caving and settling.

F. For all pipes crossing streets, roads, gravel driveways, and dirt driveways which are in regular use, backfill the trenches as specified in Paragraph C, and maintain these crossings usable by vehicular traffic until final acceptance of the water piping work. Do not under any circumstances leave a street or road crossing or a private driveway unusable overnight.

G. Up to 12" above the tops of the pipes, backfill only with selected earth which is free of rocks, stones, bricks, cinders, broken concrete, rubbish, vegetable materials, and other approved materials.

H. From 12" above tops of pipe up to finished grade of paving subgrade as the case may be, backfill with any materials removed from the excavation and suitable for backfill, except do not use as backfill material broken concrete, rocks, and stones larger than 6" in their greatest dimensions. Dispose of all excavated materials not replaced as backfill, approved.

I. Refill and smooth off as required all backfill which settles, so that all backfill finally conforms to the original ground surfaces, not only at the time of project acceptance, but also for the duration of the guarantee period. This includes removing and repairing all pavement which may be damaged by settlement.

3.07 CONNECTIONS TO EXISTING WATER SYSTEM

A. Unless otherwise indicated or authorized, make connections to existing water mains by removing plug from existing plugged fitting, or inserting a tee and proper sleeve in existing main, as applicable, at each point of connection between new and existing mains. This type of connection is classified as a "Non-Pressure Connection".

B. BEFORE SHUTTING OFF EXISTING WATER MAINS TO MAKE CONNECTIONS, OBTAIN APPROVAL OF THE CITY WATER AND FIRE DEPARTMENTS, AND ADVISE ALL AFFECTED WATER CUSTOMERS ACCORDINGLY. AFTER SHUTTING OFF, DO ALL NECESSARY WORK AND RESTORE WATER SERVICE AS QUICKLY AS POSSIBLE.

C. In the event a Pressure Connection is required by the Contractor, and WITH MLG&W

APPROVAL, make connections to existing water mains by installing a mechanical joint split tapping valve, and cutting proper hole in existing main with special tapping machine, without shutting off the water in the existing main. Tapping valves and their boxes shall conform in all respects to the requirements of VALVES AND BOXES, except that one end of the valve shall be flanged to match tapping sleeve flange, and the other end of the valve shall be a mechanical joint end. This type of connection is classified as a "Pressure Connection".

3.08 WATER LINE PRESSURE TESTS

A. After the pipe has been laid, subject all newly laid pipe or any valved section thereof to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing.

B. Test pressures shall:

1. Not be less than 1.25 times the working pressure at the highest point along the test section.
2. Not exceed the pipe or thrust restraint design pressures.
3. Be of at least 2-hour duration.
4. Not vary by more than ±5 psi.
5. Not exceed twice the rated pressure of closed valved or hydrants included in the test section.
6. Not exceed the rated pressure of resilient-seated butterfly valves.
7. Be at least 15 psi.

C. Pressurization

1. Slowly fill each valved section of pipe with water.
2. Apply the specified test pressure, based on the elevation of the lowest point of the line or section under test and correct to the elevation of the test gauge by means of a pump connected to the pipe in a manner satisfactory to the Project Engineer.

D. Air Removal

1. Before applying the specified test pressure, expel air completely from the pipe, valves, and hydrants.
2. If permanent air vents are not located at all high points, install corporation cocks at such points to expel air as the line is filled with water.
3. After all the air has been expelled, close the corporation cocks and apply the test pressure.
4. At the conclusion of the pressure test, remove the corporation cocks and plug or leave in place at the discretion of the Project Engineer.

E. Examination

1. Carefully examine all exposed pipe, fittings, valves, hydrants, and joints.
2. Repair or replace any damaged or defective pipe, fittings, valve, or hydrants, that are discovered with sound material and repeat the test until it is satisfactory to the Project Engineer.

3.09 WATER LINE LEAKAGE TESTS

A. Concurrently conduct a leakage test with the pressure test.

B. Leakage Drained: the quantity of water that must be supplied into the newly laid pipe to maintain the specified test pressure after the air in the pipeline has been filled with water.

C. Allowable Leakage:

1. Determine allowable leakage by:
   $L = \frac{ND/P}{7400}$
   Where L is the allowable leakage, in gallons per hour; N is the number of joints in the tested pipeline; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test in psig.
2. Allowable leakage at various pressures;
   Allowable Leakage Per 1,000 ft. of Pipeline*
3. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.078 gal/hr./in. of nominal valve size shall be allowed.
4. When hydrants are in the test section, test against the closed hydrant.

3.10 ACCEPTANCE OF INSTALLATION

A. If any test of pipe laid discloses leakage greater than that specified above, located and repair the defective material until the leakage is within the specified allowance.

B. Repair all visible leaks regardless of the amount of leakage.

3.11 CLEANING AND DISINFECTION OF WATER LINES

A. Flush waterlines clean prior to disinfection.
B. Thoroughly disinfect water lines prior to placing in service.

1. Use chlorine disinfecting agent applied to produce a 50 ppm dosage.
2. Allow water to escape from the ends of all lines to cause dispersion of the chlorine solution into all parts of the system.
3. Operate all valves and hydrants during the time disinfection is occurring.
4. Retain the chlorine solution in the lines for a period of 24 hours.
5. At the end of the 24 hour period, the residual chlorine must be a minimum of 25 ppm. Otherwise, repeat the disinfection procedure again.
6. Upon refilling the lines, collect a sample for bacteriological analysis. If the sample is acceptable, the lines may be connected to the system. Otherwise, repeat the disinfection procedure until acceptable samples are obtained.

3.12 CUTTING AND REPLACING PAVEMENT AND OTHER SPECIAL SURFACES

A. Restore all surfaces disturbed by the installation of the pipe lines to the conditions specified herein before.

B. As specified under TRENCHING, EXCAVATING, SHORING, BRACING, AND DEWATERING, the maximum pipe trench width shall be 24" greater than the inside diameter of the pipe laid therein. Replace existing surfaces which are cut, removed, or otherwise damaged by the water line work with new surfaces as described below. All new surfaces shall conform accurately to the elevations and contours of the existing adjacent undisturbed surfaces.

C. Where pipe is installed on the shoulders parallel to asphalt, concrete, or other surfaces, maintain ditches until they are firm and present no traffic hazard. Where authorized, place 6" thick compacted layers of new approved locally available road gravel.

D. Do not cut streets and other surfaces except where necessary for the water main installation. At Contractor's expense, repair all damage outside of the limits specified above. Maintain all crossing until project completion.

END OF SECTION

SECTION 33 30 00

SEWERAGE SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Installation of sanitary sewerage system.

1.02 RELATED WORK

A. Section 31 23 00: Trenching, Backfilling and Compaction

B. Section 33 05 00: Separation of Piped Utilities

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

A. Pipe:

1. Manufactured in accordance with ANSI A-21.50 (AWWA C- 151) and ANSI A-21.10 (AWWA C-110).
2. A cement lining meeting the requirements of ANSI 21.4 (AWWA C-104).
3. A minimum of 1 mil thick bituminous coating on the outside surface.
4. Clearly mark with manufacturer's name, D.I. or Ductile, weight, class or nominal thickness, and casting period.
5. Unless otherwise specified or shown on the plans, ductile iron pipe shall be Class 350 for 200 psi working pressure.
6. Ductile iron pipe shall be used in all diameters.

B. Fittings:

1. Fittings 4"-24": Pressure rated at 350 psi.
2. Fittings 30"-36": Pressure rated at 250 psi.
3. Joints meeting the requirements of ANSI A-21.11 (AWWA C-111).

2.02 POLYVINYL CHLORIDE PIPE AND FITTINGS

A. Manufactured from virgin, National Sanitation Foundation (NSF) approved resin conforming to ASTM D-1784.

B. Unless otherwise specified, all PVC pipe and fittings shall conform to ASTM D-3034 and have a Standard Dimension Ratio (SDR) of 26.

C. The gaskets used for joining PVC sewer pipe shall conform to ASTM F-477.

D. All PVC gravity sewer pipe shall be clearly marked with the manufacturer's name, nominal diameter, SDR, ASTM D- 3034, and NSF approval seal.

E. PVC pipe shall be used only up to 18" unless otherwise shown on the plans or directed by the Engineer.

2.03 CONCRETE MATERIALS

A. Class A in all cases with a minimum strength of 4,000 psi.

2.04 CASTINGS FOR FRAME AND COVERS

A. Gray iron, Class 30 unless otherwise specified, meeting AASHTO M-108.

B. Cleaned and coated with bituminous paint that will produce an acceptable finish that is not affected by exposure to hot or cold weather.

C. Rings and covers for use on watertight manholes shall be machined to smooth uniform bearing that will provide a watertight seal.

2.05 PRE-CAST MANHOLES

A. AASHTO M-199 SR or ASTM C-478.

B. Manholes shall be coated with a bitumastic waterproofing sealant.

C. Use pre-molded rubber or approved bitumastic gaskets at all joints between sections in sanitary sewer manholes.

2.06 MANHOLE STEPS

A. Plastic manhole steps on 16" centers.

2.07 MANHOLE BASES

A. Manhole bases shall be poured in place using Class A, 4000 psi concrete only if the pre-cast bases do not comply with section 02722, sub-section 3.06, Item E, Nos. 1-4, and then only when pre-approved by the Engineer.

B. Base section heights shall be determined by the supplier.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prior to laying pipe, prepare a suitable bedding according to Section 02221.

B. Before placing pipe in the trench, field inspect for cracks or other defects; remove defective pipe from the construction site.

C. Swab the interior of the pipe to remove all undesirable material.

D. Prepare the bell end and remove undesirable material from the gasket and gasket recess.

3.02 INSTALLING GRAVITY SANITARY SEWERS

A. Lay pipe true to the lines and grades from the grade and alignment stakes, or equally usable references.

1. Where laser equipment is used, provide offset hubs at every break in the line of sight and at every major break in grade.
2. Where batter boards are used, furnish stakes at intervals of 50 feet along the route of the pipeline.
3. Set stakes at such distance from centerline of excavation as is suitable for the excavating method and machinery used.
4. Provide and use accurately set batter boards at each 50 foot interval in establishing the bottom invert of each pipe laid.

B. Accurately establish the centerline of each pipe using a string stretched between targets and a plumb line extended to the centerline of the pipe.

C. Carefully inspect all pipe and each fitting prior to its placement in the trench, and reject and remove any defective pipe or fitting from the job site.

D. Lay pipe progressively up grade, with bell upstream, in such manner as to form close, concentric joints with smooth bottom inverts. Joining of all pipe shall be in accordance with manufacturer's specifications.

E. Bed each pipe section in accordance with Section 02221.

F. Unless otherwise specified, provide all gravity sewer lines with a minimum of 4 feet of cover in roadways and 2- 1/2 feet of cover in open areas, unless ductile iron pipe or concrete encasement is used.

G. Do not allow walking on completed pipelines until backfill has been placed to a depth of at least 6 inches above the crown of the pipe.

H. Keep the interior of the pipe free of all unneeded material, and upon completion of a section between any two manholes it shall be possible to view a complete circle of light when looking through the pipe.

I. When laying pipe ceases, close the open ends of the pipe with a suitable plug for preventing the entrance of foreign materials.

J. Couplings and adapters used for joining dissimilar gravity pipe materials, for repairing and rejoining sections of gravity sewer, and for connecting the first full joint of pipe to a short stub through a manhole wall shall meet the requirements of ASTM C-425.

K. All couplings and adapters for gravity sewer pipe shall be of rubber, plastic and metallic materials that will not be attacked by municipal wastewaters or aggressive elements in the soil and conform to ASTM C-425, Section 5.

3.03 INITIAL PROOF TESTING OF SANITARY SEWERS

A. It is the intent to specify a "test as you go" procedure in order to establish confidence in the installation and avoid the unnecessary delay of final acceptance.

B. Before a reach of pipeline is approved for payment, successfully proof test that reach for grade, alignment, cleanliness, and leakage.

C. In the event that four or more reaches fail to satisfactorily pass proof testing procedures, cease pipe laying until deficiencies are identified and corrected.

D. The basis for grade, alignment and cleanliness testing will be a visual inspection. Leakage testing will be by means of low pressure air or exfiltration or infiltration as deemed by the Project Engineer.

E. Proof test flexible pipeline installation for deflection by pulling a "go-no go" test mandrel through the line after the initial backfill is complete to avoid unnecessary dig-ups.

3.04 FINAL TESTING

A. Before the job is accepted and before any existing services are connected, a final testing procedure is to be followed.

B. Perform a visual inspection when groundwater levels are above the pipeline if possible. All visible leaks shall be repaired. It shall be the Contractor's responsibility to show proof that the groundwater is above the pipe without additional compensation.

C. If there is evidence of infiltration, make measurement with suitable pipe weirs:

1. If the flow through the lower most manhole of a continuous section of sewer does not exceed 25 gallons/day/inch/mile of pipeline and the groundwater level is representative of the highest annual level, the entire continuous section shall be approved for leakage.
2. The leakage test will be conducted with all lines connected (including service lines).
3. If the apparent infiltration rate exceeds 25 gallons/day/inch/mile, then take additional weir measurements to isolate those sections leaking.
4. Any single reach of pipeline which exhibits an apparent infiltration rate in excess of 200 gallons/day/inch/mile will not be accepted and all leaks will be located and corrected.

D. If it is not practical to wait for groundwater levels that are representative of the highest annual level, the Contractor may request approval on the basis of a low pressure air exfiltration (or other approved exfiltration) test.

1. Such tests, if approved by the Project Engineer, will be conducted in accordance with ASTM C-828 or latest revision.

2. When an exfiltration test is used as a substitute for infiltration testing, correct all conditions that are potential sources of infiltration.

E. If flexible pipe is used, pull an approved go-no go deflection mandrel of 95/100 pipe diameter through all reaches of gravity sewer main. This test shall be conducted no sooner than 30 days after completion of backfilling of the tested reach. No sections will be accepted that exhibit a deflection of more than 5%.

3.05 LOW PRESSURE AIR EXFILTRATION TEST

A. Calculate the pressure drop as the number of minutes for the air pressure to drop from a stabilized pressure of 3- 1/2 to 2-1/2 PSIG.

B. Times for mixed pipe sizes of varying lengths should be calculated as described in ASTM, C828-76T using formula t = k d/q (q = .0020).

C. Lengths of section under test shall not exceed 500 linear feet.

D. The following times are for one pipe size only:

MINIMUM TEST TIME FOR VARIOUS PIPE SIZES
(BASED UPON ASTM C828-80)

Nominal Pipe Size, In.	T (Time) Sec/100	Nominal Pipe Size, In.	T (Time) Sec/100 ft.
3	128	21	892
4	170	24	1020
6	255	27	1147
8	340	30	1275
10	425	33	1402
12	510	36	1530
15	637	42	1785
18	765	48	2040

3.06 SEWER MANHOLES - GENERAL

A. Unless otherwise specified, all manhole risers shall have an inside diameter of not less than 4 feet and a vertical wall height of not less than 2.5 feet. All base sections shall have a diameter as shown on the plans.

B. The clear opening in the manhole shall be not less than 2.0 feet.

C. Manhole types shall be as designated on the construction plans.

D. Depth of the manhole shall be the vertical distance from the lowest invert in the manhole to the base of the ring.

E. A flexible pipe-to-manhole connector shall be employed in the connection of the sanitary sewer pipe to the precast manhole base section.

1. The connector shall be the sole element relied upon to assure a flexible watertight seal of the pipe to the manhole. No adhesives or lubricants shall be employed in the installation of the connector into the manhole. The rubber for the connector shall comply with ASTM C433 and ASTM C923 and consist of EPDM and elastomers designed to be resistant to ozone, weather elements, chemicals, including acids, alkalies, animal and vegetable fats, oils and petroleum products from spills.
2. All stainless steel elements of the connector shall be totally non-magnetic Series 304 Stainless, excluding the worm screw for tightening the steel band around the pipe which shall be Series 305 Stainless. The worm screw shall be torqued by a break-away torque wrench available from the precast manhole supplier, and set for 60-70 inch-pounds.
3. The connector shall be installed in the manhole wall by activating the expanding mechanism in strict accordance with the recommendation of the connector manufacturer.
4. The connector shall be of a size specifically designed for the pipe material and size being utilized on the project.

F. Apply two applications of a bituminous waterproofing sealant to the outside of each manhole section prior to backfilling.

G. Backfill manholes with the same material used for pipeline.

H. The base of the manhole shall be precast, 8 inch thick, with room for a minimum 4 inch invert to be poured and shaped. The invert shall not be less than 0.7 x diameter of pipe in depth.

I. Manholes shall be bedded with a minimum of 1 foot of crushed limestone.

3.07 VACUUM TESTING OF MANHOLES

A. All manholes, either cast-in-place or pre-cast, shall be vacuum tested as follows:

1. All lift holes shall be plugged with an approved non-shrink grout.
2. All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole.
3. The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturer's recommendations.
4. A vacuum of ten (10) inches of mercury shall be drawn and the vacuum pump shut-off. With the valves closed, the time shall be measured for the vacuum to drop to nine (9) inches. The manhole shall pass if the time is greater than sixty (60) seconds for 48" diameter, seventy-five (75) seconds for 60" diameter, and ninety (90) seconds for 72" diameter manholes.
5. If the manhole fails the initial test, necessary repairs shall be made while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained.

3.08 STANDARD PRE-CAST CONCRETE MANHOLES

A. Pre-cast manhole bases and sections shall comply with AASHTO M-199 SR or ASTM C-478.

B. The base of the manhole shall be precast, 8 inch thick, with room for a minimum 4 inch invert to be poured and shaped. The invert shall not be less than 0.7 x diameter of pipe in depth.

C. Shape manhole inverts from Class A concrete to be smooth, accurately shaped, and in accordance with the plans.

D. Inlets and outlets from each manhole shall be finished smooth and flush with the sides of manholes walls so as not to obstruct the flow of liquid through the manhole.

E. Provide a subbase with a minimum of 12" of crushed limestone, well compacted with mechanical tamping equipment.

3.09 MANHOLE STEPS

A. Manholes shall have plastic steps at intervals of 16 inches along the wall of the manhole.

B. The treads of the steps shall be free from mortar or other material when the manhole is completed.

C. In pre-cast manholes, the holes left to receive the steps shall be mortared smooth following placement of the steps.

3.10 MANHOLE RINGS AND COVERS

A. Grout manhole rings and covers in place with cement mortars.

B. The bearing surfaces between cast rings and covers shall be machined, fitted together, and match marked to prevent rocking.

C. All castings shall be of the types, dimensions, and weights as shown on the plans and shall be free of faults, cracks, blow-holes, or other defects.

3.11 TIE-INS

A. Existing lines shall remain in place and in working order until the exact planned time of tine-ins is required.

B. Should existing lines become damaged during construction at any time prior to time of tie-in, the Contractor shall assume full responsibility for repairing and returning to normal operation.

C. Tie-ins shall be made in full coordination with the Project Engineer upon completion of and testing of all new sewer lines.

3.12 SEWER SERVICE ASSEMBLIES

A. Where shown on the plans or located in the field, install fittings for individual service assemblies.
   1. The standard collector tap shall consist of a tee connected with a 6 inch diameter branch.
   2. Use vertical risers when the depth of the collector line is greater than 8 feet or when their use will facilitate connection of individual services.
   3. Plug the ends of tee branches not to be used immediately with stoppers of the same material and joints used on the collector lines.

B. Where shown on the plans or located in the field, install collector saddles by attaching to the sewer main by stainless steel bands secured by 2 bronze or stainless steel bolts, with a minimum diameter of 3/8".

C. Service pipe shall be a minimum 6" diameter and shall be installed as shown on the plans.

   1. Plug the ends of service pipe and cover the same as for collectors and interceptors (where possible.)
   2. The minimum grade on service pipes shall be 1% or 1/8" per foot.

END OF SECTION

SECTION 33 40 00

SITE DRAINAGE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included

The work in this section consists of furnishing all materials, accessories, equipment, tools, transportation, service and performance of all operations required to execute the construction of the complete system of site drainage as shown, and including all excavation, backfill structures and catch basins, grading, pipe and connections and all other items shown are required.

B. Related Work Described Elsewhere

1. Excavating Filling and Grading - Section 31 40 00.
2. Trenching, Backfilling, and Compaction - Section 31 23 00.

PART 2 - PRODUCTS

2.01 PIPE

A. All storm drainage pipe shall be reinforced concrete pipe, unless noted as otherwise on plans, and conforming to the following:

1. Reinforced Concrete Pipe: shall conform to ASTM C76 for the specified diameters and strength classes. Horizontal and vertical elliptical pipe shall conform to ASTM C507. Arch pipe shall conform to ASTM C506.
2. Precast reinforced concrete end sections shall conform to the cited specifications to the extent to which they apply.

B. Joints for concrete pipe shall be rubber gasket joints.

C. Rubber Gasket Joints - Rubber gaskets shall conform to ASTM Specifications C443, and shall be continuous rubber rings fitting snugly into the annular space between the parallel surfaces of the tongue and groove ends of the pipe to form a flexible and watertight seal under all conditions of service. Make rubber gasket joints as recommended by the gasket manufacturer and generally as follows: Prior to installing the pipe and when recommended by the gasket manufacturer, the gasket shall be cemented to the tongue end of the pipe with a special rubber cement furnished by the manufacturer of the gasket. When placing gasket, the pipe tongue surface shall be dry and clean. Affix gasket to the pipe not more than 24 hours prior to installation. Before installing pipe, the entire interior of the groove shall be cleaned and lubricated, as well as the gasket over which the groove is fitted. All pipe shall be aligned with the previously installed pipe and the joint pulled together tightly. If the gasket becomes loose or displaced, the pipe section shall be removed and the joint remade satisfactorily. All joints shall be inspected both inside and outside for gasket faulting or displacement.

D. The sizes of pipe shall be identified by the nominal inside diameter. The pipe shall be of the sizes stipulated in the contract, shown on the plans, or established by the Project Engineer.

2.02 INLETS

All inlets shall be constructed as indicated on drawings.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavated trenches to the required lines and grades as indicated on drawings. Excavated materials not required or acceptable for backfilling shall be disposed of as directed by the Project Engineer. All excavation which is carried below the required depth shall be backfilled at the Contractor's expense with selected material compacted to the density of the surrounding earth.

B. The minimum width of the trench at the top of the pipe shall be a width which will permit the proper construction of joints and compaction of backfill around the pipe, but shall be at least equal to the outside pipe diameter plus 12 inches. The trench shall be excavated accurately to the established line to provide at least a 6-inch space between the side of the trench and the side of the pipe. The trench sides shall be vertical, unless otherwise approved by the Engineer. The maximum allowable trench width shall not exceed the outside pipe diameter plus 24 inches unless otherwise approved by the Engineer.

C. Make shallow excavations under each joint as required for proper jointing. Otherwise, the bed for the storm drain pipe shall be shaped to keep the lower quarter of the pipe in continuous contact with the trench bottom.

D. Provide trench bracing, sheathing, or shorting necessary to perform and protect the excavation for the safety of personnel and adjacent structures, and to conform to governing laws. Unless otherwise directed all bracing, sheathing, or shoring shall be removed after the completion of backfill to at least 6 inches over the top of the pipes for storm drains.

E. Provide all pumping and other dewatering equipment required for the removal of water from the excavations. Do not install any pipe until the trenches are free of water and mud. Do not lay pipe on frozen ground.

3.02 PIPE LAYING

A. Provide the necessary mason's lines and supports to insure the installation of the pipe to proper line and grade, as indicated on the drawings. Provide approved facilities for lowering pipe into the trench without causing damage to pipe or trench.

B. Begin laying pipe in finished trench at the lowest point proceeding upgrade. Set pipe firmly and accurately to grade so that the invert will be smooth and uniform.

C. All pipe which is not true in alignment, or which shows any settlement after laying shall be taken up and replace without extra compensation.

3.03 PIPE FOUNDATIONS

A. Bedding

All drainage pipe bedding shall be constructed by bedding the drainage pipe on a natural earth subgrade or uniform blanket of loose material shaped by a template to fit the lower part of the pipe exterior for at least 10 percent of its overall height. After pipe installation select earth material shall then be rammed and tamped in layers not over 6 inches in loose thickness around the pipe to the springline. When bell and spigot pipe is to be placed, recesses shall be dug in the subgrade of sufficient width and depth to accommodate the bell with out its resting on the bottom of the recess. The width of the recess shall not exceed the width of the bell by more than 2 inches.

3.04 BACKFILL - STORM SEWERS

A. All trenches and excavations shall be backfilled in a reasonable time after the pipes are properly installed. The backfill material shall be selected material from excavation; and that which is placed within a nominal pipe diameter distance at the sides of the pipe and 1 foot over the top shall be material which can be readily compacted. It shall not contain stone which will be retained on a 3-inch ring, frozen lumps, chunks of highly plastic clay or any other material which is objectionable in the opinion of the Project Engineer.

B. The backfill shall be placed in loose layers not exceeding 6 inches in depth under and around the pipe, and not exceeding 8 inches over the pipe. Successive layers shall be added and thoroughly compacted by hand and power, pneumatic tampers until the trench is completely filled and brought to the elevation as directed. Backfilling shall be done in such a manner as to avoid injurious top or side pressures on the pipe.

END OF SECTION

SECTION 33 40 10

DRAINAGE MANHOLES, INLETS, AND PIPE ENDWALLS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This work shall consist of constructing manholes, inlets, and pipe endwalls at the locations shown on the Plans, and in reasonably close conformity to the lines, grades, and design dimensions shown on the Plans, or as directed by the Project Engineer, and in accordance with the provisions of these Specifications.

B. The work shall include the furnishing and installation of such incidental appurtenances and connections to pipe and other structures as may be required to complete the construction as shown on the Plans or as directed by the Project Engineer.

1.02 MATERIALS

A. Materials used in this construction, in addition to meeting the general stipulations of these Specifications, shall meet the following requirements:

Structural Steel	ASTM A 36
Building Brick, Concrete	ASTM C 55
Sewer Brick	AASHTO M 91
Masonry Mortar	AASHTO M 150
Steel Bar Reinforcement	Sec. 03200
Gray Iron Castings	ASTM A 48
Manhole Steps	ASTM C 478
Manhole Tops	ASTM C 478

B. Portland cement concrete shall be Class A concrete, and shall be manufactured, placed and cured in accordance with the applicable requirements of Section 03300.

C. All bolts, anchors, frames, hangers, etc. for castings and plates shall be as approved by the Project Engineer.

1.03 EQUIPMENT

A. All equipment necessary for the satisfactory performance of this construction shall be on the project and approved by the Engineer before work will be permitted to begin.

PART 2 - CONSTRUCTION REQUIREMENTS

2.01 RELATED WORK SPECIFIED ELSEWHERE

A. SECTION 31 40 00: EXCAVATION, FILLING AND GRADING

B. SECTION 03 30 00: SITEWORK CAST-IN-PLACE CONCRETE

2.02 STRUCTURE EXCAVATION, FOUNDATION PREPARATION AND BACKFILL

2.03 CONCRETE CONSTRUCTION

A. All concrete construction shall be accomplished in accordance with the requirements of Section 03 30 00.

2.04 INVERTS

A. Inverts shall be of Class A concrete and shall conform to the shapes indicated on the Plans. The inverts shall be so constructed as to cause the least possible resistance to flow. The shape of the inverts shall conform uniformly to inlet and outlet pipes. A smooth and uniform finish will be required.

2.05 INLET AND OUTLET PIPES

A. Inlet and outlet pipes shall extend through the walls of manholes and inlets for a sufficient distance beyond the outside surface to allow for connections, but shall be cut off flush with the wall on the inside surface, unless otherwise directed.

B. The concrete or brick and mortar shall be so constructed around the pipes as to prevent leakage and form a neat connection.

2.06 CASTINGS AND FITTINGS

A. Castings and fittings shall be handled in a manner that will prevent damage. All damaged castings and fittings shall be rejected.

B. All castings and fittings shall be placed in the positions indicated on the Plans or as directed by the Project Engineer, and shall be set true to line and grade.

If castings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before concrete or mortar is placed. The casting shall not be disturbed until the mortar or concrete has set.

C. When castings are to be placed upon previously constructed masonry, the bearing surface of masonry shall be brought true to line and grade and present an even bearing surface in order that the entire face or back of the casting will come in contact with the masonry. Castings shall be set in mortar beds or anchored to the masonry as indicated on the Plans or as directed by the Project Engineer.

D. All castings shall be set firm and snug and shall not rattle. Unless otherwise specified, gray iron castings shall be cleaned and treated with two coats of bituminous paint.

END OF SECTION

MAJOR CODE ANALYSIS

Project Description: This project is a part of a multi-phase site development that includes an addition to the existing band room and a renovation of an existing pre-engineered metal building that will be renovated into a concession stand.

Applicable Codes:

State:
- 2012 International Building Code (IBC) (excluding Chapters 11 & 34)
- 2012 International Fire Code (IFC)
- 2012 NFPA 101 Life Safety Code
- 2012 International Mechanical Code (IMC)
- 2012 International Plumbing Code (IPC)
- 2012 International Fuel Gas Code (IFGC)
- 2017 National Electrical Code, NFPA 70
- 2012 International Energy Conservation Code (IECC)
- 2010 ADA Standards for Accessible Design (ADAAG)

Local
- 2015 International Building Code with Local Amendments
- 2015 International Existing Building Code with Local Amendments
- 2014 National Electrical Code
- 2018 Joint Electrical Code
- 2015 International Mechanical Code with Local Amendments
- 2015 International Fuel Gas Code with Local Amendments
- 2015 International Plumbing Code with Local Amendments
- 2015 International Energy Conservation Code with Local Amendments
- 2009 ICC A117.1 Accessibility and Useable Buildings and Facilities (by reference)
- 2013 ASME 17.1 Safety Code for Elevators and Escalators (by reference)

Occupancy Type: Educational (E)

Construction Type:
Band Addition - Type IIA, sprinklered, 1-hr protected;
Concession Stand - Type IIB, non-sprinklered, non-protected.

Building Data: (Allowed / Provided)

	Band Addition	Stand Alone Concession Stand
Fire Protection:	sprinklers required *and* provided	sprinklers not required *nor* provided
Building Height:	85' allowed / 27' - 8" provided	75' allowed / 18' - 3" provided
Number of Stories:	4 permitted / 1 provided	2 allowed / 1 provided
Gross Floor Area:	79,500 sf allowed / 6,423 sf provided	43,500 sf allowed / 3,200 sf provided

The Band Addition is a one story 6,423 sf addition to the existing 2 story high school building. The existing first floor contains 184,704 sf without the new addition. The existing second floor contains 68,311 sf. With the addition of the band the total square footage of the building comes to 259,438 sf.

Fire Resistance:

Exterior Walls:	For separations of 10' or greater: No Rating Required For separations 10' or less: 1-Hr Rating Required
Electrical Rooms:	1-Hr. Rating; 45-min. Protected Openings

Fire Safety:

Sprinklers: In compliance with NFPA 13
Portable Fire Extinguishers: In compliance with NFPA 10
Smoke Alarms: In compliance with NFPA 72
Automatic Fire Detection - Smoke Detectors

Responding Fire Department:

Germantown Fire Department
Jody Dwyer, Fire Marshal
2700 Cross Country Drive, Germantown, TN 38138
(901) 751-7600 - JDwyer@Germantown-TN.gov

Interior Finishes:

Interior exit passageways in unsprinklered Educational occupancies shall be Class A. Corridors and exit enclosures shall be Class B. Rooms and enclosed spaces shall be Class C per Table 803.9.

Egress:

Exit Width Per Occupant	0.2" per occupant for ramps, doors, other egress components
Maximum Common Path of Travel:	Shall Not Exceed 75 ft.
Maximum Travel Distance:	200 ft. Maximum Distance Allowed
Dead End Corridor Limitations:	Educational Occupancies: 20 ft.

Means of Egress (Per 2012 NFPA 101 Chapter 7 Means of Egress)

2012 NFPA 101 7.3.3 Egress Capacity
TABLE 7.3.3.1: Egress capacity for approved components of means of egress
Stairway Width 0.3" width per person
Level Components 0.2" width per person

2012 NFPA 101 28.3.6 Corridors
28.3.6.1.3: In Buildings protected throughout by an approved, supervised automatic sprinkler system in accordance with 28.3.5, corridor walls shall have a minimum 1/2-hour fire resistance rating.

2012 NFPA 101 28.3.6.2 Doors
28.3.6.2.1 Doors that open onto exit access corridors shall have not less than a 20-minute fire protection rating in accordance with Section 8.3.
28.3.6.2.3 Doors that open onto exit access corridors shall be self-closing and self latching.

HOUSTON HIGH SCHOOL
BAND ROOM ADDITION & CONCESSION STAND

9755 Wolf River Blvd
Germantown, TN 38139
October 11, 2019

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STRUCTURAL
Scallion Structural Engineering
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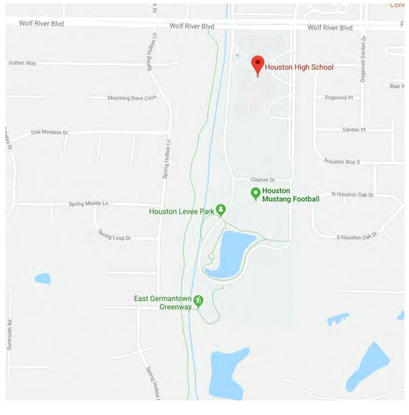
MECHANICAL / ELECTRICAL / PLUMBING / FIRE PROTECTION
HNA Engineering, PLCC.
11880 Cranston Drive, Suite 104
Arlington, TN 38002
(901) 290-6377

VICINITY MAP



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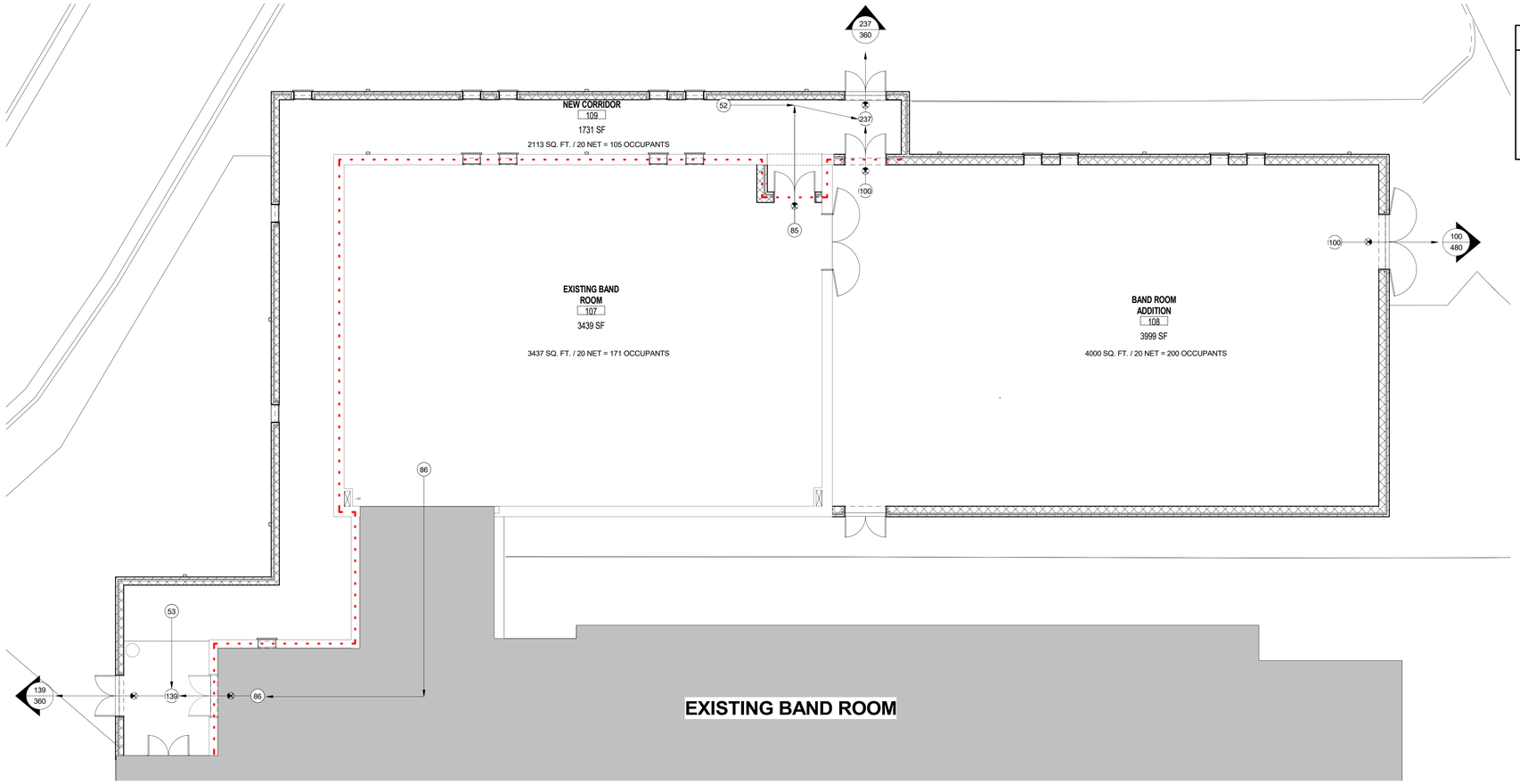
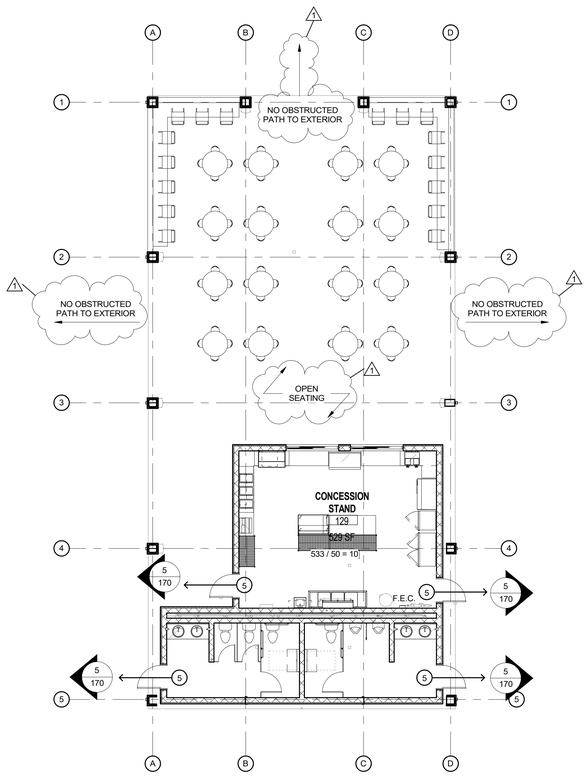
9755 Wolf River Blvd
Germantown, TN 38139

STEVEN W. LANDERS
REGISTERED ARCHITECT
ARCHITECT
10/11/19
STATE OF TENNESSEE

10/14/2019 11:22:39 AM



1 BAND ROOM LIFE SAFETY PLAN
1/8" = 1'-0"



2 CONCESSION STAND LIFE SAFETY PLAN
1/8" = 1'-0"

LIFE SAFETY GENERAL NOTES

1. ALL RATED PARTITIONS SHALL EXTEND TIGHT FROM FLOOR TO DECK, UNDERSIDE OF RATED CONSTRUCTION OR TO HORIZONTAL RATED CEILING, AND COMPLETELY AROUND AND OVER WINDOWS AND DOOR OPENING, IF REQUIRED.
2. ALL RATED PARTITIONS SHALL HAVE THE APPROPRIATE RATING STENCIL, PAINTED WITH 3" LETTERS IN THE CONCEALED SPACE ABOVE THE CEILING. MAXIMUM SPACING SHALL BE 8'-0" ON BOTH SIDES OF PARTITION, IF REQUIRED.
3. ALL PENETRATIONS THROUGH RATED PARTITIONS SHALL BE INSTALLED IN A MANNER THAT WILL NOT REDUCE THE RATING OF THE PARTITION. SEE MECHANICAL PLANS FOR THE FIRE DAMPER AND PIPE PENETRATION DETAILS, IF REQUIRED.
4. FIRE EXTINGUISHER CABINETS SHALL BE OF APPROPRIATE CONSTRUCTION TO MAINTAIN THE SURROUNDING WALL RATING. COORDINATE LOCATION W/ MECHANICAL, ELECTRICAL, AND OTHER TRADES.
5. ANNULAR SPACES AROUND PENETRATIONS THROUGH FLOOR ASSEMBLIES MUST BE SEALED TO RESIST THE FREE PASSAGE OF FIRE AND SMOKE.

LIFE SAFETY SYMBOLS LEGEND

- SMOKE TIGHT PARTITION
- CLASSROOM: 20 SF/OCCUPANT / AREA: 150 SF / OCCUPANT LOAD: 15 — ROOM TYPE AND SQUARE FOOT / OCCUPANT; ROOM AREA; OCCUPANT LOAD OF ROOM
- **MEANS OF EGRESS SYMBOL**
- 50 / 160 — TOTAL OCCUPANTS EXITING / EXIT CAPACITY PER DOOR
- 3 — OCCUPANT LOAD AND DIRECTION OF TRAVEL
- TRAVEL DISTANCE PATH
- EXIT SIGN (LIGHTED FACE SHADED)
- FEC — FIRE EXTINGUISHER CABINET
- FE — FIRE EXTINGUISHER, WALL MOUNTED

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HOUSTON HIGH SCHOOL
BAND ROOM ADDITION & CONCESSION STAND
9755 Wolf River Blvd
Germantown, TN 38139

STEVEN W. LANDWEHR — REGISTERED ARCHITECT — AGREEMENT NO. 102704 — STATE OF TENNESSEE

LIFE SAFETY PLANS

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1

PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
October 11, 2019

SHEET NUMBER
LS1.1

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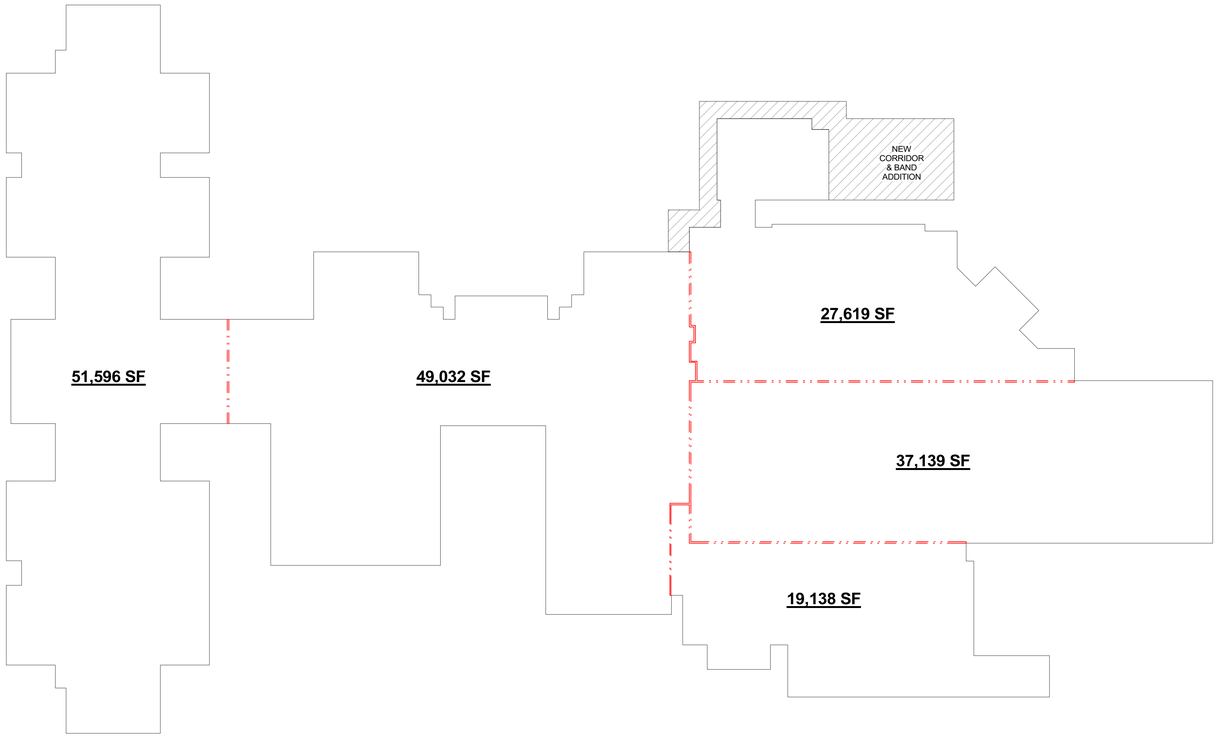
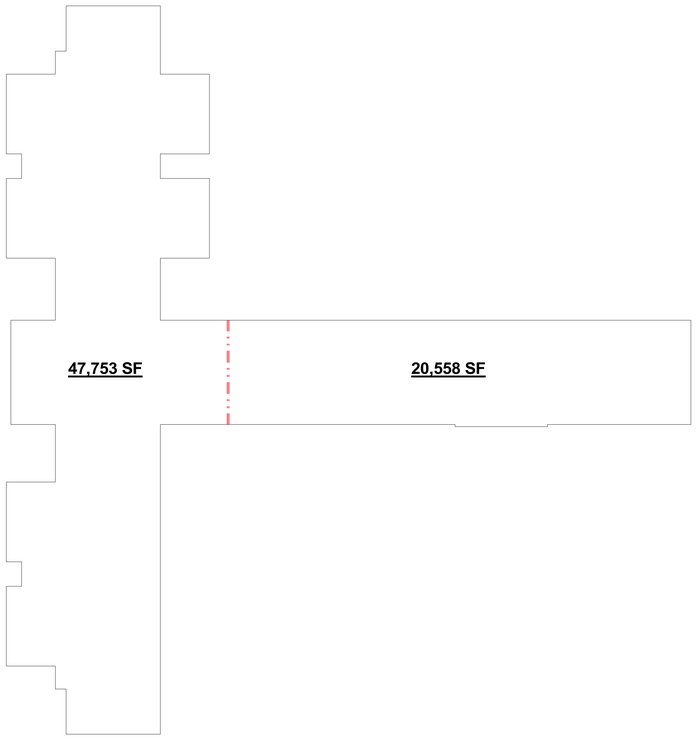


1 **HOUSTON HIGH SCHOOL FIRST FLOOR FIRE WALL PLAN**
1" = 40'-0"



2 **HOUSTON HIGH SCHOOL SECOND FLOOR FIRE WALL PLAN**
1" = 40'-0"

CODE REVIEW NOTES

The original school building was built around 1990 under the old Standard Building Code. Per the orignal code review, this building was a Type IV, non-combustible, sprinklered, 1-hour protected building. 4-hour fire walls were built in the locations depicted on these plans and constructed of concrete block. The framing supporting the areas each side of the firewall is structural steel, independent of the firewall, and does not bear either side of the firewall.

Our Band Addition will be an add-on to one of these fire areas, will be a Type IIA, sprinklered, 1-hour protected space, and will not exceed the allowable area for a multi-story educational building.

Per IBC 2015, a multi-story educational building that is one-hour protected and sprinklered can be up to 79,5000 sf in area. The total area for the fire area, including our addition, is 34,042 sf.

FIRE WALL LEGEND

	4-HR RATED WALL
	BUILDING OUTLINE
1,234 SF	FIRE WALL AREA SQUARE FOOTAGE

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HOUSTON HIGH SCHOOL
BAND ROOM ADDITION & CONCESSION STAND
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Germantown, TN 38139

STEVEN W. LANDWEHR
REGISTERED ARCHITECT
AGRICOLA
No. 101670
STATE OF TENNESSEE

CODE REVIEW

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1

PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
October 11, 2019

SHEET NUMBER
AC1.1

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FIRE-RESISTANCE DESIGN

Assembly Usage Disclaimer

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

Design No. P710

September 06, 2019

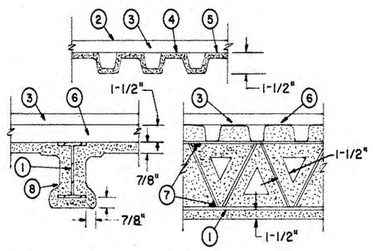
Restrained Assembly Rating — 1 Hr

Unrestrained Assembly Rating — 3/4 Hr

Unrestrained Beam Rating — 1 Hr

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Beam —** W6X16 min size, or **Steel Joist** — 14J7 with min web area of 0.31 in.^{2}.

2. **Roof Covering* —** Consisting of hot mopped or cold application materials compatible with insulation(s) described herein which provide Class A, B or C coverings.

See Roofing Materials and Systems Directory **Roof Covering Materials** (TEVT).

2A. In lieu of Item 2, roof covering consisting of single-ply **Roofing Membrane*** that is either ballasted, adhered or mechanically attached as permitted under the respective manufacturer's Classification.

See Fire Resistance Directory **Roofing Membranes** (CHCI).

2B. **Metal Roof Deck Panels* —** (Not Shown) — In addition to or in lieu of Items 2 or 2A, the roof covering may consist of a mechanically fastened metal roof deck panel assembly.

See Fire Resistance Directory **Metal Roof Deck Panels** (CETW).

3. **Roof Insulation —** May consist of the following:

A. **Mineral and Fiber Boards* —** Applied in one or more layers to a minimum thickness or 1-1/2 in. May be loosely laid or applied with adhesive. When more than one layer is used, each layer of board to be offset in both directions. From layer below a min. of 6 in. in order to lap all joints.
GAF — GAFTEMP Perlite

JOHNS MANVILLE

ROCKWOOL — MonoBoard™, MonoBoard™ Plus, "MonoBoard Plus S", TopRock®DD, TopRock® DD Plus or TopRock DD Plus S

SOPREMA INC — SopraRock®DD and SopraRock®DD Plus

B. Or 5/8 in thick, 2.2 psf minimum weight **Gypsum Board** (Classified or Unclassified), supplied in 4 ft wide sheets. Installed perpendicular to the steel roof deck with joints staggered and occurring over the crests of the roof deck. Secured to the deck with **Adhesive*** applied at a rate of 0.4 gal/100 sq ft.

See **Gypsum Board** (BWFR or CKNX) and **Adhesives** (BYWR) categories for names of manufacturers.

a). And **Foamed Plastic***, 1 to 8 in. thick, density of 2.5 pcf max, polystyrene foamed plastic insulation boards secured to the wallboard with asphalt glaze coat or adhesive.
(Note: Adhesive and/or asphalt glazer coat may be omitted when Item 1A is used).

See **Foamed Plastic** (BRYX) category in the Building Material Directory or (CCVW) category in the Fire Resistance Directory for names of manufactures.

b). Or **Foamed Plastic***, polyisocyanurate foamed plastic insulation boards, applied in one or more layers over the gypsum wallboard. Min thickness is 1.3 in. with no maximum for overall thickness. When applied in more than one layer, each layer to be offset in both directions from layer below a min of 6 in. in order to lap all joints. Adhesive* (Item 4 or 4A) may be applied between layers of insulation and to vapor retarder (or gypsum wallboard if vapor retarder is not used).
ATLAS ROOFING CORP — ACFoam II, ACFoam III, ACFoam-II SL, ACFoam IV

CARLISLE SYNTEC SYSTEMS, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC — Types HP, HP-H, HP-N, HP-W

DOW ROOFING SYSTEMS L L C — "Dow Termico Polyisocyanurate Insulation", "Dow Termico ISO 3000 Insulation", "Dow Termico ISO HP-FR"

DYPLAST PRODUCTS L L C

FIRESTONE BUILDING PRODUCTS CO L L C — "ISO 95+ GL", "ISO 95+ FK", "ISO 95+ CAN", "ISO 95+ GL NH", "ISOGARD HD Composite Board", "RESISTA", "ISOGARD GL", "ISOGARD CG"

GAF — EnergyGuard RH, Tapered EnergyGuard RH, EnergyGuard™ RA

GENFLEX ROOFING SYSTEMS L L C — "GenFlex ISO"

HUNTER PANELS — H Shield, H-Shield-F, H-Shield-CG, H-Shield-C, H-Shield Premier, H-Shield HD Composite, H-Shield HD Composite CG, H Shield NH, H-Shield-F NH, H-Shield-CG NH, H-Shield-C NH, H-Shield Premier NH, H-Shield HD Composite CG NH

JOHNS MANVILLE — ENRGY 3 25 psi, ENRGY 3, Tapered ENRGY 3, Tapered ENRGY 3 25 psi, ENRGY 3 AGF, Tapered ENRGY 3 AGF, ENRGY 3 25 psi AGF, Tapered ENRGY 3 25 psi AGF, ENRGY 3 CGF, Tapered ENRGY 3 CGF, ENRGY 3 25 psi CGF, Tapered ENRGY 3 25 psi CGF, ISO-3, Tapered ISO-3, ValuTherm, Tapered ValuTherm, ValuTherm 25 psi, Tapered ValuTherm 25 psi, ValuTherm AGF, Tapered ValuTherm AGF, ValuTherm 25 psi AGF, Tapered ValuTherm 25 psi AGF, ValuTherm CGF, Tapered ValuTherm CGF, ValuTherm 25 psi CGF, Tapered ValuTherm 25 psi CGF

LOADMASTER SYSTEMS INC — Loadmaster Polyisocyanurate Insulation

MARTIN FIREPROOFING CORP — "Perform-A-Deck I"

RMAX OPERATING L L C — Multi-Max-3, Multi-Max FA-3, Ultra-Max, Ultra-Max Plus, Tapered Ultra-Max Plus, Tapered Thermaroof-3, Tapered Thermaroof FA-3, Tapered Ultra-Max

SIKA SARNAFIL INC — Sarnatherm-R Insulation, Sarnatherm-R CG Insulation, Sarnatherm-R Tapered Insulation, Sarnatherm-R CG Tapered Insulation

SIPLAST INC — Paratherm G

SOPREMA INC — Sopra-ISO s, Sopra-ISO s Tapered, Sopra-ISO+ s, Sopra-ISO+ s Tapered, Sopra-ISO H+ s, *Sopra-ISO H+ s Tapered

TREMCO INC — Trisotech G, Trisotech CGF

VERSICO INC — MP-H, VersiCore MP-H, WeatherBond XP, MP-HF, WeatherBond XP-HF, SecurShield, WeatherBond XFP, SecurShield CD, WeatherBond XFP CD

c). Or **Building Units*** — Min 1.3 in thick polyisocyanurate foamed plastic insulation boards (measured at thinnest section of polyisocyanurate), nom 48 by 48 or 96 in., faced on underside with mineral and fiber boards. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.
ATLAS ROOFING CORP

SOPREMA INC

d). Or **Building Units*** — Polyisocyanurate foamed plastic insulation boards faced on the underside with wood fiber board. Min thickness of the polyisocyanurate core is 1.3 in. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.
JOHNS MANVILLE — ENRGY 2 Plus

e). Or **Building Units*** — Polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in., faced on the top surface with oriented strand board. Min thickness of the polyisocyanurate core is 1.3 in. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.
JOHNS MANVILLE — Type Nailboard

f). Or **Building Units*** — Polyisocyanurate foamed plastic insulation boards faced on the underside (or both sides) with mineral fiber board. Min thickness of the polyisocyanurate core is 1.3 in. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.
JOHNS MANVILLE — Fesco-Foam

g). or **Building Units*** — Not Shown — Composite polyisocyanurate foamed plastic insulation board with an adhered nailing surface, nom 48 by 48 or 96 in. may be used with the following limitations. These composite building units have ventilation slots internal to the panels. The building units are applied over gypsum wallboard. The thickness of the panel depends upon the thinnest portion of the polyisocyanurate insulation. The following dimensions apply to the polyisocyanurate insulation, min 1.3 in. thick. There is no limit on the max insulation thickness.
JOHNS MANVILLE — Type ISO-VENT

h). or **Building Units*** — Polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in., faced on the top surface with gypsum board. Min thickness of the polyisocyanurate core is 1.3 in. No limit on overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.
JOHNS MANVILLE — ENRGY 2 Gypsum Composite

i). or **Foamed Plastic*** — Polyurethane foamed plastic roof insulation. Formed by the simultaneous spraying of two liquid components applied over gypsum wallboard (item 4) in accordance with the manufacturer's instructions. Min thickness is 1.3. No limit on max overall thickness.
BASF CORP — Types FE348-2.5, FE348-2.8, FE348-3.0, ELASTOSPRAY 81255, ELASTOSPRAY 81285, ELASTOSPRAY 81305, SKYTITE 2.5, SKYTITE 2.8 or SKYTITE 3.0.

BASF CORP — Elastospray 5100-2.0, Elastospray 5100-2.5, Elastospray 81302, Elastospray 81272, Elastospray Alpha System, Elastospray 81252

3A. **Foamed Plastic* —** Optional — (Not Shown) — Maximum 1 in. thick polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in. Boards may be applied as the top layer in addition to the specified minimum thickness of any roofing system described herein, as long as the roofing system states that there is no limit on maximum thickness. Joints offset in both directions from layer below.
FIRESTONE BUILDING PRODUCTS CO L L C — "ISOGARD HD"

3B. **Foamed Plastic* —** Optional — (Not Shown) — Maximum 5/8 inch thick polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in. Boards may be applied as the top layer in addition to the specified minimum thickness of any roofing system described herein, as long as the roofing system states that there is no limit on maximum thickness. Joints offset in both directions from layer below.
RMAX OPERATING L L C — "Ultra-Max HD"

SIKA SARNAFIL INC — "Sarnatherm Roof Board-R"

3C. **Foamed Plastic* —** Optional — (Not Shown) — Maximum 1/2 inch thick polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in. Boards may be applied as the top layer in addition to the specified minimum thickness of any roofing system described herein, as long as the roofing system states that there is no limit on maximum thickness. Joints offset in both directions from layer below.
HUNTER PANELS — H-Shield HD, H-Shield HD90, H-Shield HD NH, H-Shield HD90 NH

VERSICO INC — SecurShield HD, WeatherBond XFP HD Cover Board

4. **Adhesive* —** (Optional) — Used with insulation board. Applied at rate of 0.4 gal per 100 sq ft in 1/2 in. wide ribbons approx 6 in. OC.

See **Adhesives** (BYWR) category for names of manufacturers.

4A. **Adhesive* —** Optional — (Bearing the UL Classification Marking for Roof Systems (TGFU)) — The vapor retarder, the gypsum wallboard or the first layer of roof insulation may be secured with adhesive to the steel crest surfaces. Also used to attach the vapor retarder to gypsum wallboard, the first layer of insulation to vapor retarder or gypsum wallboard and each additional layer of insulation. Applied at a max rate of 19.8 g/ft^2.
CARLISLE SYNTEC SYSTEMS, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC — FAST 100

5. **Vapor Retarder — Sheathing Material*** — Optional — Applied with adhesive to roof deck units, overlapped approx 2 in. on sides.

See **Sheathing Materials** (CHIZ) category for names of manufacturers.

6. **Steel Roof Deck — (Unclassified) —** Min 1-1/2 in. deep, No. 22 MSG galv steel. Min width of 24 in., flutes spaced 6 in. OC. Attached to supports with 3/4 in. puddle welds approx 9 in. OC. Side joints crimped or button punched at 2 ft OC; or: **Classified Steel Floor and Form Units*** — Noncomposite 1-1/2 in. deep, 36 in. wide, fluted galv steel deck. Min gauge is 22 MSG. Attached to supports with 3/4 in. puddle welds approx 9 in. OC.
Side joints crimped or button punched at 2 ft. OC.

CANAM STEEL CORP — Type P-3606 or P-3615

MARLYN STEEL DECKS INC — Types B, F, N, NV

NEW MILLENNIUM BUILDING SYSTEMS L L C — Types BD, FD, and ND. Units may be ptd/ptd.

ROOF DECK INC — Type A, B-1, B-2 or F

VULCRAFT, DIV OF NUCOR CORP — Types 1.5A, 1.5B, 1.5BI, 1.5PLB, 1.5F, 3N, 3NI, 3.0PLN, 3NL-32, 3NI-32, 3PLN-32. Units may be ptd/ptd; Types BW, B High Strength, BW High Strength

7. **Bridging —** 1-1/4 by 1-1/4 by 1/8 in. cold-rolled steel angle bridging between joists. Protected with 1 in. of Spray-Applied Fire Resistive Materials.

8. **Spray-Applied Fire Resistive Materials* —** Applied by mixing with water and spraying in more than one coat to final thicknesses indicated, to steel surfaces which must be free of dirt, oil, or scales. Min avg and min ind density of 15/14 pcf respectively. Min avg and min ind density of 19/18 pcf respectively for Type 7GP and 7HD. For method of density determination, refer to Design Information Section.
GCP APPLIED TECHNOLOGIES INC — Types MK-6/HY, MK-6s, RG, Monokote Acoustic 1

GCP KOREA INC — Types MK-6/CBF, MK-6/ED, MK-6/HY, MH-65, Monokote Acoustic 1.

PYROK INC — Type LD

SOUTHWEST FIREPROOFING PRODUCTS CO — Types 4, 5, 5EF, 5GP, 5MD, 7GP, 7HD, 8EF, 8GP, 8MD, 9EF, 9GP, 9MD

9. **Metal Lath —** (Optional, Not Shown) — Metal lath may be used to facilitate the spray application of spray-applied resistive materials on steel bar joists and trusses. The diamond mesh, 3/8 in. expanded steel lath, 1.7 to 3.4 lb/sq yd is secured to one side of each steel joist with No. 18 SWG galv steel wire at joist web and bottom chord members, spaced 15 in. O.C. max. When used, the metal lath is to be fully covered with spray-applied resistive materials with no min thickness requirements.

9A. **Nonmetallic Fabric Mesh —** (Optional, Not Shown) — As an alternate to metal lath, glass fiber fabric mesh, weighing approximately 2.5 oz/sq yd, polypropylene fabric mesh, weighing approximately 1.25 oz/sq yd or equivalent, may be used to facilitate the spray application. The mesh is secured to one side of each joist web member. The method of attaching the mesh must be sufficient to hold the mesh and the spray-applied resistive materials in place during application until it has cured. An acceptable method to attach the mesh is by embedding the mesh in minimum 1/4 in. long beads of hot melted glue. The beads of glue shall be spaced a maximum of 12 in. O.C. along the top chord of the bar joist. Another method to secure the mesh is by 1-1/4 in. long by 1/2 in. wide hairpin clips formed from No. 18 SWG or heavier steel wire.

10. **Metal Lath —** (Not Shown) — Where Type 7HD is applied to steel deck, 3/8 in. metal ribbed lath weighing 3.4 lb/yd^2 shall be secured to the underside of the steel deck (ribs upward) with S-12 by 3/8 in. long pan head, self-tapping steel screws spaced 12 in. OC in all directions. Steel screws shall be fitted with 1/2 in. diameter steel washers. Adjacent pieces of lath shall be overlapped 1 in. min.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2019-09-06

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HOUSTON HIGH SCHOOL
BAND ROOM ADDITION & CONCESSION STAND
9755 Wolf River Blvd
Germantown, TN 38139

STEVEN W. LANDWEHR
REGISTERED ARCHITECT
AGRICULTURE
STATE OF TENNESSEE

REVISIONS		
Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1

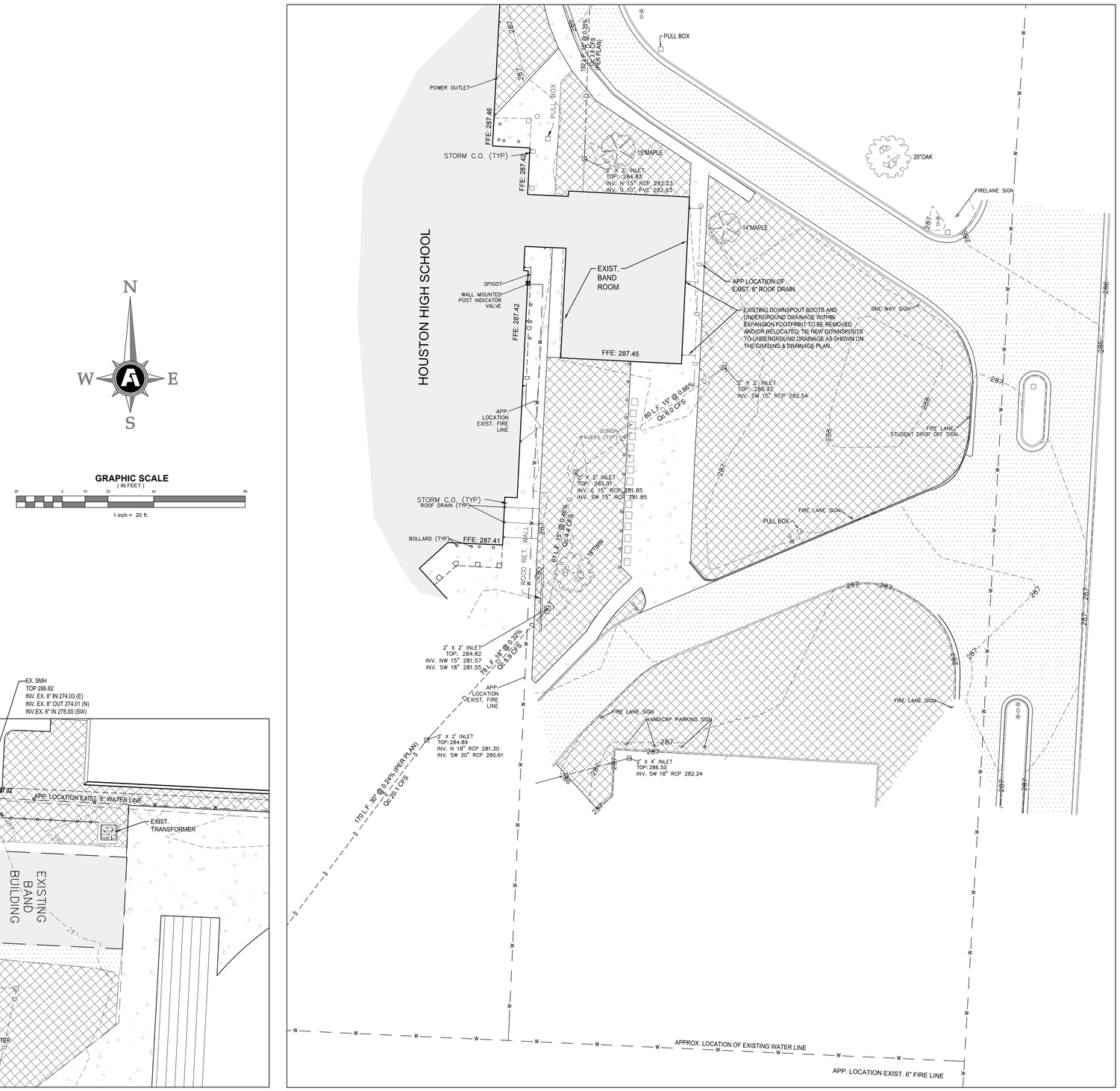
PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
October 11, 2019

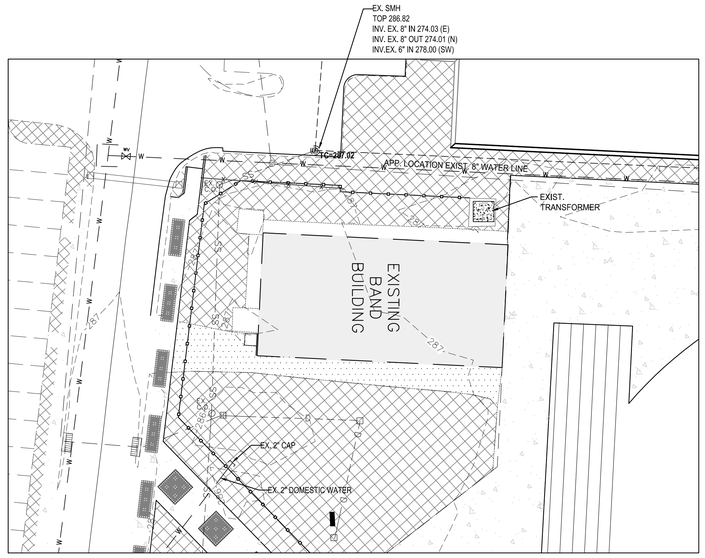
SHEET NUMBER
AC2.1

UL P710 DETAIL

10/14/2019 11:23:05 AM



BAND ROOM EXPANSION

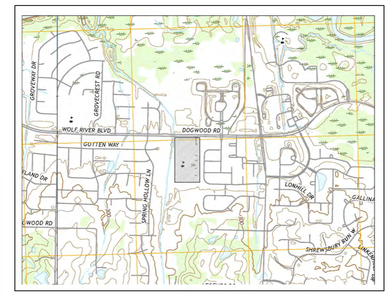


CONCESSION STAND AND RESTROOMS

GRAPHIC SCALE
(IN FEET)

20 0 10 20 40 80

1 inch = 20 ft.



VICINITY MAP
NOT TO SCALE

LEGEND

- EXIST. BUILDING
- EXIST GREEN SPACE
- EXIST. CONCRETE PAVEMENT / WALKWAYS
- EXIST. ASPHALT PAVEMENT

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HOUSTON HIGH SCHOOL BAND ROOM EXPANSION

GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10/11/2019	

MICHAEL D. ROGERS — LICENSED LANDSCAPE ARCHITECT — STATE OF TENNESSEE

Issue Date:	2019-08-26
F&A Project No:	FLEMARCH0015LD
Drafted By:	MRS
Checked By:	MDR

Sheet Title:

EXISTING CONDITIONS

Sheet No.
C001

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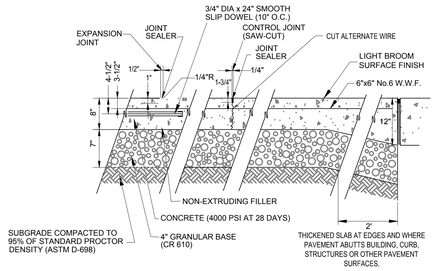
File name: Z:\FLEMARCH0015LD\Civil\Design Drawings\Band Room Addition\Plans\Flem15-sv1.dwg
Layout Name: C001 Existing Conditions
Plotted: Friday, October 11, 2019 - 11:15 am



CONCRETE PAVEMENT SECTION

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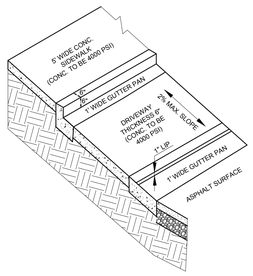
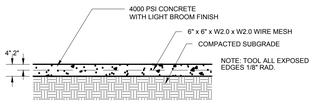
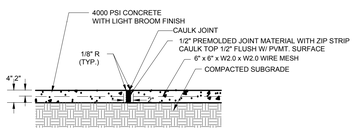


TRUCK PARKING SECTION

NTS



4" CONCRETE SIDEWALK



CONCRETE CONTROL JOINT

TYP. JOINT - INSTALL AS SHOWN ON DRAWINGS OR AT A MAX OF 6' O.C.

4" CONCRETE EXPANSION JOINT

NOTES:

1) INSTALL CONTROL AND EXPANSION JOINTS AS INDICATED ON DRAWINGS OR IN ALL LOCATIONS WHERE CONCRETE FLATWORK ABUTS FOUNDATION WALLS, CURBS, WALLS, INLET BOXES, STRUCTURAL FOOTINGS, OR OTHER FIXED OBJECTS.

2) EXPANSION JOINTS TO BE PLACED AT MAX. 50' SPACING O. C. OR WHERE CONCRETE POURS ARE SUSPENDED. AVOID PLACING EXPANSION JOINTS WHERE SINGLE JOINTS BEND OR CHANGE DIRECTION, AND LOCATIONS WHERE THREE OR MORE JOINTS INTERSECT. INSTALL CONTROL JOINTS IN THESE SITUATIONS.

3) PROVIDE A 4" SMOOTH TROWELLED EDGE ON ALL CONCRETE EDGES INCLUDING EXPANSION AND CONTROL JOINTS.

CONCRETE WALK DETAILS

SCALE: NTS

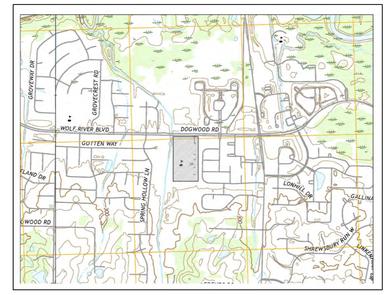
GRAPHIC SCALE
(IN FEET)

20 0 10 20 40 80

1 inch = 20 ft.

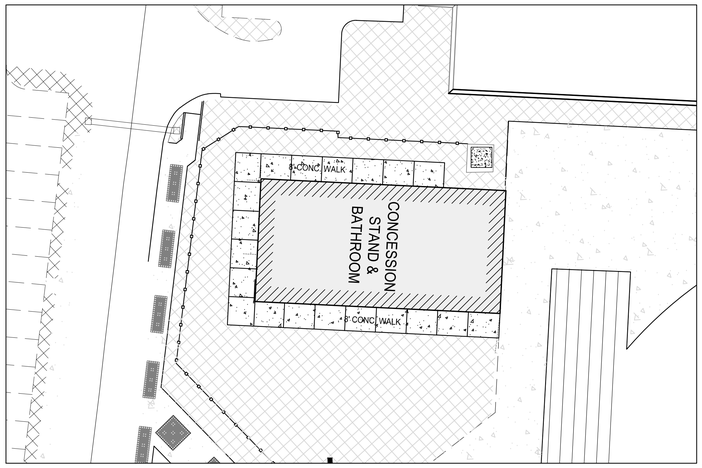
LEGEND

- EXIST. BUILDING
- EXIST GREEN SPACE
- EXIST. CONCRETE PAVEMENT / WALKWAYS
- EXIST. ASPHALT PAVEMENT
- PROP. BUILDING
- PROP. CONCRETE WALKWAYS
- PROP. CONCRETE PAVEMENT
- PROP. GREEN SPACE

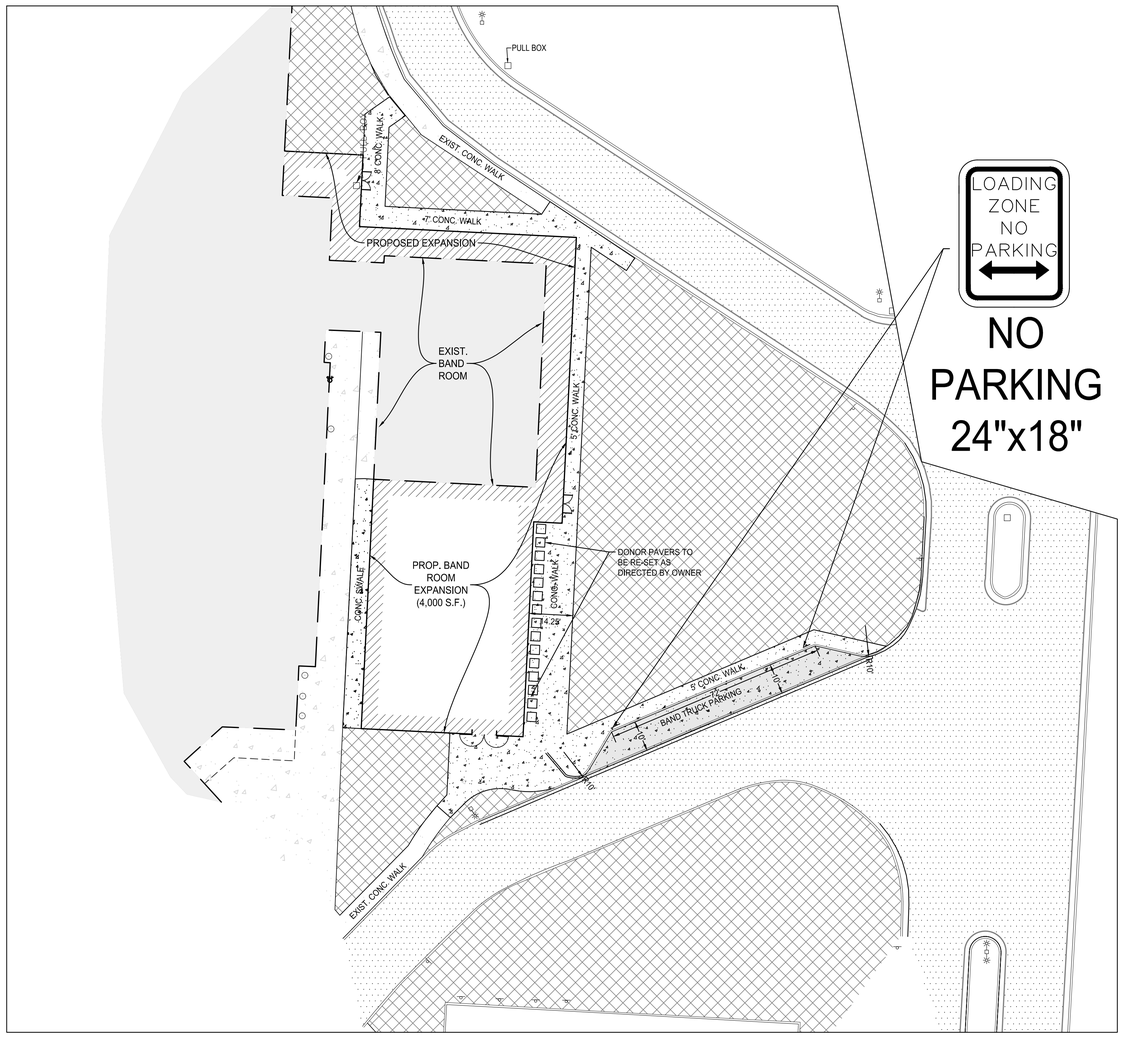


VICINITY MAP

NOT TO SCALE



CONCESSION STAND AND RESTROOMS



BAND ROOM EXPANSION

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HOUSTON HIGH SCHOOL
BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10/11/2019	

MICHAEL D. ROGERS REGISTERED LANDSCAPE ARCHITECT No. 1000 STATE OF TENNESSEE

Issue Date:	2019-08-26
F&A Project No:	FLEMARCH
Drafted By:	MRS
Checked By:	MDR

Sheet Title: SITE PLAN

Sheet No. C002

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File name: Z:\FLEMARCH\2019\Submission\Plans\Flem19-sp1.dwg
Layout Name: C002 Site Plan
Plotted: Friday, October 11, 2019 - 11:15 am

GRAPHIC SCALE
(IN FEET)
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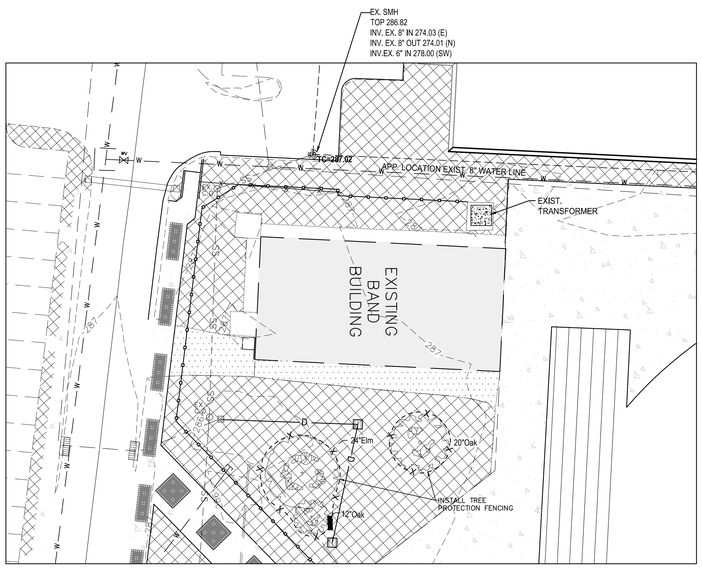
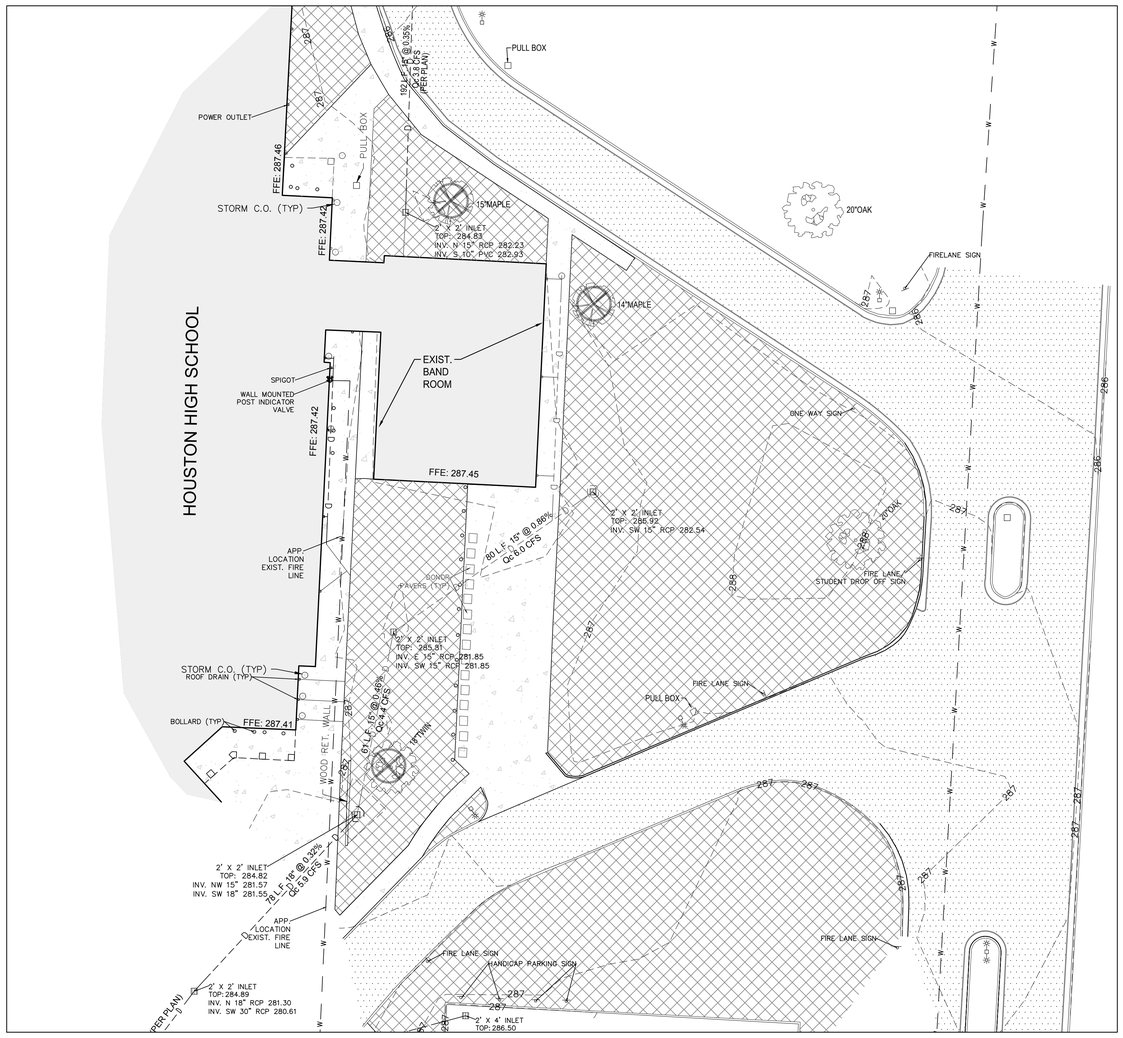
1 inch = 20 ft.



CONCESSION STAND AND RESTROOMS



BAND ROOM EXPANSION

LEGEND

10" OAK — TREE TO BE PRESERVED

10" OAK — TREE TO BE REMOVED

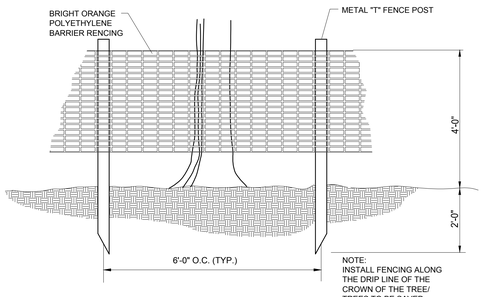
TREE LIST			
	PRESERVED	REMOVED	PLANTED
NO.	5	3	6
TOTAL CALIPER	96"	47"	15"

Tree Type	Size
~~MAPLE~~	~~14~~
~~MAPLE~~	~~15~~
OAK	20
OAK	20
~~TREE~~	~~18~~
OAK	20
OAK	12
ELM	24

TREE SUMMARY

NOT TO SCALE

CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT TREE REMOVAL OPERATIONS DO NOT CAUSE INJURY TO EXISTING TREES TO REMAIN. THE ROOT SYSTEMS FOR TREES BEING REMOVED ARE TO REMAIN IN PLACE WHERE THE REMOVED TREES ARE IN CLOSE PROXIMITY TO EXISTING TREES TO REMAIN (SPECIFICALLY THOSE TREES IN CLOSE PROXIMITY TO THE PRESERVED 15" OAK, 24" ELM, 12" OAK, AND 20" OAK). REMAINDER OF STUMPS TO BE GROUND TO JUST BELOW EXISTING GRADE.



TREE PROTECTION DETAIL

N.T.S.

TREE NOTES:
1. TREES THAT ARE INDICATED TO REMAIN MUST BE PROTECTED WITH CONSTRUCTION FENCE TO THE DRIP LINE. ALL FENCING MUST BE IN PLACE PRIOR TO ANY CLEARING, GRADING, OR CONSTRUCTION.
2. VERIFY ALL TREE LOCATIONS ALONG PROPERTY LINE.
3. CONTRACTOR SHALL FLAG ALL TREES TO REMAIN.
4. ANY VISIBLE DAMAGE TO TREES SHOWN TO BE PROTECTED MUST BE BROUGHT TO THE ATTENTION OF THE CITY OF GERMANTOWN AND DEVELOPER FOR INSTRUCTIONS ON CARE FOR SAID DAMAGED TREE.

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File name: Z:\FLEMARCH\0001D (Subdivision plans\Plan15-tp1.dwg
Layout Name: C003 Tree Plan
Plotted: Friday, October 11, 2019 – 11:16 am

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HOUSTON HIGH SCHOOL BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

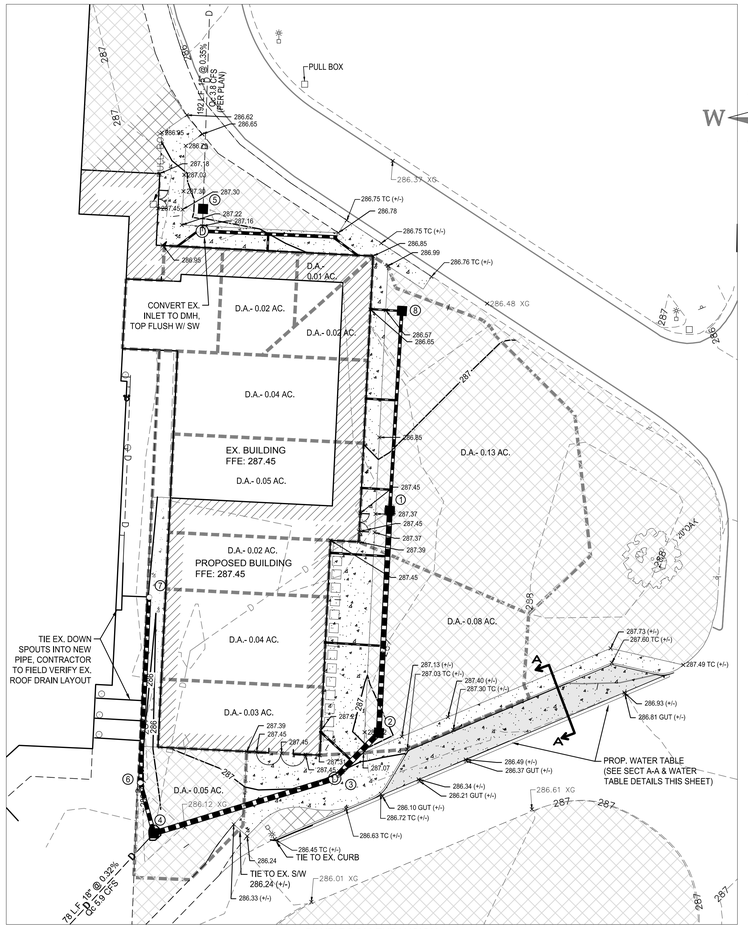
Rev.	Date	Revision Description
1	10/11/2019	

MICHAEL D. ROGERS — REGISTERED ENGINEER — AGRICULTURE — 100 — COMMERCE — STATE OF TENNESSEE

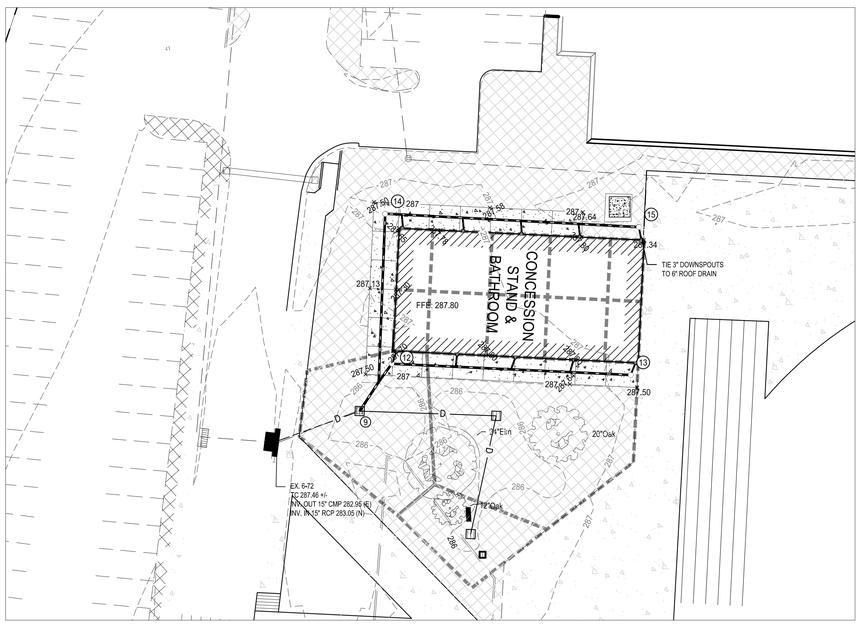
Issue Date: 2019-08-26
F&A Project No: FLEMARCH
Drafted By: MRS
Checked By: MDR

Sheet Title: TREE PLAN

Sheet No. C003



BAND ROOM EXPANSION



CONCESSION STAND AND RESTROOMS

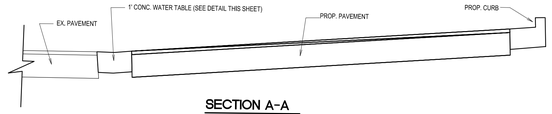
STORM STRUCTURE TABLE		
NO.	TYPE	RIM/GRATE/ THROAT EL.
TEE FITTING	6x6 TEE FITTING	-
1	#3070 INLET	THR. 286.70
2	#3070 INLET	THR. 286.40
3	DMH	286.92
4	#3070 INLET	THR. 284.82
5	#3070 INLET	THR. 286.90
6	C.O.	-
7	C.O.	-
8	#3070 INLET	THR. 286.10
9	EX. #3070 INLET	EX. THR. 285.41
12	C.O.	-
13	C.O.	-
14	C.O.	-
15	C.O.	-

STORM PIPE TABLE											
FROM	F/L (FT.)	AS-BLT F/L	TO	F/L (FT.)	AS-BLT F/L	SIZE (IN)	L (FT.)	TYPE	SLOPE	AS-BLT SLOPE	Qc (CFS)
TEE FITTING	269.91		9	269.79		6	11	6" HDPE	1.00%		0.7
	281.94		1	281.29		10	65	10" HDPE	1.07%		2.7
1	280.86		2	280.14		15	73	15" HDPE	0.60%		5.9
2	281.45		3	281.25		15	21	15" HDPE	0.53%		5.7
3	280.02		4	279.40		15	62	15" HDPE	0.52%		5.5
6	279.13		4	279.30		12	17	12" HDPE	0.50%		3.0
7	279.13		6	278.52		12	61	12" HDPE	0.50%		3.0
8	281.39		1	280.86		12	85	12" HDPE	0.50%		3.0
12	273.50		TEE FITTING	273.43		6	7	6" HDPE	1.00%		0.7
13	276.51		12	275.73		6	78	6" HDPE	2.58%		1.1
14	270.33		TEE FITTING	269.78		6	55	6" HDPE	2.58%		1.1
15	277.64		14	276.82		6	83	6" HDPE	1.00%		0.7

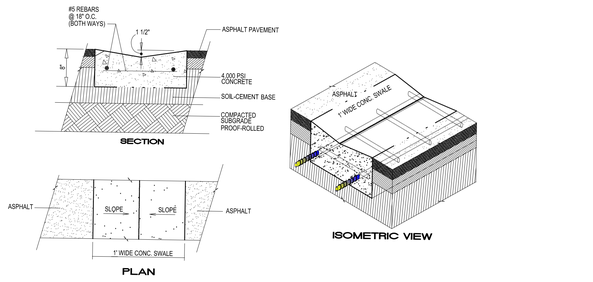
SPOT ELEVATION NOTATION

ALL SPOT ELEVATIONS SHOWN HEREON ARE FINISHED GRADE ELEVATIONS UNLESS NOTED OTHERWISE WITH THE FOLLOWING CODE:

XG - EX. GRADE
TC - TOP OF CURB
GUT - GUTTER



SECTION A-A
N.T.S.



DETAIL OF 1' WIDE CONCRETE WATER TABLE
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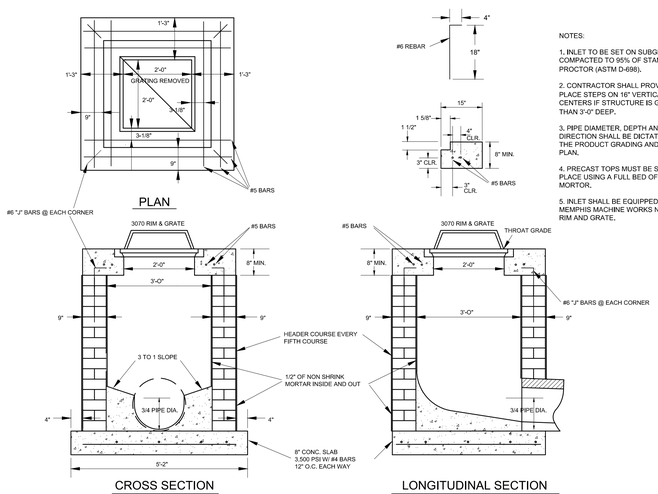
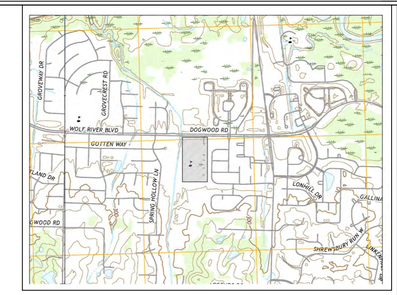


NOTES:

1. INLET TO BE SET ON SUBGRADE COMPACTED TO 95% OF STANDARD PROCTOR (ASTM D-698).
2. CONTRACTOR SHALL PROVIDE AND PLACE STEPS ON 16" VERTICAL CENTERS IF STRUCTURE IS GREATER THAN 3'-0" DEEP.
3. PIPE DIAMETER, DEPTH AND DIRECTION SHALL BE DICTATED BY THE PRODUCT GRADING AND DRAINAGE PLAN.
4. PRECAST TOPS MUST BE SET IN PLACE USING A FULL BED OF MORTOR.
5. INLET SHALL BE EQUIPPED WITH A MEMPHIS MACHINE WORKS NO. 3070 RIM AND GRATE.

STANDARD NO. 3070 INLET
N.T.S.



VICINITY MAP
NOT TO SCALE

GRAPHIC SCALE
(IN FEET)

20 0 10 20 40 80

1 inch = 20 ft.

GRADING & DRAINAGE NOTES:

1. Minimum compaction requirements for fill in all areas shall be achieved by placing the fill in 6" thick loose lifts and compacting to minimum of 95 percent of standard proctor density with moisture content of cohesive fill material maintained within two percent of optimum as defined by the standard proctor test. Compaction requirements for lawn areas (outside of paved or buildable areas) shall be 85% of standard proctor.
2. GEOTECHNICAL TESTING AND FREQUENCY: Test fill materials to verify suitability for use, gradation of material, moisture-density relation by ASTM D698 standard proctor method, Waterberg limits, bearing value, and percent of organic materials. Test frequency will be at least 1 (one) test for each 2500 s. f. of filled area. Each lift will be tested to verify compaction meets requirements. Reports of testing results will be sent to the City with copies of all proctors. Test every building pad to assure minimum compaction requirements.
3. All the proposed concrete drainage pipes shown shall be reinforced concrete minimum Class- III
4. TRENCH BACKFILL: All trenches excavated for the installation of drainage in proposed paved areas shall be compacted as follows:

A. Backfill under, around and over pipe: Immediately after laying pipe, backfill the trench with approved fill to an elevation of 12" above the top of pipe, making certain that the fill is compacted around the haunches of the pipe. Grade at 12"above pipe to be compacted to 70% relative density (ASTM D4254). From 12"above top of pipe to finished grade or pavement sub grade, backfill with a clean suitable fill material in loose lifts of not more than 8" in thickness.

B. Backfill to be compacted to 95% of material's maximum dry density as determined by the standard proctor compaction test (ASTM D698). The material's moisture content will be maintained to within 2% of its optimum moisture.

NOTE: Water settling, puddling, and/or jetting of backfill materials as a compaction. These methods are not acceptable.

5. TRENCH BACKFILL TESTING: In-place density tests should be performed at fill grade (12" above top of pipe) and at every 8" lift of fill to finish grade for every 50 ineal feet of pipe.
6. SITE PREPARATION: All topsoil, vegetation, roots, and any soft, unsuitable soils shall be stripped from the ground surface and either hauled off or stockpiled as directed by the Engineer for later use.
7. Prior to placement of base material in a roadway, the area to be paved shall be proof-rolled. Any sub grade failing the proof-roll shall be tested, and if test results fall below the specified level, the sub grade in that area shall be re-worked to achieve the density specified. All such rework shall be at the expense of the contractor or developer.
8. When field test indicate that installed compacted material does not meet requirements, the contractor will provide additional compaction until specified density is achieved, or remove and replace defective material as directed by soils engineer at no cost to the City.
9. When construction installation is complete, provide as-built information to City.
10. Joints for radial, elliptical and arched reinforced concrete pipe shall be poured Portland Cement Mortar joints using continuous diapers attached to the pipe with steel wires or bands of adequate strength to hold the loaded diaper without stretching or slipping.
11. Joints for straight reinforced concrete pipe shall be rubber wedge-shaped, sliding seal, pre-lubricated (ASTM C443), or flexible plastic rope (AASHTO M 198-Type B),or flexible butyl rope (AASHTO M 198-Type B), or Portland Cement Mortar.
12. Pipe bedding shall conform to the requirements given herein for Class A, B, or C bedding, whichever is shown on the plans. If the class of bedding is not shown, a minimum of Class C bedding shall be provided.
13. CLASS A BEDDING: (Concrete Cradle) Consist of a continuous concrete cradle up to spring line constructed in conformity with the details shown on the plans or as directed by the Engineer.
14. CLASS B: (Crushed Limestone) Consist of bedding the drain pipe on a six inch thickness of crushed limestone and sufficient additional crushed limestone which is accurately shaped by a template to fit the lower part of the pipe exterior for at least 10 percent of its overall height. After pipe installation, crushed limestone shall then be rammed under the haunches and tamped in layers not over 6 inches in loose thickness around the pipe to the spring line. The remaining depth of trench shall then be backfilled and compacted as specified in TRENCH BACKFILL notes herein. When bell and spigot pipe is to be placed, recesses shall be dug in the bedding material of sufficient width and depth to accommodate the bell without its resting on the bottom of the recess. The width of the recess shall not exceed the width of the bell by more than 2 inches.
15. CLASS C: (Natural Sub grade) Consist of bedding the drain pipe on a natural earth sub grade shaped by a template to fit the lower part of the pipe exterior for at least 10% of its overall height. After pipe installation, select earth material shall then be rammed and tamped in layers not over 6 inches in loose thickness around the pipe to the spring line. The remaining depth of trench shall then be backfilled and compacted as specified in TRENCH BACKFILL notes herein. When bell and spigot pipe is placed, recesses shall be dug in the sub grade of sufficient width and depth to accommodate the bell without its resting on the bottom of the recess. The width of the recess shall not exceed the width of the bell by more than 2 inches
16. SUBGRADE PREP FOR ROADS: Prior to the installation of soil cement or other roadway base material, the sub grade shall be proof-rolled to determine soft areas not having adequate compaction. All areas failing a proof roll shall be excavated to remove unsuitable materials in the presence of a certified soils engineer or technician who will determine the limits of excavation horizontally and vertically, and the methods and materials of backfilling. The technician will then approve final compaction in all areas that had originally failed a proof roll.
17. Begin laying each pipe run at the lowest point with the bell end upgrade.
18. The maximum allowable joint width measured on the inside surface of concrete pipe shall not be more than ¾ inch for pipe sizes 15 inches through 21 inches in inside diameter; 1 inch for pipe sizes 24 inches through 45 inches in inside diameter; and 1-1/4 inch for pipe sizes 48 inches and larger.
19. Drain manholes shall be 5'-0" in diameter unless noted otherwise and shall have 3:1 benches and smooth, rounded inverts conforming to the shape of the outlet pipe.
20. The placing of concrete and forming of inverts as indicated for brick manholes shall apply in like manner for precast manholes.
21. All brick used for inlets and manholes shall be concrete brick.

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HOUSTON HIGH SCHOOL BAND ROOM EXPANSION

GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10/11/2019	

MICHAEL D. ROGERS — REGISTERED ENGINEER — AGRICULTURE — NO. 109[illegible] — STATE OF TENNESSEE

Issue Date:	2019-08-26
F&A Project No:	FLEMARCH
Drafted By:	MRS
Checked By:	MDR

Sheet Title:

GRADING AND DRAINAGE PLAN

Sheet No.

C-004

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Filename: T:\FLEMARCH (J0715LD \Subdivision \Plans\Plans5-grl.dwg
Layout: Layout1
Plotted: Friday, October 11, 2019 - 11:16 am

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(IN FEET)
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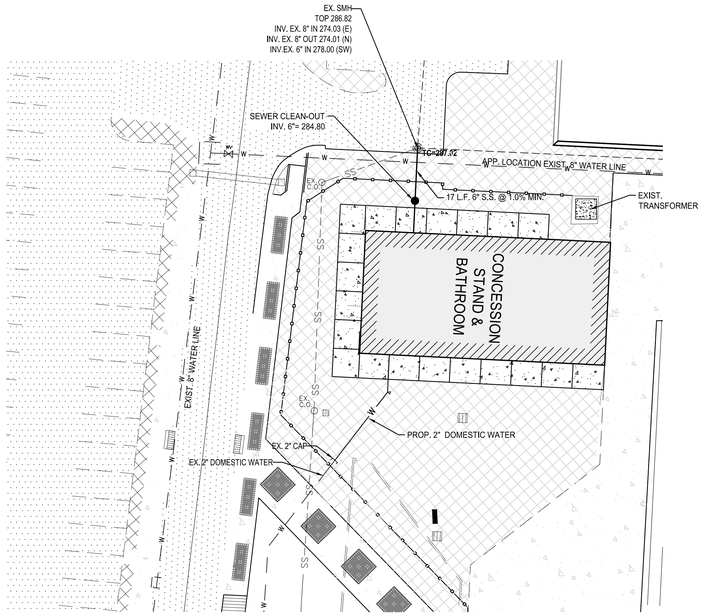
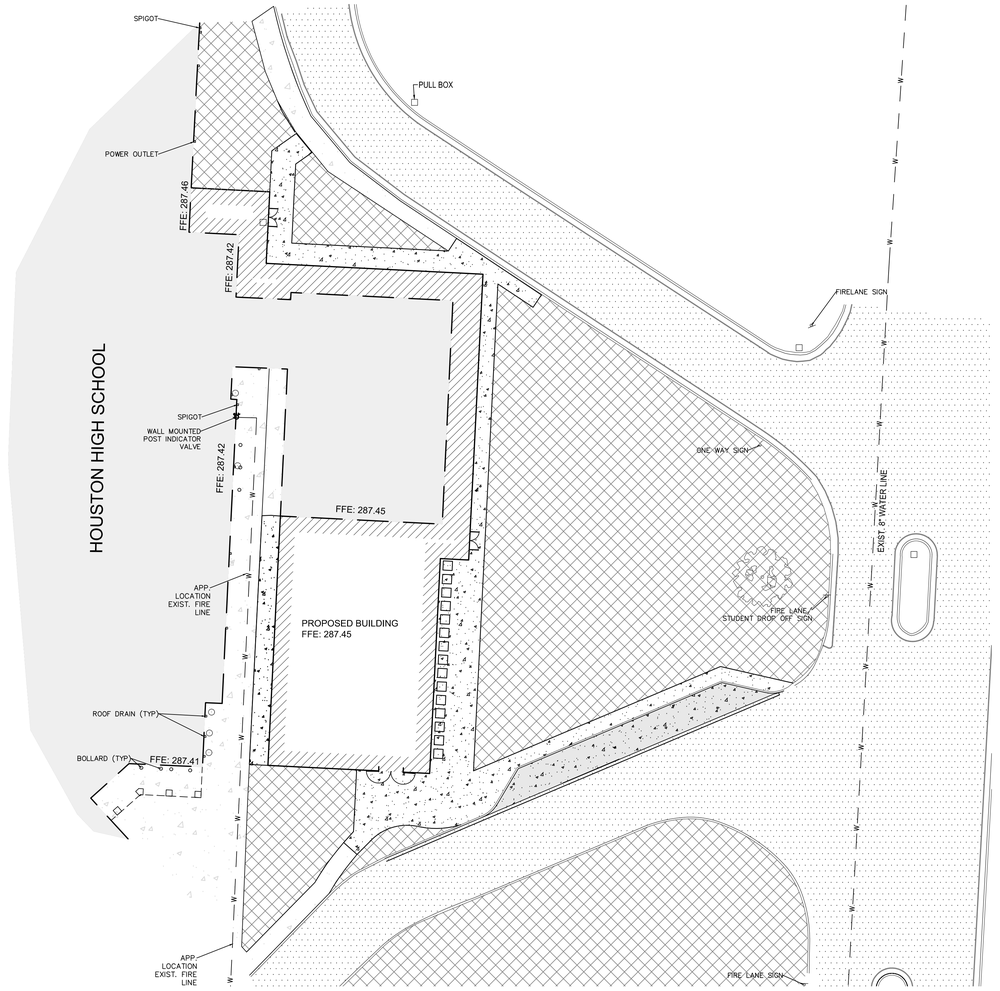
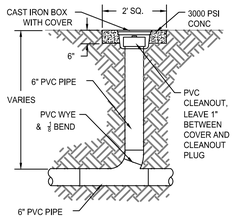
1 inch = 20 ft.



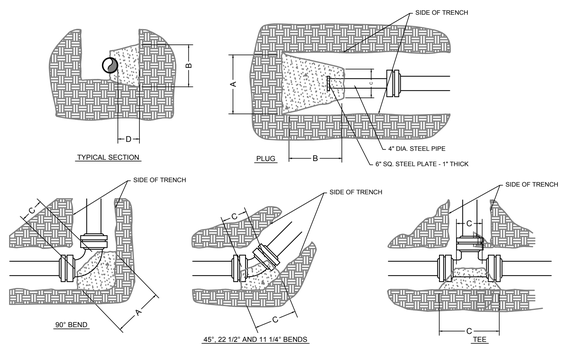
CONCESSION STAND AND RESTROOMS



BAND ROOM EXPANSION



SEWER CLEANOUT, IN TRAFFIC
NOT TO SCALE



NOTE:
THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED EARTH.

90° BEND							
SIZE	2"	4"	6"	8"	10"	12"	18"
A	16"	16"	26"	33"	40"	50"	70"
B	16"	16"	24"	33"	40"	50"	70"
C	9"	9"	12"	12"	15"	16"	22"
D	8"	8"	12"	16"	20"	25"	24"

11 1/4° BEND							
SIZE	2"	4"	6"	8"	10"	12"	18"
A	9"	9"	11"	13"	16"	18"	30"
B	9"	9"	11"	13"	16"	18"	30"
C	8"	8"	10"	12"	14"	16"	15"
D	4"	4"	5"	6"	8"	9"	16"

45° BEND							
SIZE	2"	4"	6"	8"	10"	12"	18"
A	12"	12"	18"	24"	31"	37"	52"
B	12"	12"	18"	24"	31"	37"	52"
C	8"	8"	10"	12"	14"	16"	14"
D	6"	6"	9"	12"	15"	18"	18"

PLUG							
SIZE	2"	4"	6"	8"	10"	12"	18"
A	26"	26"	26"	34"	43"	52"	70"
B	26"	26"	26"	34"	43"	52"	70"
C	12"	12"	12"	12"	12"	12"	30"
D	11"	11"	11"	15"	22"	32"	32"

22 1/2° BEND							
SIZE	2"	4"	6"	8"	10"	12"	18"
A	9"	9"	13"	18"	23"	26"	40"
B	9"	9"	13"	18"	23"	26"	40"
C	8"	8"	10"	12"	14"	16"	15"
D	4"	4"	6"	9"	11"	13"	16"

TEE							
SIZE		2"	4"	6"	8"	10"	12"	12"
MAIN		2'-6"	8'-10"	8'-10"	12"	12"	12"	12"
BRANCH		2'-6"	2'-6"	8'-10"	2'-6"	8'-10"	12"	16"-18"
A		26"	26"	43"	26"	43"	52"	70"
B		26"	26"	43"	26"	43"	52"	70"
C		12"	12"	12"	12"	12"	12"	30"
D		13"	13"	21"	13"	21"	26"	24"

THRUST BLOCK DETAIL

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HOUSTON HIGH SCHOOL
BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10/11/2019	

MICHAEL D. ROGERS
REGISTERED ENGINEER
PROFESSIONAL ENGINEER
COMMISSION NO. 109551
STATE OF TENNESSEE

Issue Date:	2019-08-26
F&A Project No:	FLEMARCH
Drafted By:	MRS
Checked By:	MDR

Sheet Title:
UTILITY PLAN

Sheet No.
C005

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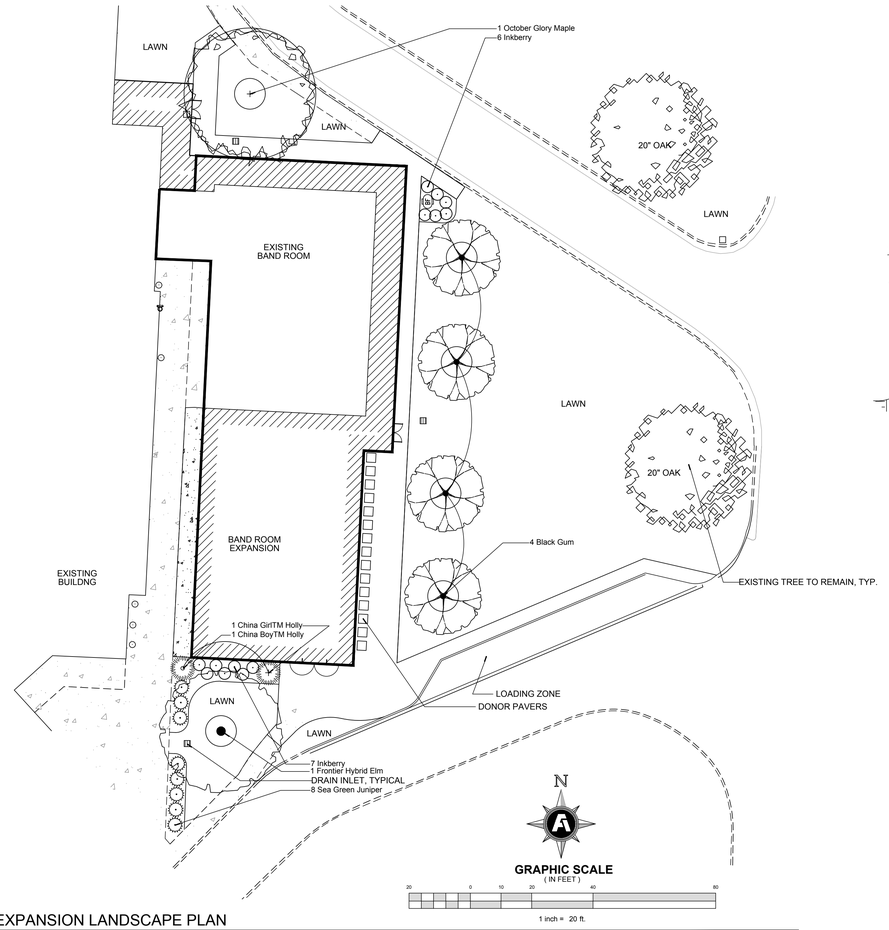
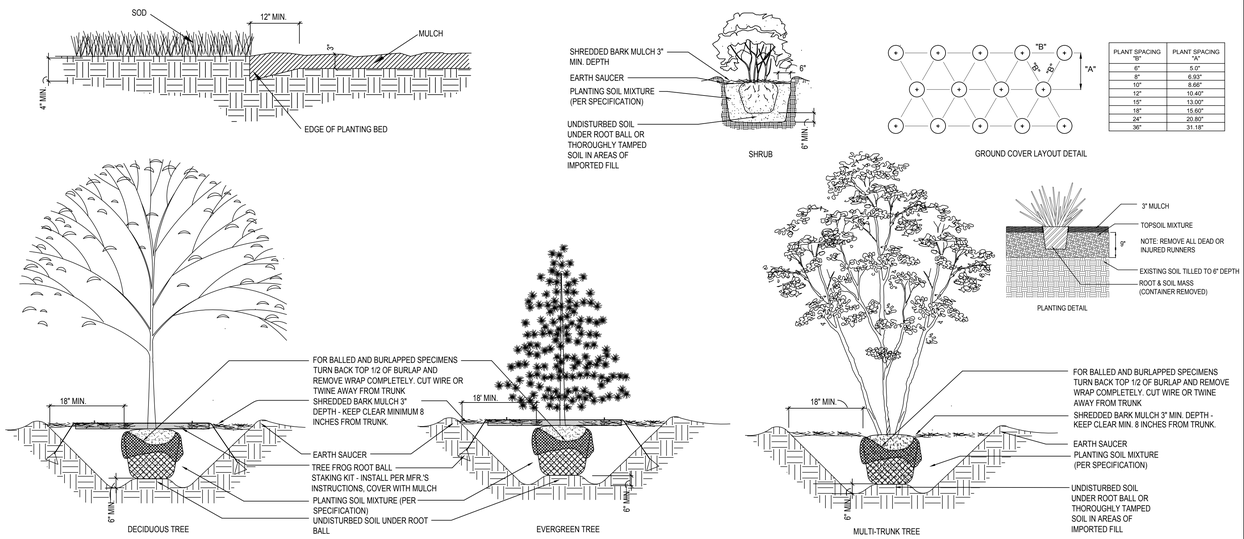
Layout Name: C005 Utility Plan
Plotted: Friday, October 11, 2019 - 11:16 am



BAND ROOM EXPANSION LANDSCAPE PLAN

SCALE: 1" = 20'-0"



TYPICAL PLANTING AND BED EDGING DETAILS

NOT TO SCALE

PLANT SCHEDULE BAND ROOM EXPANSION

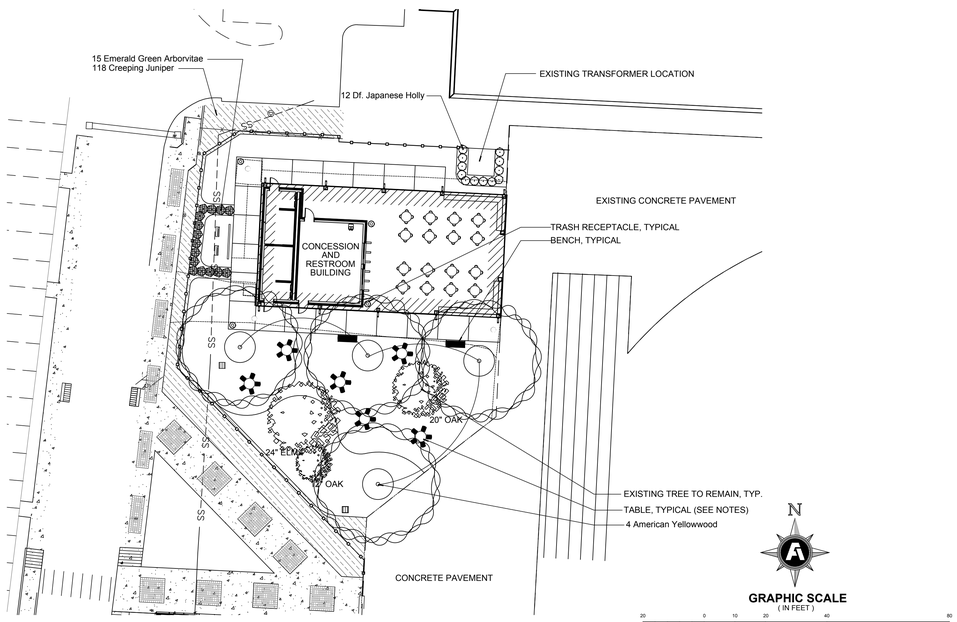
TREES	COMMON NAME	BOTANICAL NAME	CONDITION	CAL	SIZE	REMARKS
4	Black Gum	Nyssa sylvatica `Wildfire`	--	2.5"Cal		Matched specimens, min. 4` clear trunk
1	Frontier Hybrid Elm	Ulmus x `Frontier`	--	2.5"Cal		Matched specimens, min. 3 stems
1	October Glory Maple	Acer rubrum `October Glory` TM	--	2.5"Cal		Matched specimens, min. 4` clear trunk

SHRUBS	COMMON NAME	BOTANICAL NAME	CONDITION	SPR.	HT.	REMARKS
1	China BoyTM Holly	Ilex x meserveae `Mesdob`	--		36"	Dense, full to ground
1	China GirlTM Holly	Ilex x meserveae `Mesog`	--		36"	Dense, matching specimens, full to ground
+ 13	Inkberry	Ilex glabra `Shamrock`	--		24"	Dense, matching specimens, full to ground
8	Sea Green Juniper	Juniperus chinensis `Sea Green`	--	18" spread		Dense, full matching specimens

NOTE: CONTRACTOR SHALL PROVIDE ADDITIONAL PLANTS NOTED WITH "+" FOR SCREENING UTILITIES INSTALLED BUT NOT SHOWN ON THE PLAN. CONTRACTOR TO OBTAIN LANDSCAPE ARCHITECT'S APPROVAL PRIOR TO INSTALLING ADDITIONAL SCREENING PLANTS.

PLANT SCHEDULE - BAND ROOM EXPANSION

NOT TO SCALE



CONCESSION STAND AND RESTROOMS LANDSCAPE PLAN

SCALE: 1" = 20'-0"

PLANT SCHEDULE CONCESSION BLDG

TREES	COMMON NAME	BOTANICAL NAME	CONDITION	CAL	SIZE	REMARKS
4	American Yellowwood	Cladrastis kentukea	--	2.5"Cal		Matched specimens, min. 4` clear trunk
+ 15	Emerald Green Arborvitae	Thuja occidentalis `Smaragd`	--	2.5"Cal	5-6' ht.	Matched specimens, full to ground

SHRUBS	COMMON NAME	BOTANICAL NAME	CONDITION	SPR.	HT.	REMARKS
+ 12	Df. Japanese Holly	Ilex crenata `Compacta`	--		24"	Dense, full specimens

GROUND COVERS	COMMON NAME	BOTANICAL NAME	CONT	SPACING	REMARKS
118	Creeping Juniper	Juniperus horizontalis `Plumosa Compacta`	18" spread	4` on centers	Dense, full plants

NOTE: CONTRACTOR SHALL PROVIDE ADDITIONAL PLANTS NOTED WITH "+" FOR SCREENING UTILITIES INSTALLED BUT NOT SHOWN ON THE PLAN. CONTRACTOR TO OBTAIN LANDSCAPE ARCHITECT'S APPROVAL PRIOR TO INSTALLING ADDITIONAL SCREENING PLANTS.

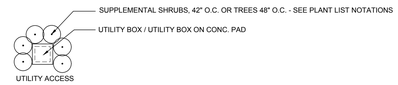
PLANT SCHEDULE - CONCESSION BUILDING

NOT TO SCALE

1. SITE FURNISHINGS (BENCHES, TABLES, TRASH RECEPTACLES) TO BE SELECTED BY THE OWNER AND INSTALLED BY THE CONTRACTOR IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, WITH SURFACE OR EMBEDMENT MOUNT, AS SELECTED BY OWNER. AT LEAST ONE OF EACH BENCH AND TABLE SHALL BE ADA COMPLIANT. SITE FURNISHING COLORS TO BE SELECTED FROM AVAILABLE STANDARD COLORS, PREFERABLY IN SCHOOL COLORS, AS APPROVED BY THE OWNER.
2. AN AUTOMATIC UNDERGROUND IRRIGATION SYSTEM SHALL BE PROVIDED FOR ALL REQUIRED PLANTINGS, WITH MINIMAL DISTURBANCE TO THE ROOT SYSTEMS OF EXISTING TREES TO REMAIN. PIPING AND IRRIGATION HEADS TO BE LOCATED ADJACENT TO NEW WALKS WHEREVER POSSIBLE.
3. IRRIGATION BACKFLOW PREVENTER TO BE LOCATED IN NEW BUILDING RISER ROOM OR SHALL BE SCREENED AS A UTILITY, AS NOTED ON THE PLANT SCHEDULE AND IN THE UTILITY SCREENING DETAIL.

GENERAL NOTES

NOT TO SCALE



NOTE: UTILITY ENCLOSURES NOT SHOWN ON THE PLANS ARE TO BE SCREENED WITH EVERGREEN SHRUBS OR TREES, AS NOTED IN THE SCHEDULE. CONTRACTOR SHALL OBTAIN APPROVAL OF THE LANDSCAPE ARCHITECT REGARDING WHETHER EVERGREEN TREES OR SHRUBS ARE REQUIRED FOR THE UTILITY SCREENING, PRIOR TO INSTALLATION.

UTILITY SCREENING DETAIL

NOT TO SCALE

TREE LIST			
	PRESERVED	REMOVED	PLANTED
NO.	5	3	25
TOTAL CALIPER	96"	47"	62.5"

Tree Type	Size
~~MAPLE~~	~~14~~
~~MAPLE~~	~~15~~
OAK	20
OAK	20
~~TREE~~	~~18~~
OAK	20
OAK	12
ELM	24

TREE SUMMARY

NOT TO SCALE

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Filename: Z:\FLEMARCH\00\Planning\plans\Item15-LS01 total project.dwg
Layout Name: LANDSCAPE PLAN
Plotted: Friday, October 11, 2019 - 10:01 am

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HOUSTON HIGH SCHOOL
BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

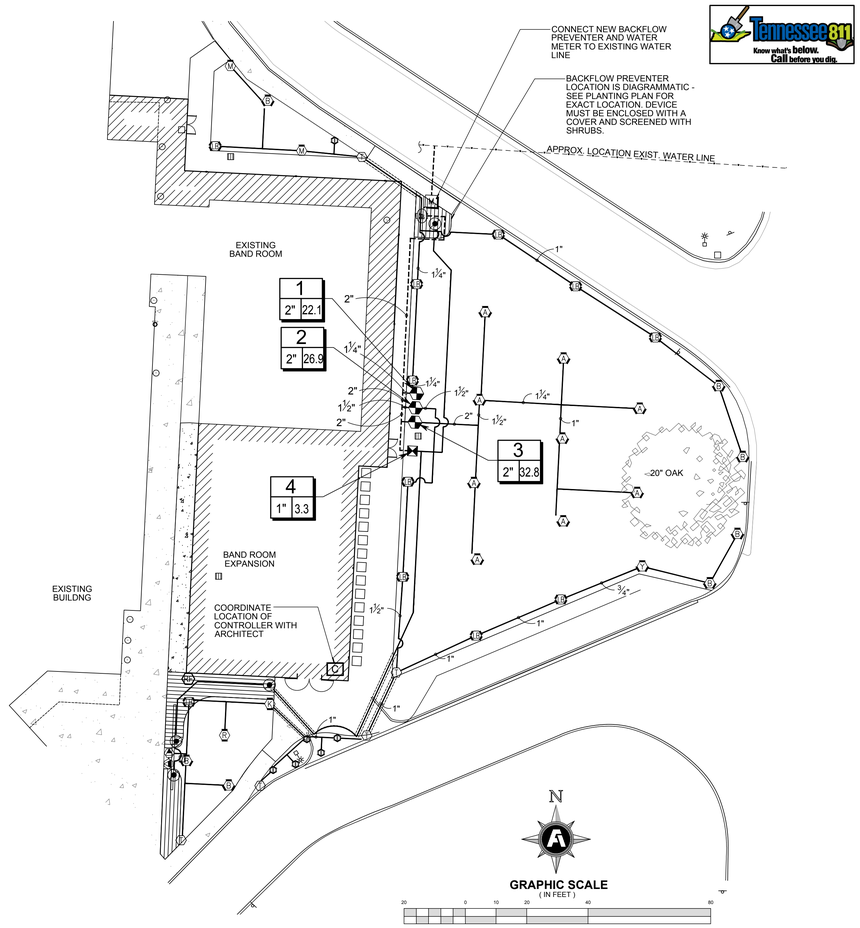
Rev.	Date	Revision Description
1	10-11-19	REPLACES PREVIOUS PLAN
5-29-2019		REV. SPRINKLER DESIGN

SOBEL R. BRANCH
TENNESSEE
REGISTERED
LANDSCAPE ARCHITECT
10-11-2019

Issue Date:	2019-08-26
F&A Project No:	FLEMARCH
Drafted By:	IRR
Checked By:	DBB

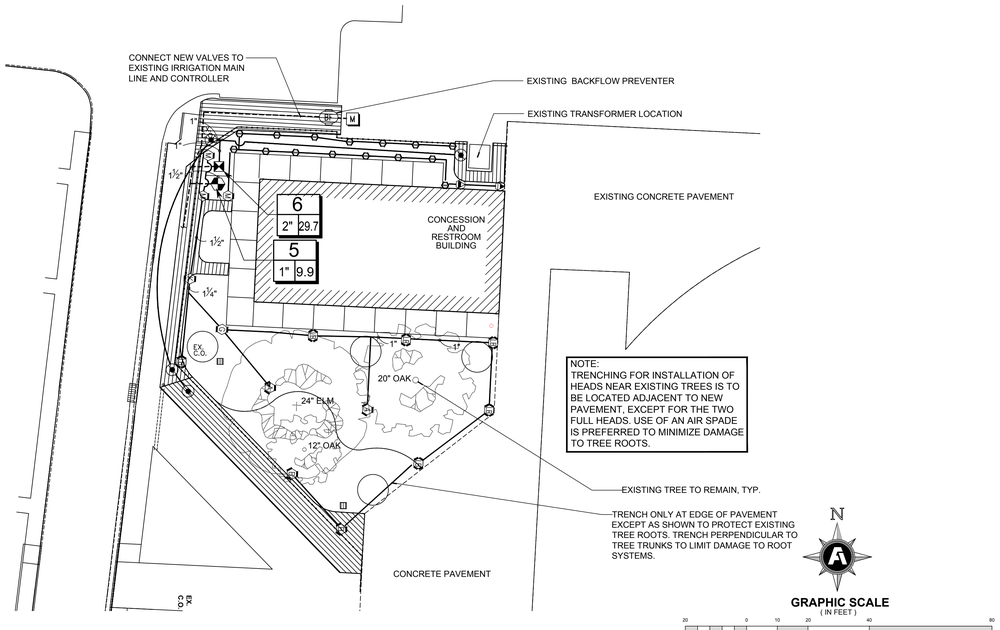
Sheet Title:
LANDSCAPE PLAN

Sheet No.
L001



BAND ROOM EXPANSION IRRIGATION PLAN

SCALE: 1" = 20'-0"



CONCESSION STAND AND RESTROOMS IRRIGATION PLAN

SCALE: 1" = 20'-0"

IRRIGATION SYSTEM:

1. THE IRRIGATION WATER SUPPLY SHALL CONSIST OF A 1" WATER METER (INSTALLED BY GENERAL CONTRACTOR). A 2" TYPE K COPPER WATER TUBE SERVICE LINE, AND A 2" REDUCED PRESSURE BACKFLOW PREVENTION DEVICE AS SHOWN IN THE PLANS.
2. THE IRRIGATION SYSTEM HAS BEEN DESIGNED TO PROVIDE OPTIMUM DISTRIBUTION OF WATER, WITH ROTORS IN TURF AREAS, AND DRIP IRRIGATION IN BED AREAS.
3. MINIMUM STATIC WATER PRESSURE REQUIRED AT EACH ZONE VALVE FOR THE EFFICIENT OPERATION OF THE IRRIGATION SYSTEM AS DESIGNED IS INDICATED ON THE IRRIGATION SCHEDULE. THE INSTALLER SHALL VERIFY THAT ADEQUATE WATER PRESSURE IS AVAILABLE AT THE SITE PRIOR TO BEGINNING INSTALLATION. NOTIFY THE DESIGNER IN WRITING IF THE STATIC PRESSURE IS INSUFFICIENT.
4. UTILITIES ARE NOT LOCATED ON THE IRRIGATION PLANS. THE IRRIGATION INSTALLER IS RESPONSIBLE FOR LOCATING ALL UTILITIES ON THE PROJECT SITE.
5. LOCATIONS OF ELEMENTS ON THE DRAWINGS ARE SCHEMATIC. EXACT LOCATIONS ARE TO BE VERIFIED IN THE FIELD BY THE INSTALLER. PIPE LINES DRAWN SIDE BY SIDE MAY BE LAID IN THE SAME TRENCH. SOME PIPE LOCATIONS ARE SHOWN IN LOCATIONS OFFSET FROM OPTIMUM LOCATIONS (BACK OF CURB, SIDEWALK, DRIVES, ETC.) TO CLEARLY SHOW THE INTENDED PIPE ROUTING.
7. LATERAL PIPE SIZES FOR TURF IRRIGATION ARE 3/4" UNLESS OTHERWISE NOTED ON THE PLAN.
8. ALL IRRIGATION ZONES SHALL BE CLEARLY LABELED ON A ZONE CHART LOCATED IN OR NEAR THE CONTROLLER.
9. CONTRACTOR TO PROVIDE AS-BUILT PLANS UPON COMPLETION OF PROJECT.
10. EACH CONTROL VALVE SHALL BE IDENTIFIED BY CONTROLLER LETTER ZONE NUMBER, SIZE AND GPH.
11. ALL ROTOR WATERING SHALL TAKE PLACE AFTER 2:00 AM AND BEFORE 7:00 AM.
12. THE CONTRACTOR IS RESPONSIBLE FOR THE IRRIGATION SYSTEM FOR ONE (1) YEAR AFTER THE COMPLETION OF THE SYSTEM.
13. THIS IRRIGATION PLAN IS DIAGRAMMATIC IN NATURE. CONTRACTOR SHALL VERIFY ACTUAL FIELD CONDITIONS AS WELL AS LOCATION OF DISTRIBUTION PIPING, SLEEVING, AND SYSTEM CALCULATIONS PRIOR TO INSTALLATION TO OBTAIN A COMPLETE AND OPERATIONAL IRRIGATION SYSTEM. REPORT ANY AND ALL LAYOUT DISCREPANCIES IMMEDIATELY TO THE OWNER'S REPRESENTATIVE FOR DECISION.
14. CONTRACTOR TO LOCATE MAIN AND LATERAL LINES TO AVOID DISRUPTION TO THE ROOT SYSTEM OF EXISTING TREES TO REMAIN.
15. CONTRACTOR TO CONFIRM ALL IRRIGATION SLEEVES ARE IN PLACE AND MARKED PRIOR TO START OF IRRIGATION WORK.
16. ALL IRRIGATION LINES RUNNING IN THE SAME TRENCH SHALL BE SEPARATED BY A MINIMUM OF 3" OF SOIL.
17. IRRIGATION CONTRACTOR TO REQUEST AND CONFIRM ALL ALIGNMENTS AND DEPTHS OF ALL PROPOSED OR EXISTING UTILITY LOCATIONS BEFORE ANY TRENCHING BEGINS.

IRRIGATION DISTRIBUTION PIPING:

1. THE BURIAL DEPTH FOR THE MAIN LINE SHALL BE NO LESS THAN 24" AT FINISHED GRADE.
2. ALL MAIN LINE PIPING RUNS SHALL BE "SNAKED" IN THE TRENCH DURING INSTALLATION TO PREVENT EXCESSIVE STRAIN DUE TO THERMAL EXPANSION AND CONTRACTION.
3. ALL SLEEVING SHALL BE APPROPRIATELY SIZED NON-PERFORATED SCHEDULE 40 PVC PIPE UNLESS OTHERWISE NOTED. SLEEVING SHALL BE NO LESS THAN 24" DEEP UNDER PAVEMENT. PROVIDE SLEEVES UNDER ALL PAVEMENTS.
4. USE PURPLE PRIMER AND GLUE TO CONNECT PIPE.
5. MAIN LINE PIPE SIZE IS 2" UNLESS OTHERWISE NOTED.

CONTROL VALVES FOR ROTARY SPRAYS:

1. ALL VALVES SHALL BE INSTALLED IN RAINBIRD VALVE BOXES WITH LIDS, OR APPROVED EQUAL. THEY ARE TO BE MOUNTED AT GRADE LEVEL.VALVE BOX TOPS TO BE LABELED WITH VALUE NUMBER CORRESPONDING TO NUMBER IN CONTROLLER.
2. REMOTE VALVES SHALL BE AS SHOWN ON THE IRRIGATION SCHEDULE.
3. ALL MANUALLY OPERATED VALVES IN THE SYSTEM SHALL BE RATED FOR A WORKING PRESSURE MINIMUM OF 150 PSI.
4. VALVE WIRING SHALL FOLLOW THE MAINLINE PIPING WHERE FEASIBLE AND SHALL BE LAID TO THE SIDE OF THE PIPING IN A COMMON TRENCH.
5. WIRE RUNS SHALL BE INSTALLED WITH ENOUGH SLACK AND/OR OCCASIONAL EXPANSION LOOPS TO PREVENT EXCESSIVE STRAIN DUE TO THERMAL CONTRACTION.
6. ALL WIRING SHALL BE INSTALLED IN ACCORDANCE WITH THE LOCAL CODE REQUIREMENTS.
7. VALVE LOCATION IS DIAGRAMMATIC. CONTRACTOR SHALL GROUP VALVES TOGETHER AND LOCATE IN BED AREAS WHEREVER POSSIBLE.

CONTROLLER:

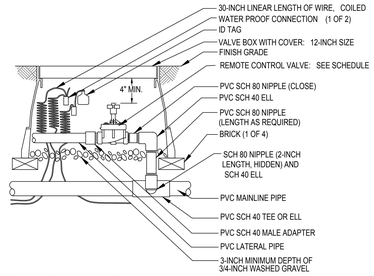
1. THE IRRIGATION CONTROLLER SHALL BE AS NOTED IN THE IRRIGATION SCHEDULE. CONTRACTOR SHALL COORDINATE LOCATION OF CONTROLLER FOR BAND ROOM EXPANSION WITH THE OWNER. THE CONTROLLER SHALL HAVE MORE THAN ENOUGH STATIONS TO HANDLE THE NUMBER OF ZONES REQUIRED FOR ZONES 1-4. ZONES 5 AND 6 SHALL CONNECT TO FIELD HOUSE IRRIGATION CONTROLLER.
2. THE CONTRACTOR SHALL INSTALL AND WIRE THE CONTROLLER TO THE IRRIGATION SYSTEM, INCLUDING ZONES 4 AND 5 TO THE FIELDHOUSE IRRIGATION SYSTEM CONTROLLER.
3. CONTRACTOR SHALL COORDINATE INSTALLATION OF THE CONTROLLER WITH THE ELECTRICAL CONTRACTOR.
4. ALL ELECTRICAL CONNECTIONS MUST BE IN ACCORDANCE WITH LOCAL CODE REQUIREMENTS.
5. RAIN SENSOR SHALL BE PROVIDED ON EXTERIOR FACE OF BUILDING IN APPROXIMATE LOCATION SHOWN ON THE PLAN.

BACKFLOW PREVENTER:

1. BACKFLOW PREVENTION SHALL BE INSTALLED IN STRICT ACCORDANCE WITH LOCAL CODE REQUIREMENTS. APPROXIMATE LOCATION IS SHOWN ON THIS PLAN TO PROVIDE CLARITY OF PIPING LAYOUT. SEE LANDSCAPE PLAN FOR MORE EXACT LOCATION SO THAT SCREENING IS PROVIDED BY PLANT MATERIALS.
2. THE BACKFLOW PREVENTION SYSTEM SHALL BE SUPPLIED WITH ISOLATION VALVES TO ALLOW FOR PROPER MAINTENANCE.
3. USE DEVICE AS NOTED ON THE IRRIGATION SCHEDULE AND PROVIDE ENCLOSURE APPROVED BY THE CITY OF GERMANTOWN.

GENERAL NOTES

NOT TO SCALE



REMOTE CONTROL VALVE

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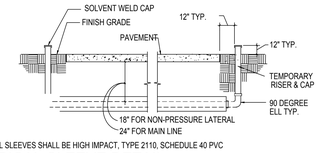
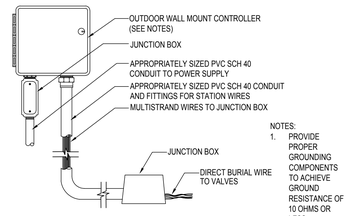


ALL SLEEVES SHALL BE HIGH IMPACT, TYPE 2110, SCHEDULE 40 PVC

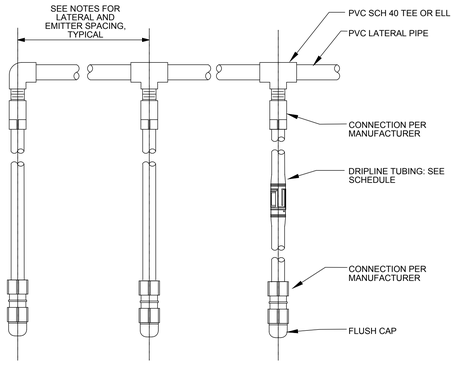
TYPICAL SLEEVE DETAIL



NOTES:
1. PROVIDE PROPER GROUNDING COMPONENTS TO ACHIEVE GROUND RESISTANCE OF 10 OHMS OR LESS.

CONTROLLER

NOT TO SCALE



LANDSCAPE DRIPLINE AT MULCHED AREAS

NOT TO SCALE

IRRIGATION SCHEDULE

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
T	Hunter MP Corner PROS-06-PRS40-CV Turf Rotator, 6" (15.24cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. T=Turquoise adj arc 45-105.	5
LST RST SST	Hunter MP Strip PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. LST=Ivory left strip, SST=Brown side strip, RST=Copper right strip.	4
M E O	Hunter MP1000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. M=Maroon adj arc 90 to 210, L=Light Blue 210 to 270 arc, O=Olive 360 arc.	5
K G R	Hunter MP2000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. K=Black adj arc 90-210, G=Green adj arc 210-270, R=Red 360 arc.	4
B Y A	Hunter MP3000 PROS-06-PRS40-CV Turf Rotator, 6" (15.24 cm) pop-up with factory installed check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. B=Blue adj arc 90-210, Y=Yellow adj arc 210-270, A=Gray 360 arc.	21
LB	Hunter MP3500 PROS-06-PRS40-CV Turf Rotator, 6.0" Pop-up with factory installed check valve, pressure regulated to 40 psi, MP Rotator nozzle on PRS40 body. LB=light brown adjustable arc, 90-210.	17
ADJ. 360	Hunter MP800SR PROS-06-PRS40-CV Turf Rotator, 4.0" pop-up with check valve, pressure regulated to 40 psi (2.76 bar), MP Rotator nozzle on PRS40 body. ADJ=Orange and Gray (arc 90-210), 360=Lime Green and Gray (arc 360)	21

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
	Hunter ICZ-101-25 Drip Control Zone Kit. 1" ICV Globe Valve with 1" HY100 filter system. Pressure Regulation: 25psi. Flow Range: 2 GPM to 20 GPM. 150 mesh stainless steel screen.	2
	Pipe Transition Point	8
	Area to Receive Dripline Hunter PLD-06-18 (18) In-Line Pressure Compensating Landscape Dripline with Built-In Check Valve. 0.6GPH emitters at 18.0" O.C. Dripline laterals spaced at 18.0" apart, with emitters offset for triangular pattern. UV Resistant.	2,783 s.f.

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	QTY
	Hunter PGV-201 Angle 2" Plastic Electric Remote Control Valve, for Residential/Light Commercial Use. Female NPT Inlet/Outlet, With Flow Control. Angle Configuration.	4
BF	Watts LF909 1" Lead Free Reduced Pressure Backflow Preventer.	1
C	Hunter ACC-1200 12 Station Outdoor Modular Controller. No Module Required. High-End Commercial Use. Metal Cabinet.	1
R	Hunter RFC Rain and freeze sensor, with conduit installation, mount as noted. Normally closed switch.	1
M	Water Meter 1"	1
	Irrigation Lateral Line: PVC Class 200 SDR 21	1,984 l.f.
	Irrigation Mainline: PVC Class 200 SDR 21	207.0 l.f.
	Pipe Sleeve: PVC Schedule 40	127.5 l.f.

Valve Callout

IRRIGATION SCHEDULE

NOT TO SCALE

Generated:	2019-09-09 12:14
P.O.C. NUMBER: 01	
Water Source Information:	
FLOW AVAILABLE	
Water Meter Size:	1"
Flow Available:	37.50 gpm
PRESSURE AVAILABLE	
Static Pressure at POC:	80.00 psi
Elevation Change:	0.00 ft
Service Line Size:	2"
Length of Service Line:	20.00 ft
Pressure Available:	80.00 psi
DESIGN ANALYSIS	
Maximum Station Flow:	32.76 gpm
Flow Available at POC:	37.50 gpm
Residual Flow Available:	4.74 gpm
Pressure Req. at Critical Station:	44.03 psi
Loss for Fittings:	0.06 psi
Loss for Main Line:	0.58 psi
Loss for POC to Valve Elevation:	0.00 psi
Loss for Backflow:	15.28 psi
Loss for Water Meter:	6.43 psi
Critical Station Pressure at POC:	66.38 psi
Pressure Available:	80.00 psi
Residual Pressure Available:	13.62 psi

CRITICAL ANALYSIS

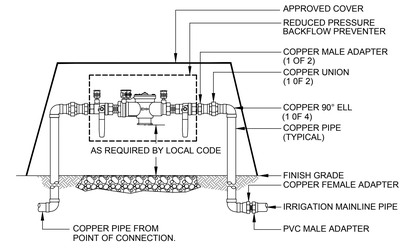
NOT TO SCALE

VALVE_SCHEDULE

NUMBER	MODEL	SIZE	TYPE	GPM	PSI	PSI @ POC	PRECIP
1	Hunter PGV-201 Angle	2"	Turf Rotary	22.09	44.94	62.43	0.34 in/h
2	Hunter PGV-201 Angle	2"	Turf Rotary	26.86	45.55	65	0.39 in/h
3	Hunter PGV-201 Angle	2"	Turf Rotary	32.76	44.03	66.38	0.31 in/h
4	Hunter ICZ-101-25	1"	Area for Dripline	3.16	42.44	54.13	0.45 in/h
5	Hunter ICZ-101-25	1"	Area for Dripline	9.92	47.34	58.02	0.45 in/h
6	Hunter PGV-201 Angle	2"	Turf Rotary	29.72	45.92	58.17	0.51 in/h

VALVE SCHEDULE

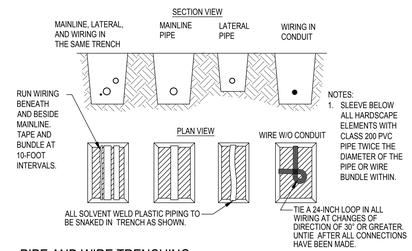
NOT TO SCALE



NOTE:
1. INSTALL BACKFLOW PREVENTER AS REQUIRED BY LOCAL CODES AND HEALTH DEPARTMENT. VERIFY LOCAL REQUIREMENTS PRIOR TO INSTALLATION.

BACKFLOW PREVENTER

NOT TO SCALE



NOTES:
1. SLEEVE BELOW ALL HARDSCAPE ELEMENTS WITH CLASS 200 PVC PIPE TWICE THE DIAMETER OF THE PIPE OR WIRE BUNDLE WITHIN.

PIPE AND WIRE TRENCHING

NOT TO SCALE

NOTE:
ALTHOUGH THIS SYSTEM HAS BEEN DESIGNED USING HUNTER BRAND IRRIGATION EQUIPMENT, RAINBIRD PRODUCTS ARE AN ACCEPTABLE EQUIVALENT. CONTRACTOR IS RESPONSIBLE FOR ANY PROJECT RE-DESIGN REQUIRED FOR RAINBIRD PRODUCT SUBSTITUTION.

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HOUSTON HIGH SCHOOL
BAND ROOM EXPANSION
GERMANTOWN, TENNESSEE

Rev.	Date	Revision Description
1	10-11-19	REPLACES PREVIOUS PLAN

SOREL R. RITTER
REGISTERED
No. 20
STATE OF TENNESSEE
LANDSCAPE ARCHITECT
10-11-2019

Issue Date:	2019-08-26
F&A Project No:	FLEMARCH
Drafted By:	IRR
Checked By:	DBB

Sheet Title:
IRRIGATION PLAN

Sheet No.
L002

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Filename: 2019_FLEMARCH_000_Planning Plans V.rvt15-LS01 DRC IRRIGATION.dwg
Layout Name: IRRIGATION PLAN
Plotted: Monday, October 14, 2019 - 7:23 am

Abbreviations

AFF	Above Finished Floor
Approx	Approximate(ly)
Arch	Architectural
Bldg	Building
BTM	Bottom
Brg	Bearing
CL	Centerline
Clr	Clear or Clearance
CMU	Concrete Masonry Unit
Col	Column
Conc	Concrete
Conn	Connection
Const	Construction
Cont	Continuous
Dia, Ø	Diameter
Dim	Dimension
Dwg	Drawing
Ea	Each
EF	Each Face
Elec	Electrical
Elev	Elevation
Embed	Embedment
Eq	Equal
EW	Each Way
Exist	Existing
Exp	Expansion
Ext	Exterior
Fnd	Foundation
FFE	Finished Floor Elevation
FP	Full Penetration
FS	Far Side
Ftg	Footing
Ga	Gage or Gauge
Horiz	Horizontal
Int	Interior
K	Kips(1000 LBS.)
KSI	Kips per Square Inch
LB, #	Pound
LL	Live Load
LLH	Long Leg Horizontal
LLV	Long Leg Vertical
Long	Longitudinal
Manuf	Manufacturer
Max	Maximum
Mech	Mechanical
Mid	Middle
Min	Minimum
Misc	Miscellaneous
N/A	Not Applicable
NS	Near Side
NTS	Not to Scale
o.c.	On Center
Opp	Opposite
Perp	Perpendicular
PL	Plate
PEMB	Pre-engineered Metal Building
Prelim	Preliminary
Proj	Projection
PSF	Pounds per Square Foot
PSI	Pounds per Square Inch
Reinf	Reinforcing(-ed, -ment)
Req'd	Required
Rev	Revision
RW	Retaining Wall
Sched	Schedule(d)
Sect	Section
Sim	Similar
Spec	Specifications(s)
Sym	Symmetrical
T	Top, Tension
T/, T.O.	Top of
T/Conc	Top of Concrete
T/Ftg	Top of Footing
T/Slab	Top of Slab
T&B	Top & Bottom
Temp	Temperature
Thk	Thickness
TOS	Top of Steel
TOW	Top of Wall
Trnv	Transverse
Typ	Typical
UNO	Unless Noted Otherwise
Vert	Vertical
w/	With
w/o	Without
W.W.F.	Welded Wire Fabric

Design Criteria

Building Code
- 2012 International Building Code (IBC)
- ASCE 7-10

Roof Loads:
- Live Load = 20 psf
- Dead Load = 25 psf

Snow Load:
- Ground Snow Load: Pg = 10 psf

Wind Load (Per ASCE 7-10):
- Basic wind speed
  - V_{ULT} = 120 mph
  - V_{ASD} = 93 mph
- Risk Factor = III
- Wind Exposure = B

Seismic loads (Per ASCE 7-10):
- Risk Category = IV
- Spectral Response Coefficients
  - S_s = 0.797
  - S_{MS} = 0.628
  - S_1 = 0.283
  - S_{M1} = 0.346
- Soil Site Class = D
- Seismic Design Category = D
- Seismic force resisiting system:
  - Special Reinforced Masonry Shear Walls
  - Response modification factor R = 5.0
  - System overstrength factor = 2.5
  - Deflection amplification factor C_d =3.5
- Design base shear.....V= C_sW
- Analysis procedure.....Equivalent Lateral Force

Shallow Foundations

1. Foundations are designed based upon assumed soil bearing capacities as stated below.

2. Allowable soil bearing pressures used in design: Spread footings =1800 psf /Continuous footing = 1800 psf

3. Footing excavations shall be observed and tested by an experienced geotechnical engineer prior to steel or concrete placement in order to assess that the foundation materials are consistent with above stated assumed soil bearing capacities.

4. In the event that the soils test results are disapproved, footing excavations shall be undercut (under the direction of the soils engineer) until soils of adequate bearding capacity are encountered. Backfill under footings shall consist of concrete f'c = 2500 psi @ 28 days placed up to the proposed bottom of footing elevation.

5. Footings shall bear on undisturbed residual soils or compacted fill, maximum desnist of 98% ASTM D-698.

6. Footing elevations shown on the plans are for estimating purposes only. Actual footing elevations shall be determined by the contractor at the site and shall be a minimum of 12" below finished grade.

7. All water shall be removed from foundation excavations prior to placing of concrete. If bottoms of trenches become softened due to water before footings are cast, the contractor, at his own expense, shall excavate the softened material and replace with concrete.

8. All pipes (water lines, sewer lines, etc.) And conduits running through walls / slabs shall be protected with ½" expansion material.

9. Continuous footing perpendicular to pipe runs shall be either lowered to allow pipes to pass through above such footings or have concrete jacket if pipes are low enough to be placed below such footings. Footings parallel to pipe runs shall be lowered to avoid surcharge onto the trench excavations.

General Notes

1. No provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the contract documents) shall be effective to change the duties and responsibilities of the owner, contractor, architect, engineer, supplier, or any of the consultants, agents, or employees from those set forth in the contract documents, nor shall it be effective to assign to the structural engineer of record (S.E.R.) or any of the S.E.R.'s consultants, agents, or employees any duty or authority to supervise or direct the furnishing or performance of the work or any duty or authority to undertake responsibilities contrary to the provisions of the contract documents.

2. Reference to standard specifications (concerning structural design) of any technical society, organization, or association or to codes of local or state authorities, shall mean the latest standard codes, specification or tentative specification adopted at the date of taking bids, unless specifically stated otherwise.

3. In the event contract documents conflict with the code of practice or specifications of ACI, PCI, AISC, AISI, SJI or other standards, contact structural engineer for clarification.

4. Notes and specific details on the drawings shall take precedence over general structural notes and typical details. Contact the architect / engineer for a determination of intent before proceeding with related work if there is any discrepancy or question regarding which note to follow.

5. Material, workmanship, and design shall conform to the referenced building code.

6. The contractor shall verify the dimensions, elevations and site conditions before starting work. The architect / engineer shall be notified of any discrepancy.

7. The design, adequacy, and safety of erection bracing, shoring, temporary supports, etc. is the sole responsibility of the contractor.

8. The contractor shall coordinate the architectural, mechanical, electrical, plumbing and civil works with the structural contract documents. The architect / engineer shall be notified of any discrepancies or omissions.

9. The contractor shall notify, in writing, the engineer of conditions encountered in the field that are contradictory to those shown on the contract documents.

10. For dimensions not shown on the structural drawings see the architectural drawings.

Concrete

1. All phases of work pertaining to the concrete construction shall conform to the "Building Code Requirements for Structural Concrete" (ACI 318), latest edition with modifications as noted in the drawings or specifications.

2. Concrete mixes shall be designed by a qualified testing laboratory and approved by the structural engineer.

3. All exposed corners or edges of columns, piers, walls, etc., shall be formed with a 3/4" chamfer unless noted otherwise on structural or architectural drawings.

4. All reinforcing bars, anchor bolts and other concrete inserts shall be well secured in position prior to placing concrete.

5. Provide sleeves for plumbing and electrical openings in concrete before placing concrete. Do not cut any reinforcing that may conflict. Coring is not permitted except as shown. Notify the structural engineer in advance of conditions not shown on the drawings.

6. Conduit or pipe size (o.d.) shall not exceed 30% of the slab thickness and shall be placed between the top and bottom reinforcing unless specifically detailed otherwise. Concentrations of conduits or pipes shall be avoided except where detailed openings are provided.

7. Curing compounds on concrete that is to receive special finish shall be approved by the manufacturer before use.

8. Roughen surface of horizontal or nearly horizontal construction joints so that the aggregate shall be exposed uniformly, leaving no laitance, loosed particles or damaged concrete.

9. Locate joints not indicated to least impair strength and appearance of the structure. Locate horizontal joints in concrete only where they normally occur or where indicated. Locate vertical joints in middle third of spans of slabs, beams, or girders unless a beam intersects a girder at middle location, in which case offset joints in girders twice the width of the beam.

10. Once formwork has been removed from concrete retaining walls, brace walls thoroughly before placing soil against wall and keep bracing in place for a minimum of 7 days after earthwork is complete.

Schedule of Concrete Strengths

Use (Location)	28 Day Strength	Aggregate Size (Max.)	Cement/CY (Min.)	W/C ratio (Max.)	Slump (Max.)	Air Entrainment
Slab-on-grade (Interior)	f'c=4,000 psi	1"	560#	.54	4-1/2"	None
Exposed Concrete	f'c=4,000 psi	1"	560#	.54	4-1/2"	4%-6%
Footings	f'c=3,000 psi	1"	480#	.62	4-1/2"	None

1. All aggregate shall be Limestone
2. All cement shall be Portland Cement Type 1

Reinforcing

1. Reinforcing shall be detailed and placed in conformance with ACI Detailing Manual.

2. Reinforcing bars shall conform to the requirements of ASTM A615 Grade 60 except all reinforcing in concrete moment frames and shear walls and all welded reinforcement shall conform to ASTM A706 Grade 60.

3. Welded wire fabric shall conform to ASTM A185.

4. Minimum lap of welded wire fabric shall be 6" or one full mesh + 2", whichever is greater.

5. Dowels between footings and walls shall be the grade, size and spacing or number as the vertical reinforcing, respectively.

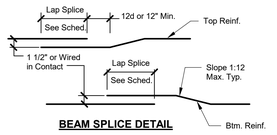
6. Reinforcing steel in all concrete walls and footings shall be continuous around corners.

7. Provide (2) #5 extra reinforcing bars around all side of openings in concrete, unless noted otherwise on the plans. Extend bars 2'-0" beyond each edge of opening.

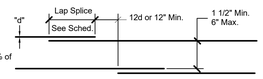
8. Minimum clear coverage of concrete over reinforcement shall be:
   a. Concrete cast against and permanently exposed to earth .....3"
   b. Concrete exposed to earth or weather:
      i. No. 6 through no. 18 bar.....2"
      ii. No. 5 bar, w31 or d31 wire or smaller.....1-1/2"
   c. Concrete not exposed to weather or in contact with ground:
      i. Slabs walls and joists no. 14 & no. 18.....1-1/2"
      ii. Slabs walls and joists no. 11 & smaller.....3/4"
      iii.Beams, columns: ties and primary reinforcing.....1-1/2"

LAP SPLICE LENGTH SCHEDULE

Bar Size	f'c = 3000 PSI	f'c = 4000 PSI
#3	22"	19"
#4	29"	25"
#5	36"	31"
#6	43"	38"
#7	63"	54"
#8	72"	62"



BEAM SPLICE DETAIL



SLAB SPLICE DETAIL

Notes:
1. Fy = 60 ksi
2. Splice lengths are for normal weight concrete.
3. All splices shall be staggered as shown. If more than 50% of the reinforcing is lap spliced within the required lap splice length, the lap splice length shall be increased by 33%.
4. Lap lengths specifically detailed in drawings shall govern in lieu of schedule.
5. Smaller bar required lap length shall be used when splicing with a larger bar.

Masonry

1. Concrete masonry units for load bearing walls shall have a minimum compressive strength of f'm = 1500 psi.
   a. Hollow units: ASTM C90 Grade N, lightweight Type 1 (moisture controlled)
   b. Solid units: ASTM C145 Grade N, Type 1 (moisture controlled)

2. Concrete masonry units shall be laid with type M or S mortar.

3. Grout for reinforced masonry: ASTM C476 (2000 psi)

4. Reinforcement:
   a. Horizontal joints: standard dur-o-wall or equivalent truss or tri-rod reinforcement at 16"o.c. unless noted otherwise
   b. Vertical and horizontal reinforcement: ASTM A615, Grade 60

5. Construction of all concrete masonry shall conform to the latest edition of ACI-530.

6. Grout solid all cells containing reinforcing and all cells below grade.

7. Control joints: spacing shall not exceed 30'-0" or 3 times the wall height whichever is lesser, unless noted otherwise.

8. Grout all beam and joist pockets solid after installation of beams and joists.

9. Minimum lap of reinforcing steel shall be 50 bar diameters for typical reinforcing and 50 bar diameters for all jamb bars shown on wall elevations or 2'-0" minimum.

10. Maximum height of grout pour shall be 4'-0".

11. Provide 1/4" clearance from inside face of block masonry cells and minimum of one bar diameter, but not less than 3/4" clear distance between parallel bars.

12. All vertical reinforcing steel shall be positioned and held in place by means of wire spacers.

Structural Steel

1. Structural steel W-Shapes shall conform to ASTM A992, Channels, Angles and Pipes shall conform to A36. Pipe columns shall conform to ASTM A53 type E or S Grade B. Tubes shall conform to ASTM A500 Grade B.

2. Design, fabrication, and erection shall be in accordance with aisc specification for the design, fabrication, and erection of structural steel buildings.

3. Structural steel shall be detailed in accordance with standard practices of AISC
   a. Connections: AISC Manual standard connections, unless noted.
   b. High-strength bolts: ASTM A325 bearing type N installed in accordance with "specification for structural joints Using ASTM A325 or A490 Bolts", research council on riveted and bolted structural joints.

4. All welds must be made in accordance with the American Welding Society Code D-1.1.

5. Field and shop connections shall be welded as shown on drawings or bolted with high strength bolts, unless noted otherwise.

6. See architectural drawings for angles, clips, bars, plates, and other items attached to structural members, and for chamfers on concrete walls, beams, etc.

7. Provide temporary bracing as required to maintain alignment and security of structures during construction.

8. Do no cutting, drilling or modifying of structural members without the approval of the engineer.

9. The manufacturer's name, brand or trademark (mill identification marks) shall be shown in raised letters at intervals along the length. (ASTM A6/A6M 96-97, paragraph 12.2) note: small shapes with the greatest cross-sectional dimension not greater.

Metal Roof Deck

1. Provide design, fabrication, and erection of metal deck conforming to the Steel Deck Institute's "Code of Recommended Standard Practice and Basic Design Specifications".

2. Form roof deck from steel sheets conforming to ASTM A611 or A653 or higher specifications with minimum yield strength of 33 ksi.

3. Attach sheets to steel support members as indicated and in accordance with the manufacturer's instructions for installation. When deck is scheduled to be exposed, de-slag, clean and touched up welds with a zinc-rich primer.

4. Lap roof ends minimum of 2 inches when fastening deck to support members provide welding materials installation procedures to prevent burning of holes in deck.

5. Metal deck fabricator to furnish shop drawings for structural engineer's review prior to fabrication. Shop drawings shall include welding procedure, side lap connections, testing programs for welding, coating material and erection sequence.

6. Roof deck shall have the following minimum section properties.
   a. Section properties (per foot of width).
      Type = 1.5B:
      20 gauge: I = .212 in^4; S_p =0.234 in^3; S_n = 0.247 in^3 ; F_y = 33ksi

Joist & Joist Girders

1. Provide open web under slung, parallel chord joists and joist girders unless noted otherwise on the drawings.

2. Design, fabricate, and erect open web steel joists and joist girders to the specifications of the Steel Joist Institute, latest edition.

3. Unless noted otherwise, weld K-series joists to supporting beams or bearing plates with 3/16 inch fillet weld, 1-1/2 inches long on each side of joist seat. Use minimum of 2-3/4 inch diameter A325-N bolts at joist connections on or nearest to column lines.

4. Unless noted otherwise, weld LH or DLH-series joists to supporting beams or bearing plates with ¼ inch fillet weld, 2 inches long on each side of joist seat. Use minimum of 2-3/4 inch diameter A325-N connection bolts at joist connections on or nearest to column lines.

5. Provide joist bridging, size and spacing, in accordance with Steel Joist Institute. Provide supplemental bridging as required for net wind uplift pressures.

6. Design roof joists for the following net uplift wind uplift pressures
   a. Edge zones (regions within "Z" distance of roof edge) = 20 psf.
   b. Corner zones (regions within "Z" distance of two intersecting roof edges) = 25 psf.
   c. Interior zones (regions that are not edge or corner zones = 15 psf.
   d. Distance Z = 10.0 ft.

7. Joist and joist girder sizes as shown on drawings are based on gravity load capacities. Design joists and joist girders for the gravity load capacities in addition to other loads (uplift, axial loads, concentrated loads, moments, etc.) as indicated on drawings.

8. Shop drawings for joists, joist accessories, joist girders and joist girder accessories to be prepared by the joist manufacturer's detailers.

9. Submit design calculations in accordance with steel joist institute design standards for all joist and joist girders. Design calculations to be signed and sealed by a professional engineer licensed in the state where the project is located.

10. Provide 2-1/2 inch minimum bearing on structural steel for K-series joists, 4 inch minimum bearing on masonry or provide bearing lengths per steel joist institute requirements unless greater lengths are shown on drawings.

11. Verify size, weight, location and configuration of all roof top equipment with the architect and mechanical engineer. Coordinate openings with the mechanical and general contractor.

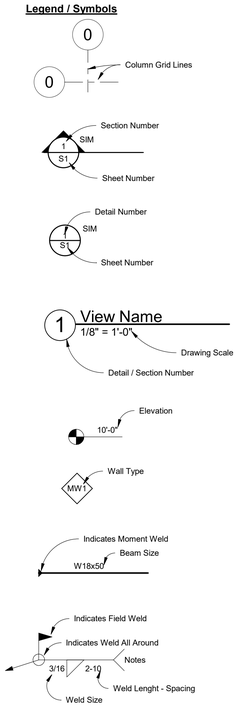
12. All concentrated loads greater than 100 pounds supported by open web steel joists and girders shall be located within 6 inches of joist or girder panel points or the joist or girder shall be reinforced with an additional web member. Refer to the "Typical Joist Modification Detail" on the structural drawings.

13. Provide special bearing ends to accommodate slopes from sloped joists, sloped girders or sloped bearing conditions.

14. Extend all joist bottom chords at columns and weld after dead load is applied. Provide additional bottom chord extensions as required indicated in structural or architectural drawings.

15. At joist parallel to beams anchor bridging by welding to beams. At joists parallel to walls, weld bridging to an L3x3x3/16 at top and bottom. Anchor angle to wall using (2) 3/8" diameter sleeve anchors.

Legend / Symbols



DRAWING LIST	
Sheet No:	**Sheet Name**
S1.1	General Notes
S1.2	Quality Assurance Plan
S1.3	Typical Details
S2.0	Foundation Plan
S3.0	Framing Plan
S4.0	Foundation & Framing Plan - Concession Stand
S5.0	Framing Sections & Details

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HOUSTON HIGH SCHOOL
BAND ROOM ADDITION AND CONCESSION STAND
9755 Wolf River Blvd.
Germantown, TN 38139

REVISIONS

Revision Date	Revision Number

PROJECT NUMBER
SSE #: 18-065

DATE OF ORIGINAL ISSUE
Sept. 2, 2019

SHEET NUMBER
S1.1

General Notes

9/3/2019 5:46:13 PM

STRUCTURAL QUALITY ASSURANCE PLAN

GENERAL

THIS STRUCTURAL QUALITY ASSURANCE PLAN IDENTIFIES THE RESPONSIBILITIES OF THE CONTRACTOR AND THE SPECIAL INSPECTOR IN PERFORMING THE TESTING AND INSPECTION OF THE WORK REQUIRED BY CHAPTER 17 OF THE 2012 INTERNATIONAL BUILDING CODE THAT IS WITHIN THE SCOPE OF THE STRUCTURAL ENGINEERING SERVICES FOR THIS PROJECT. REFER TO OTHER PORTIONS OF THE CONSTRUCTION DOCUMENTS FOR TESTING AND INSPECTIONS REQUIRED OF ARCHITECTURAL, MECHANICAL, ELECTRICAL, OR OTHER BUILDING COMPONENTS.

CONTRACTOR RESPONSIBILITIES

THE CONTRACTOR SHALL SUBMIT TO THE BUILDING OFFICIAL AND THE ARCHITECT A WRITTEN STATEMENT OF RESPONSIBILITY THAT CONTAINS THE FOLLOWING:

1. ACKNOWLEDGMENT OF AWARENESS OF THE SPECIAL REQUIREMENTS CONTAINED WITHIN THIS STRUCTURAL QUALITY ASSURANCE PLAN.
2. ACKNOWLEDGMENT THAT CONTROL SHALL BE EXERCISED TO OBTAIN CONFORMANCE WITH THE CONSTRUCTION DOCUMENTS APPROVED BY THE BUILDING OFFICIAL.
3. PROCEDURES FOR EXERCISING CONTROL WITHIN THE CONTRACTOR'S ORGANIZATION, THE METHOD AND FREQUENCY OF REPORTING, AND THE DISTRIBUTION OF REPORTS.
4. IDENTIFICATION AND QUALIFICATIONS OF THE PERSON(S) EXERCISING SUCH CONTROL AND THEIR POSITION(S) IN THE ORGANIZATION.

THE STRUCTURAL TESTING/INSPECTION AGENCY THAT IS TO ACT AS THE SPECIAL INSPECTOR SHALL BE HIRED BY THE OWNER AND SHALL BE APPROVED BY THE BUILDING OFFICIAL AND THE ARCHITECT. THE CONTRACTOR SHALL SUBMIT WITH HIS BID THE NAME AND QUALIFICATIONS OF THE STRUCTURAL TESTING/INSPECTION AGENCY AND IT PERSONNEL THAT WILL ACT AS THE SPECIAL INSPECTOR. IF MULTIPLE STRUCTURAL TESTING/INSPECTION AGENCIES ARE USED, SUBMIT THE INFORMATION STATED ABOVE FOR EACH FIRM ALONG WITH A STATEMENT OF THE SPECIAL INSPECTION RESPONSIBILITIES FOR EACH FIRM.

CONTRACTOR SHALL PAY FOR ANY ADDITIONAL STRUCTURAL TESTING /INSPECTION REQUIRED FOR WORK OR MATERIALS NOT COMPLYING WITH THE CONSTRUCTION DOCUMENTS DUE TO NEGLIGENCE OR NONCONFORMANCE AND SHALL PAY FOR ANY ADDITIONAL STRUCTURAL TESTING/ INSPECTION REQUIRED FOR HIS CONVENIENCE.

CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THE SPECIAL INSPECTOR IS PRESENT FOR ALL WORK REQUIRING SPECIAL INSPECTION. ANY WORK THAT REQUIRES SPECIAL INSPECTION AND IS PERFORMED WITHOUT THE SPECIAL INSPECTOR BEING PRESENT IS SUBJECT TO BEING DEMOLISHED AND RECONSTRUCTED.

CONTRACTOR HAS THE FOLLOWING RESPONSIBILITIES TO THE SPECIAL INSPECTOR:

1. PROVIDE COPY OF CONSTRUCTION DOCUMENTS TO THE SPECIAL INSPECTOR.
2. NOTIFY THE SPECIAL INSPECTOR SUFFICIENTLY IN ADVANCE OF OPERATIONS TO ALLOW ASSIGNMENT OF PERSONNEL AND SCHEDULING OF TESTS.
3. COOPERATE WITH SPECIAL INSPECTOR AND PROVIDE ACCESS TO WORK.
4. PROVIDE SAMPLES OF MATERIALS TO BE TESTED IN REQUIRED QUANTITIES.
5. PROVIDE STORAGE SPACE FOR THE SPECIAL INSPECTOR'S EXCLUSIVE USE, SUCH AS FOR STORING AND CURING CONCRETE TESTING SAMPLES.
6. PROVIDE LABOR TO ASSIST THE SPECIAL INSPECTOR IN PERFORMING TESTS/ INSPECTIONS.

SPECIAL INSPECTOR RESPONSIBILITIES

SPECIAL INSPECTOR SHALL MAINTAIN RECORDS OF INSPECTIONS IN ACCORDANCE WITH CHAPTER 17 OF THE 2012 INTERNATIONAL BUILDING CODE AND SHALL DISTRIBUTE THESE RECORDS TO THE BUILDING OFFICIAL, ARCHITECT, AND STRUCTURAL ENGINEER ON A REGULAR BASIS. AT THE CONCLUSION OF THE PROJECT, THE SPECIAL INSPECTOR SHALL SUBMIT A WRITTEN STATEMENT THAT THE SPECIAL INSPECTIONS DURING CONSTRUCTION HAVE COMPLIED WITH THE STRUCTURAL QUALITY ASSURANCE PLAN AND THAT ANY DISCREPANCIES NOTED DURING CONSTRUCTION HAVE BEEN CORRECTED.

CAST-IN-PLACE CONCRETE:

CONTRACTOR SHALL PERFORM THE FOLLOWING:

1. SUBMIT MANUFACTURER'S DATA FOR TENSILE AND COMPRESSIVE SPLICES.
2. ESTABLISH CONCRETE MIX DESIGN PROPORTIONS PER ACI 318, CHAPTER 5. SUBMIT THREE COPIES OF THE CONCRETE MIX DESIGNS.
   INCLUDE THE FOLLOWING:
   2.1. TYPE AND QUANTITIES OF MATERIALS
   2.2. SLUMP
   2.3. AIR CONTENT
   2.4. FRESH UNIT WEIGHT
   2.5. AGGREGATES SIEVE ANALYSIS
   2.6. DESIGN COMPRESSIVE STRENGTH
   2.7. LOCATION OF PLACEMENT IN STRUCTURE
   2.8. METHOD OF PLACEMENT
   2.9. METHOD OF CURING
   2.10. 7-DAY AND 28-DAY COMPRESSIVE STRENGTHS
3. SUBMIT A CERTIFICATION FROM EACH MANUFACTURER OR SUPPLIER STATING THAT MATERIALS MEET THE REQUIREMENTS OF THE SPECIFIED ASTM AND ACI STANDARDS.
4. SUBMIT CERTIFICATION THAT THE READY-MIX CONCRETE PLANT COMPLIES WITH THE REQUIREMENTS OF THE NATIONAL READY MIX CONCRETE ASSOCIATION.

SPECIAL INSPECTOR SHALL PERFORM THE FOLLOWING ITEMS
NON REQUIRED THIS PROJECT

STRUCTURAL STEEL:

CONTRACTOR SHALL PERFORM THE FOLLOWING:

1. SUBMIT CERTIFICATION THAT STEEL FABRICATOR IS CERTIFIED BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) QUALITY CERTIFICATION PROGRAM FOR: CONVENTIONAL STEEL BUILDINGS.
2. FABRICATOR NOT CERTIFIED BY THE AISC QUALITY CERTIFICATION PROGRAM SHALL HAVE FABRICATION PROCEDURES AND FABRICATED STEEL TESTED AND INSPECTED BY AN INDEPENDENT TESTING AGENCY. PAYMENT OF THESE TESTS AND INSPECTIONS SHALL BE BY THE FABRICATOR. TESTS AND INSPECTIONS SHALL BE PERFORMED BY AWS CERTIFIED WELDING INSPECTORS. PRIOR TO DELIVERY OF STRUCTURAL STEEL TO THE PROJECT, SUBMIT COPIES OF THE INSPECTION REPORTS TO THE STRUCTURAL ENGINEER. THE PURPOSE OF THIS INSPECTION IS TO ENABLE THE TESTING/INSPECTION AGENCY TO VERIFY THAT, IN GENERAL, THE STEEL IS BEING FABRICATED IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS. A MINIMUM OF ONE TRIP PER WEEK IS RECOMMENDED. THE FIRST TRIP SHOULD BE SCHEDULED IN THE EARLY STAGES OF FABRICATION. CONTACT STRUCTURAL ENGINEER PRIOR TO INITIAL INSPECTION. TESTS AND INSPECTIONS SHALL INCLUDE THE FOLLOWING:
   2.1. EXAMINE MILL TEST REPORTS AND VERIFY THAT MATERIAL BEING USED IS THE SAME AS THE MILL TESTED REPORT.
   2.2. REVIEW THE FABRICATOR'S WRITTEN WELDING PROCEDURES. VERIFY THAT THE FABRICATOR'S WELDING PROCEDURES ARE BEING FOLLOWED. VERIFY THAT WELDERS ARE CERTIFIED WITH CURRENT PAPERS AND THAT THEY DEMONSTRATE PROPER TECHNIQUES.
   2.3. OBSERVE HIGH STRENGTH BOLTING PROCEDURES. VERIFY THAT SHOP INSTALLATION OF HIGH STRENGTH BOLTS CONFORM TO AISC SPECIFICATIONS.
   2.4. EXAMINE JOINT PREPARATION FOR COMPLETE PENETRATION JOINTS. ULTRASONICALLY INSPECT 100% OF THE COMPLETE PENETRATION WELDS.
   2.5. EXAMINE FILLET WELDS FOR PROPER SIZE, PROFILE, THROAT, POROSITY AND END RETURNS.
   2.6. EXAMINE STEEL MEMBERS FOR LAMELLAR TEARING. SPOT CHECK DIMENSIONS AND HOLE SIZES.
   2.7. EXAMINE BOLT AREA BURRS.
3. SUBMIT CERTIFIED MILL TEST REPORTS FOR STRUCTURAL STEEL.
4. SUBMIT MANUFACTURE'S CERTIFICATION OF COMPLIANCE FOR HIGH-STRENGTH BOLTING AND WELD FILLER MATERIALS.

SPECIAL INSPECTOR SHALL PERFORM THE FOLLOWING ITEMS:
SEE SPECIAL INSPECTION TABLE

CONCRETE MASONRY

CONTRACTOR SHALL PERFORM THE FOLLOWING:

1. SUBMIT A CERTIFICATION FROM EACH MANUFACTURER OR SUPPLIER STARTING THAT THE FOLLOWING MATERIALS COMPLY WITH THE SPECIFIED ASTM OR ACI STANDARDS:
   1.1. CONCRETE MASONRY UNITS.
   1.2. MORTAR MATERIALS: PORTLAND CEMENT, HYDRATED LIME, AND AGGREGATES.
   1.3. GROUT MATERIALS: PORTLAND CEMENT AND AGGREGATES.
   1.4. JOINT REINFORCEMENT STEEL.
   1.5. REINFORCING STEEL.

SPECIAL INSPECTOR SHALL PERFORM THE FOLLOWING ITEMS:
SEE SPECIAL INSPECTION TABLE

SPECIAL INSPECTION TABLE: MASONRY CONSTRUCTION

REQUIRED VERIFICATION AND INSPECTION OF MASONRY CONSTRUCTION PER IBC 2012 SECTION 1704.5 (ACI 530.1 TABLE 4 - LEVEL B)

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC
1. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.	-	X
2. Verification of f'_m and f_{AAC} prior to construction except where specifically exempted by this code.	-	X
3. Verification of slump flow and VSI as delivered to the site for self-consolidating grout.	X	-
4. As masonry construction begins, the following shall be verified to ensure compliance:		
a. Proportions of site-prepared mortar.	-	X
b. Construction of mortar joints.	-	X
c. Location of reinforcement, connectors, prestressing tendons and anchorages.	-	X
d. Prestressing technique.	-	X
e. Grade and size of prestressing tendons and anchorages.	-	X
5. During construction the inspection program shall verify:		
a. Size and location of structural elements.	-	X
b. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.	-	X
c. Specified size, grade and type of reinforcement, anchor bolts, prestressing tendons and anchorages.	-	X
d. Welding of reinforcing bars.	X	-
e. Preparation, construction and protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F).	-	X
f. Application and measurement of prestressing force.	X	-
6. Prior to grouting, the following shall be verified to ensure compliance:		
a. Grout space is clean.	-	X
b. Placement of reinforcement and connectors, and prestressing tendons and anchorages..	-	X
c. Proportions of site-prepared grout and prestressing grout for bonded tendons..	-	X
d. Construction of mortar joints.	-	X
7. Grout placement shall be verified to ensure compliance:	X	-
a. Grouting of prestressing bonded tendons.	-	X
8. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed:	X	-

SPECIAL INSPECTION TABLE: STRUCTURAL STEEL CONSTRUCTION

VERIFICATION AND INSPECTION	FREQUENCY OF INSPECTION	REFERENCED STANDARD	REMARKS
1. MATERIAL VERIFICATION OF HIGH STRENGTH BOLTS, NUTS AND WASHERS:			
a. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	PERIODIC	AISC 360, SECTION A3.3 AND APPLICABLE ASTM MATERIAL STANDARDS	
b. MANUFACTURER'S CERTIFICATION OF COMPLIANCE REQUIRED.	PERIODIC		
2. INSPECTION OF HIGH-STRENGTH BOLTING:			
a. SNUG-TIGHT JOINTS.	PERIODIC	AISC 360, SECTION M2.5	
b. PRETENSIONED AND SLIP-DRITICAL JOINTS USING TURN-OF-NUT WITH MATCHMARKING, TWIST-OFF BOLT OR DIRECT TENSION INDICATOR METHODS OF INSTALLATION.	PERIODIC		SEE NOTE 1
c. PRETENSIONED AND SLIP-DRITICAL JOINTS USING TURN-OF-NUT WITHOUT MATCHMARKING OR CALIBRATED WRENCH METHODS OF INSTALLATION.	CONTINUOUS		SEE NOTE 1
3. MATERIAL VERIFICATION OF STRUCTURAL STEEL AND COLD-FORMED STEEL DECK:			
a. FOR STRUCTURAL STEEL, IDENTIFICATION MARKINGS TO CONFORM TO AISC 360.	PERIODIC	AISC 360, SECTION M5.5	
b. FOR OTHER STEEL, IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	PERIODIC	APPLICABLE ASTM MATERIAL STANDARDS SEE DWG. NOTES	
c. MANUFACTURER'S CERTIFIED TEST REPORTS.	PERIODIC		
4. MATERIAL VERIFICATION OF WELD FILLER MATERIALS:			
a. IDENTIFICATION MARKINGS TO CONFORM TO AWS SPECIFICATION IN THE APPROVED CONSTRUCTION DOCUMENTS.	PERIODIC	AISC 360, SECTION A3.5 AND APPLICABLE AWS AS DOCUMENTS	
b. MANUFACTURER'S CERTIFICATE OF COMPLIANCE REQUIRED.	PERIODIC		
5. INSPECTION OF WELDING:			
a. STRUCTURAL STEEL AND COLD-FORMED STEEL DECK:			
1) COMPLETE AND PARTIAL PENETRATION GROOVE WELDS.	CONTINUOUS	AWS D1.1	
2) MULTIPASS FILLET WELDS.	CONTINUOUS		
3) SINGLE-PASS FILLET WELDS > 5/16"	CONTINUOUS		
4) PLUG AND SLOT WELDS.	CONTINUOUS		
5) SINGLE-PASS FILLET WELDS <= 5/16"	PERIODIC		
6) FLOOR AND ROOF DECK WELDS.	PERIODIC	AWS D1.3	
b. REINFORCING STEEL:			
1) VERIFICATION OF WELDABILITY OF REINFORCING STEEL OTHER THAN ASTM A 706.	PERIODIC	AWS D1.4 AND ACI 318, SECTION 3.5.2	SEE NOTE 2
2) REINFORCING STEEL RESISTING FLEXURAL AND AXIAL FORCES IN INTERMEDIATE AND SPECIAL MOMENT FRAMES, AND BOUNDARY ELEMENTS OF SPECIAL STRUCTURAL WALLS OF CONCRETE AND SHEAR REINFORCEMENT.	CONTINUOUS		SEE NOTE 2
3) SHEAR REINFORCEMENT.	CONTINUOUS		SEE NOTE 2
4) OTHER REINFORCING STEEL.	PERIODIC		SEE NOTE 2
6. INSPECTION OF STEEL FRAME JOINT DETAILS FOR COMPLIANCE:			
a. DETAILS SUCH AS BRACING AND STIFFENING.	PERIODIC	VERIFICATION WITH DESIGN DOCUMENTS AND APPROVED SHOP DRAWINGS	
b. MEMBER LOCATIONS.	PERIODIC		
c. APPLICATION OF JOINT DETAILS AT EACH CONNECTION.	PERIODIC		

TABLE NOTES:
1. INSPECTION NOT REQUIRED; NO PRETENSIONED OR SLIP-CRITICAL JOINTS INCLUDED IN THIS PROJECT.
2. INSPECTION NOT REQUIRED; NO WELDING OF REINFORCING STEEL INCLUDED IN THIS PROJECT.

SPECIAL INSPECTION TABLE: SOILS

VERIFICATION AND INSPECTION	FREQUENCY OF INSPECTION	REFERENCED STANDARD	REMARKS
1. VERIFY MATERIALS BELOW SHALLOW FOUNDATION ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.	PERIODIC	VERIFICATION WITH DESIGN DOCUMENTS AND GEOTECHNICAL REPORT	
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.	PERIODIC		
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.	PERIODIC		
4. VERIFY USE OF PROPER MATERIALS, DENSITIES, AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF FILL.	CONTINUOUS		
5. PRIOR TO PLACEMENT OF COMPACTED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.	PERIODIC		

TABLE NOTES:
1. *NONE*

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9/2/19
STATE OF TENNESSEE

REVISIONS	
Revision Date	Revision Number

PROJECT NUMBER
SSE #: 18-065

DATE OF ORIGINAL ISSUE
Sept. 2, 2019

SHEET NUMBER
S1.2

Quality Assurance Plan

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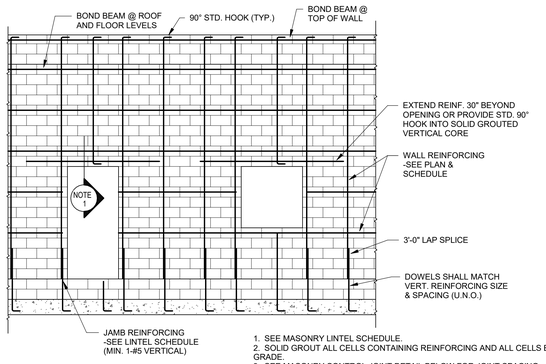
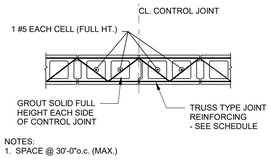


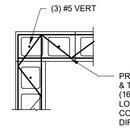
TYPICAL WALL ELEVATION

1. SEE MASONRY LINTEL SCHEDULE.
2. SOLID GROUT ALL CELLS CONTAINING REINFORCING AND ALL CELLS BELOW GRADE.
3. SEE MASONRY CONTROL JOINT DETAIL BELOW FOR JOINT SPACING.
4. HORIZONTAL REINFORCING SHALL BE CONTINUOUS THROUGH CONTROL JOINTS AT ROOF AND FLOOR LEVELS AND AT LINTEL LOCATIONS.
5. REINFORCING SHALL BE CENTERED IN WALL U.N.O.
6. SEE MASONRY COL. SCHEDULE FOR MASONRY COLUMN DETAILS.
7. ALL CELLS OF MASONRY COLUMNS ARE TO BE GROUTED SOLID WITH 3000 psi NON-SHRINK GROUT (MIN.).
8. COLUMNS ARE TO BE CONSTRUCTED INTEGRALLY WITH THE WALL WHICH THEY ARE A PART OF.

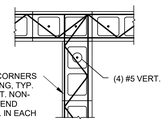


NOTES:
1. SPACE @ 30'-0"o.c. (MAX.)

MASONRY CONTROL JOINT

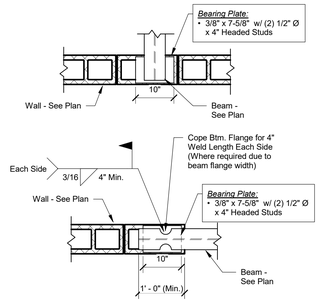


TYP. CORNER DETAIL

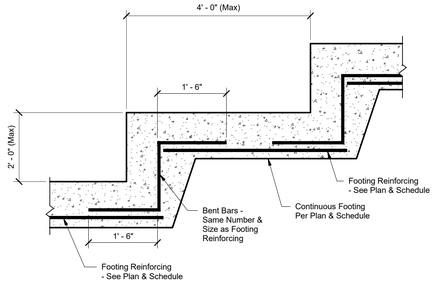


TYP. DETAIL @ INTERSECTING WALLS

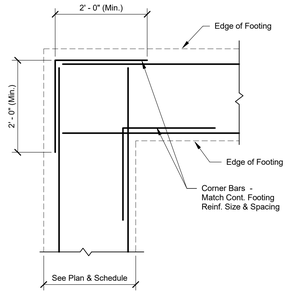
1 Typical Masonry Wall
1/4" = 1'-0"



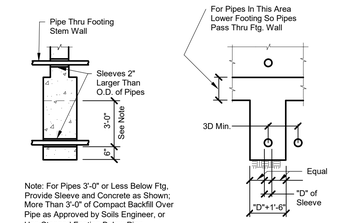
2 Beam Bearing Details
3/4" = 1'-0"



3 Typical Footing Step Detail
3/4" = 1'-0"

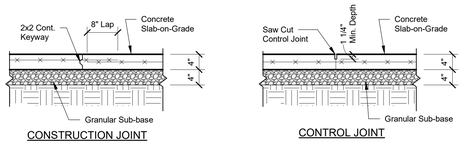


4 Typ. Cont. Corner Footing Detail
3/4" = 1'-0"



Note: For Pipes 3'-0" or Less Below Ftg, Provide Sleeve and Concrete as Shown; More Than 3'-0" of Compact Backfill Over Pipe as Approved by Soils Engineer, or Use Stepped Footing Below Pipe.
Where Pipes Cross Under and are More Than 3' Below, the Figs Shall be Stepped if the Following Exists:
a) Multiple Pipes Where the Spacing Betw. is < 3 Times the Diameter of the Larger Pipe Size.
b) Pipes 24" Diameter or Larger.

5 Typ. Pipe @ Footing Detail
3/4" = 1'-0"



Notes:
1. Maximum spacing of control joints shall be 15'-0"o.c. (U.N.O.).
2. Locate control joints as specified on architectural drawings (when applicable).
3. Provide 10 MIL Vapor Barier below slab (U.N.O.)

6 Slab-on-Grade Details
3/4" = 1'-0"

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REVISIONS

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Typical Details

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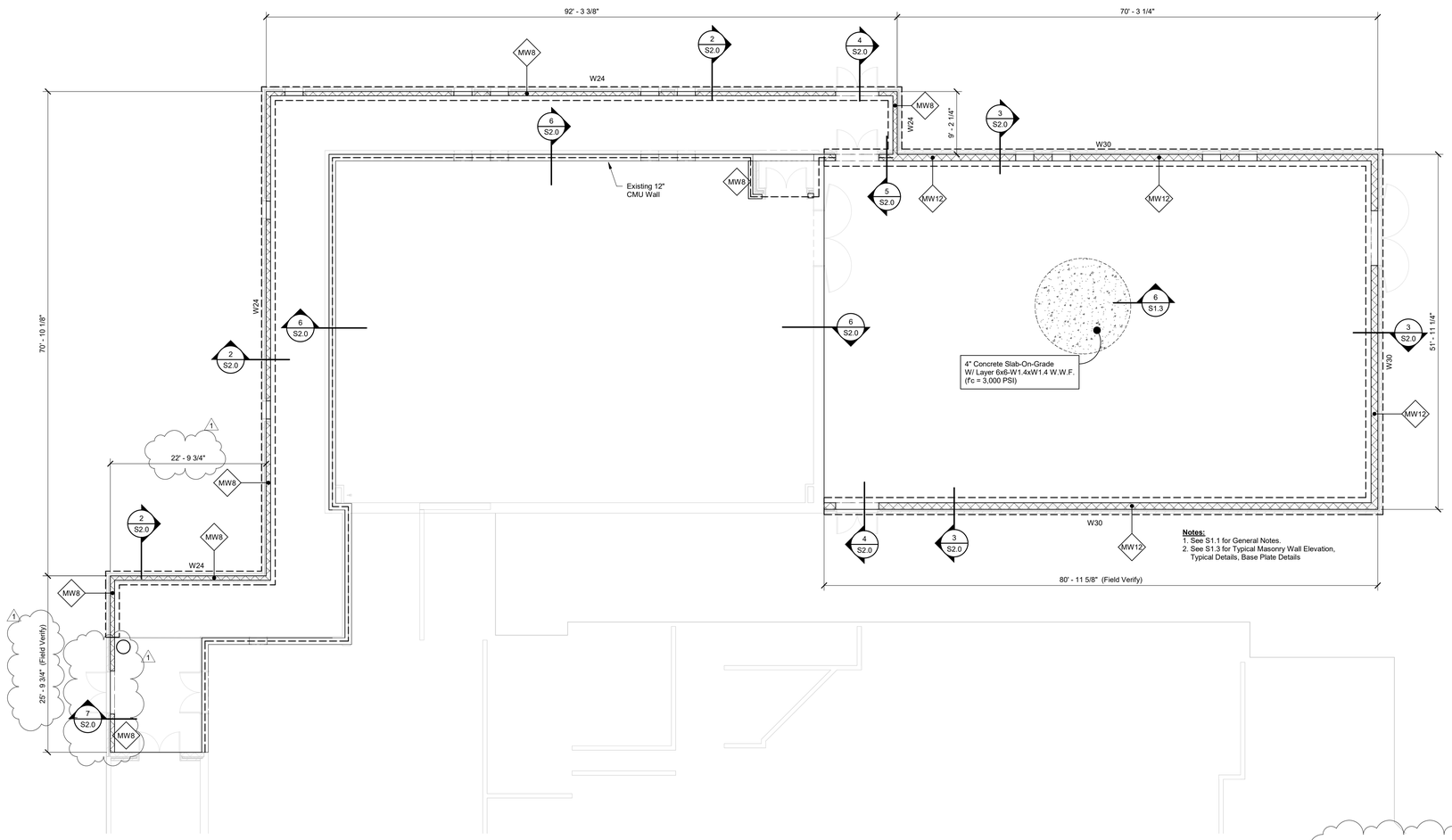


CONTINUOUS WALL FOOTING SCHEDULE

	Dimensions		Reinforcing	
Type	Width	Depth	Longitudinal	Transverse
W24	2' - 0"	1' - 0"	(3) #4 x Cont.	#4 x 1'-6" @ 60"o.c.
W30	2' - 6"	1' - 0"	(4) #5 x Cont.	#5 x 2'-0" @ 60"o.c.

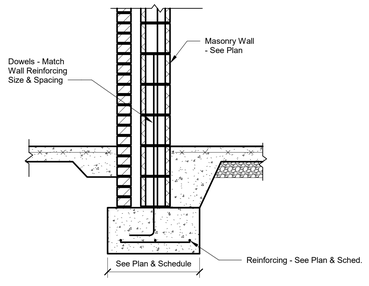
MASONRY WALL SCHEDULE

		Reinforcing			
Type	Width	Horizontal	Vertical	Joint	Material
MW8	7 5/8"	#5 @ 48"o.c.	#5 @ 32"o.c.	Std. Dur-o-wall @ 16"o.c.	f'm = 1500psi
MW12	11 5/8"	#5 @ 48"o.c.	#6 @ 32"o.c.	Std. Dur-o-wall @ 16"o.c.	f'm = 1500psi

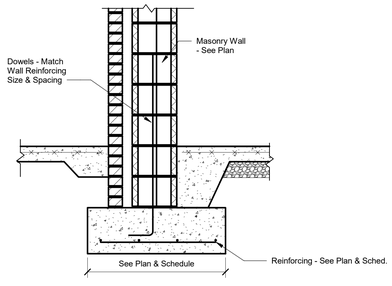
WALL LEGEND

SMOKE TIGHT PARTITION

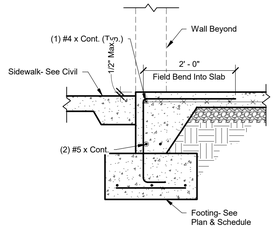
1 Foundation Plan
1/8" = 1'-0"



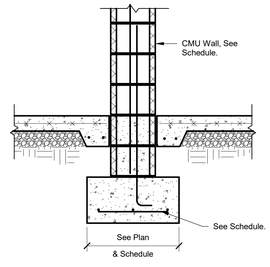
2 Footing @ Exterior Wall
3/4" = 1'-0"



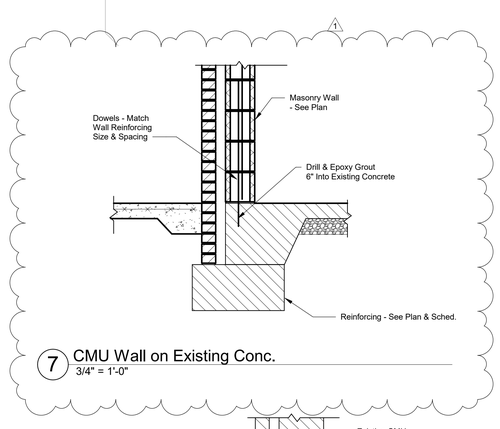
3 Footing @ Exterior Wall
3/4" = 1'-0"



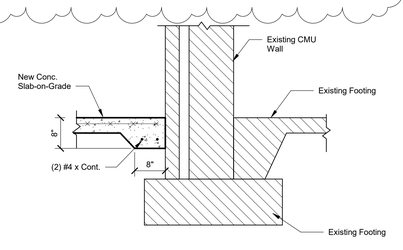
4 Footing @ Door
3/4" = 1'-0"



5 Footing at Interior Load Bearing Wall
3/4" = 1'-0"



7 CMU Wall on Existing Conc.
3/4" = 1'-0"



6 Slab Edge @ Existing
3/4" = 1'-0"

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HOUSTON HIGH SCHOOL
BAND ROOM ADDITION AND CONCESSION STAND

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JEREMY RANDOLPH SCALLION
REGISTERED
No. 104897
STATE OF TENNESSEE
10/11/2019

REVISIONS	
Revision Date	Revision Number
10/11/19	1

PROJECT NUMBER
SSE #: 18-065

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Sept. 2, 2019

SHEET NUMBER
S2.0

Foundation Plan

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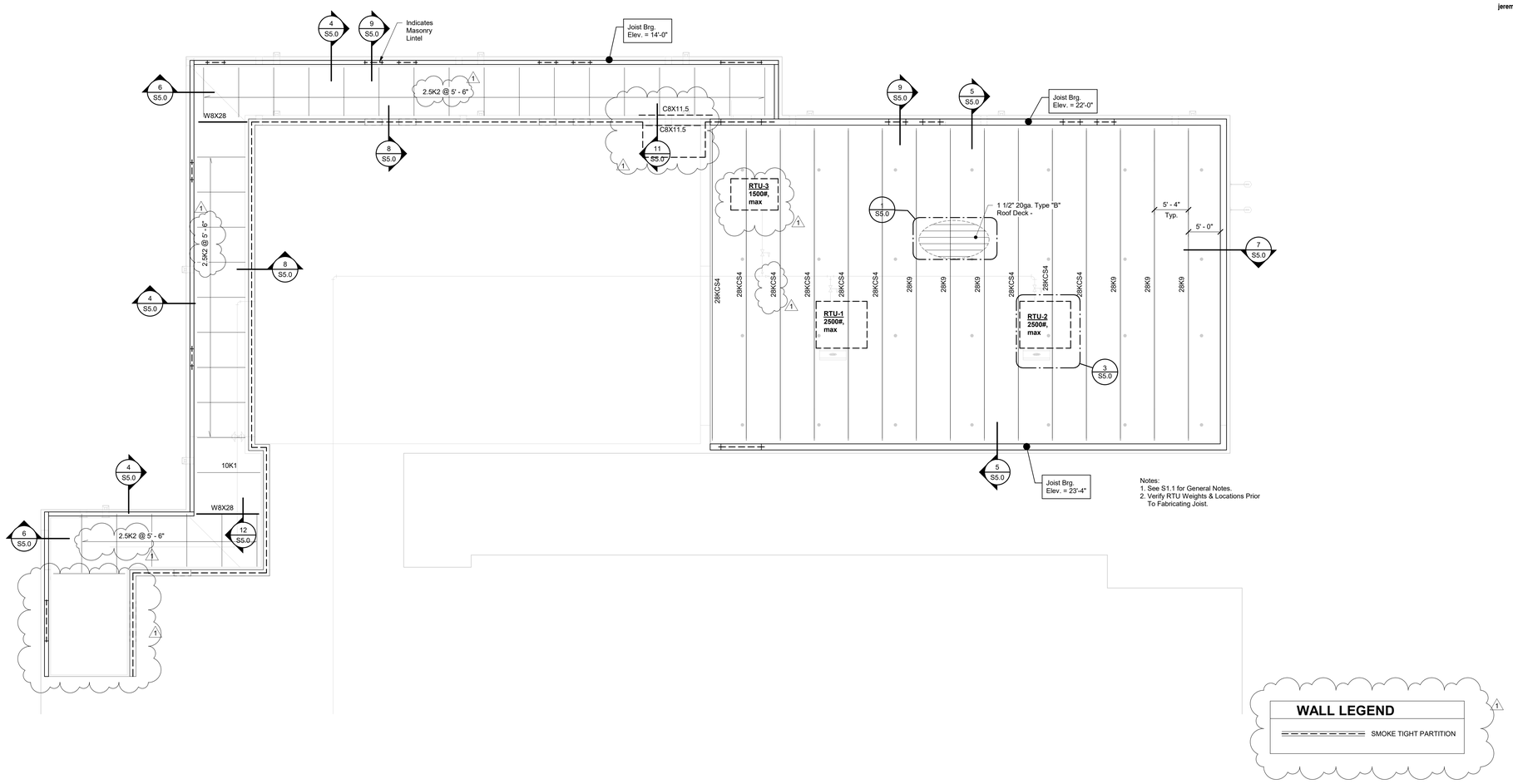
jeremy@scallionstructural.com



1 Roof Framing Plan
1/8" = 1'-0"

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HOUSTON HIGH SCHOOL
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LICENSED PROFESSIONAL ENGINEER
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10/11/2019

REVISIONS

Revision Date	Revision Number
10/11/19	1

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SHEET NUMBER
S3.0

Framing Plan

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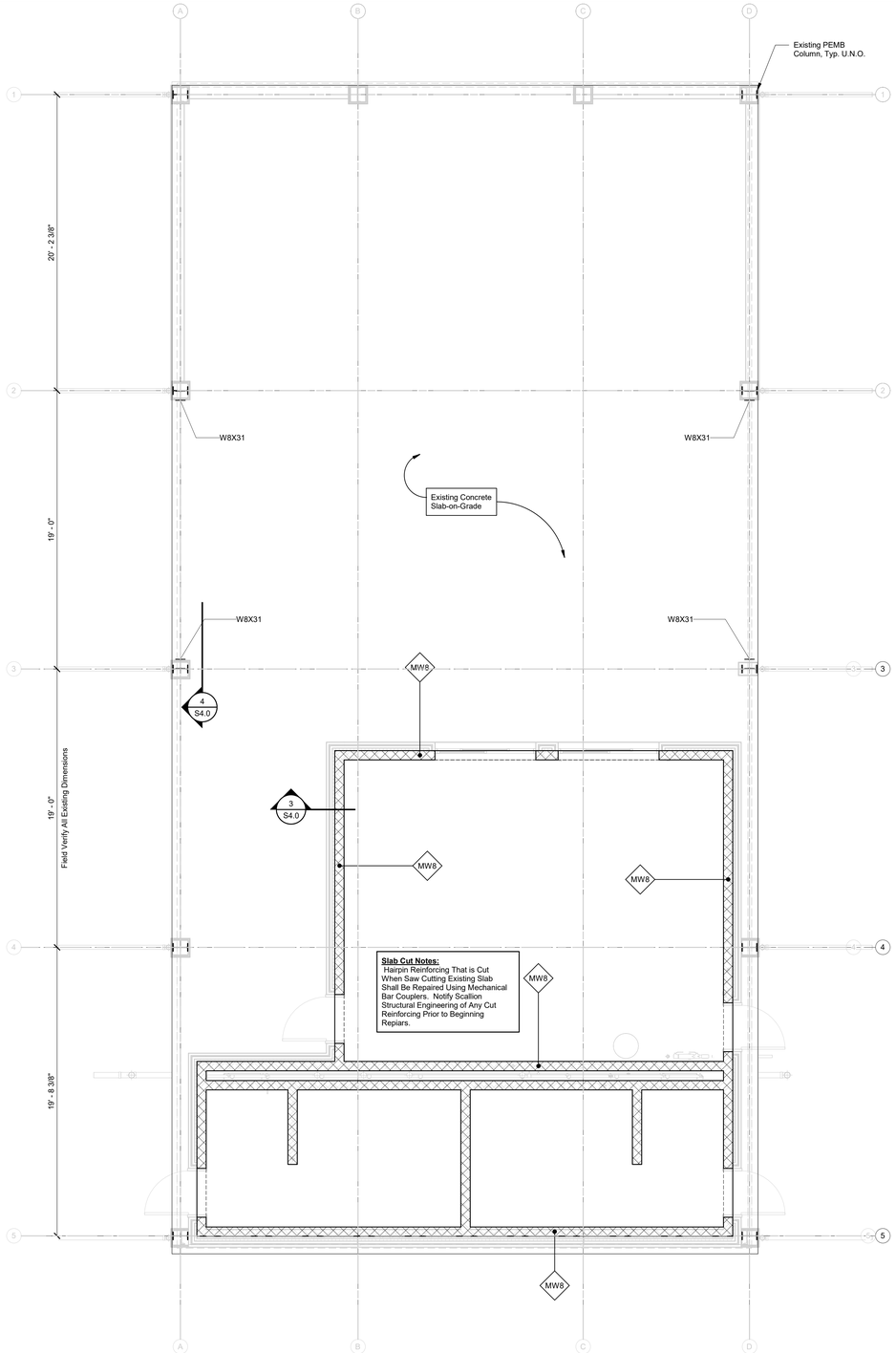
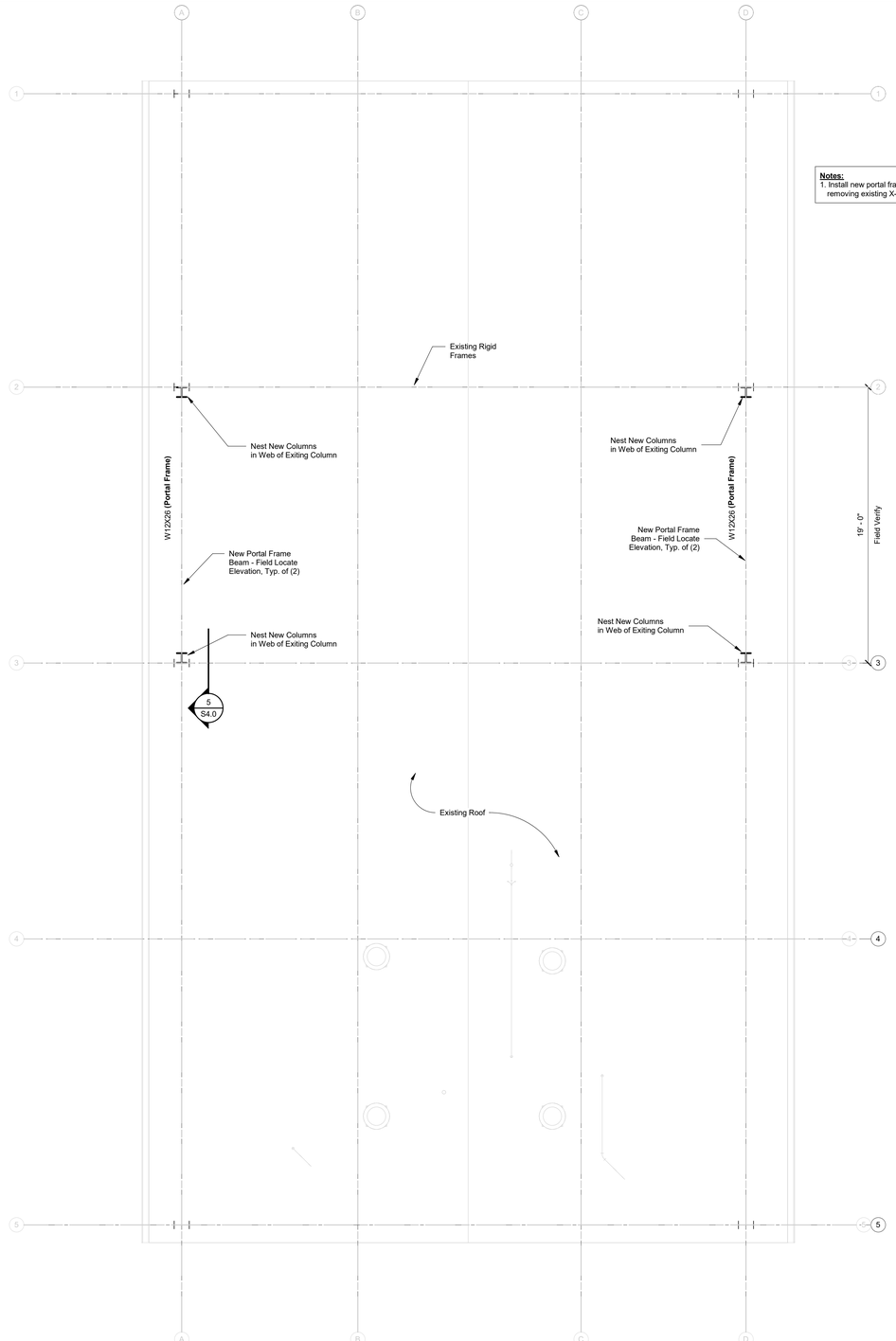


1 Foundation Plan - Concessions
1/4" = 1'-0"

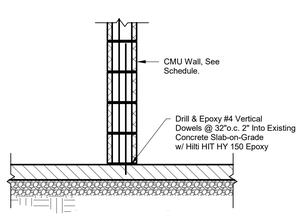


2 Framing Plan @ Concession
1/4" = 1'-0"

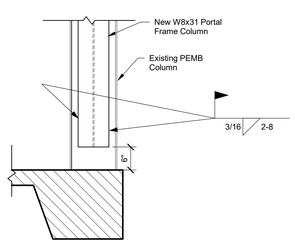
Notes:
1. Install new portal frames **before** removing existing X-bracing.

MASONRY WALL SCHEDULE

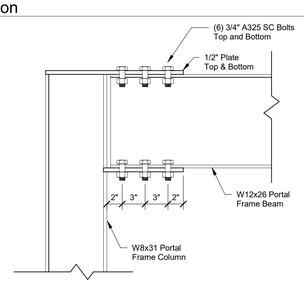
Type	Width	Reinforcing			Material
		Horizontal	Vertical	Joint	
MW8	7 5/8"	#5 @ 48"o.c.	#5 @ 32"o.c.	Std. Dur-o-wall @ 16"o.c.	f'm = 1500psi
MW12	11 5/8"	#5 @ 48"o.c.	#6 @ 32"o.c.	Std. Dur-o-wall @ 16"o.c.	f'm = 1500psi



3 Section @ New Wall @ Conecssions
3/4" = 1'-0"



4 Portal Frame Colmn
3/4" = 1'-0"



5 Portal Frame Moment Connection
1 1/2" = 1'-0"

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HOUSTON HIGH SCHOOL
BAND ROOM ADDITION AND CONCESSION STAND

9755 Wolf River Blvd.
Germantown, TN 38139

Foundation & Framing Plan - Concession Stand

REVISIONS

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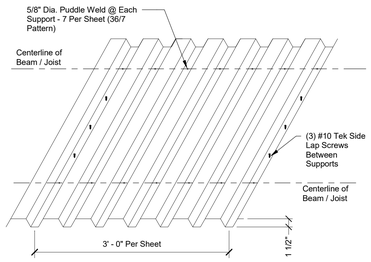
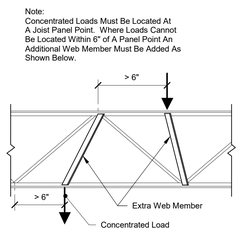
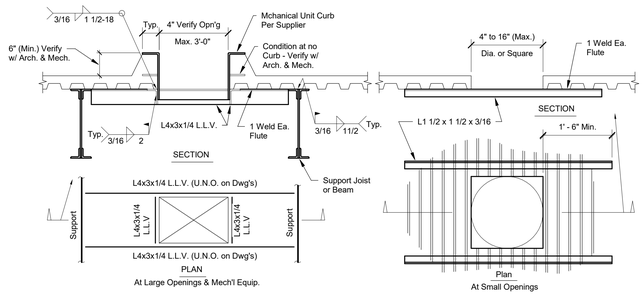


Notes:
1. Weld Deck Edge to Supports With 5/8" Dia. Puddle Weld @ 12"o.c.
2. Lap Deck 2" Minimum.

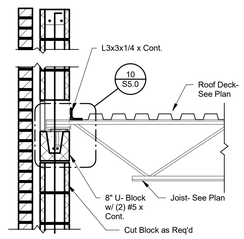
1 Roof Deck Attachment Detail
3/4" = 1'-0"



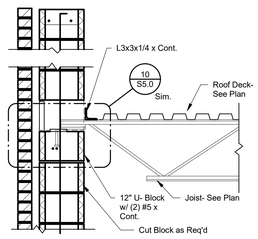
2 Typical Joist Modification Detail @ Point Loads
3/4" = 1'-0"



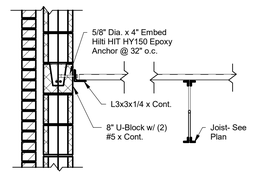
3 RTU and Roof Opening Detail
3/4" = 1'-0"



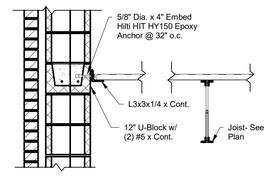
4 Section @ Exterior Wall
3/4" = 1'-0"



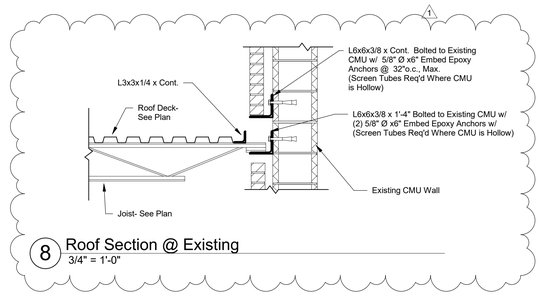
5 Section @ Exterior Wall @ 12" CMU
3/4" = 1'-0"



6 Section @ Ext. Wall - Parallel to Joists
3/4" = 1'-0"



7 Section @ Ext. Wall - Parallel to Joists @ 12" CMU
3/4" = 1'-0"



8 Roof Section @ Existing
3/4" = 1'-0"

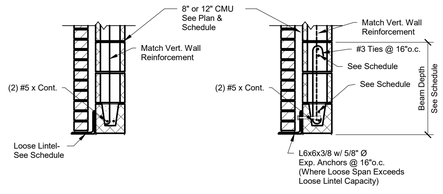
CMU LINTEL SCHEDULE

SPAN	NOMINAL DEPTH	REINFORCING
0'-0" to 6'-4"	8"	(2) #4
6'-5" to 8'-0"	16"	(2) #5 T&B

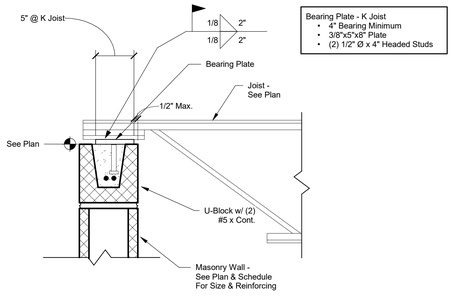
LOOSE (BRICK) LINTEL SCHEDULE

Span	Lintel Size
0' to 4'-0"	L4x4x3/8
4'-1" to 6'-0"	L6x4x3/8 (LLV)
6'-1" to 8'-0"	L7x4x3/8 (LLV)
Lintels Shall Bear 8" Each End (Min.)	

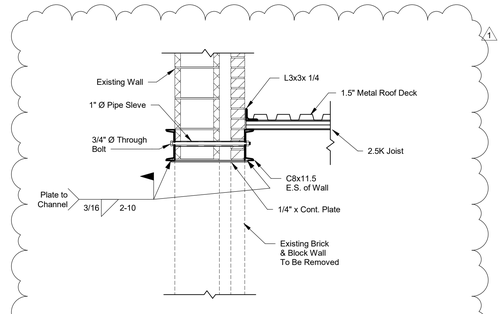
NOTES:
1. Refer to architectural plans for locations and clear span dimensions of all CMU lintels.
2. Lintels shall span continuous between bearings on each side.
3. Provide 8" minimum bearing for clear span 8'-0" or less, 16" minimum for clear span greater than 8'-0".
4. Extend bottom reinforcing to end of bearing each side. Extend top reinforcing where possible 40 bar diameters into wall each side. Where this is not possible (at wall control joints or free edges), provide standard 90 degree hooks.
5. Provide solid grouted or solid masonry jamb under lintels each side of opening for clear spans greater than 6'-0".
6. CMU lintels shall be shored during construction until the masonry has achieved sufficient strength to carry its own weight (24 hours minimum).



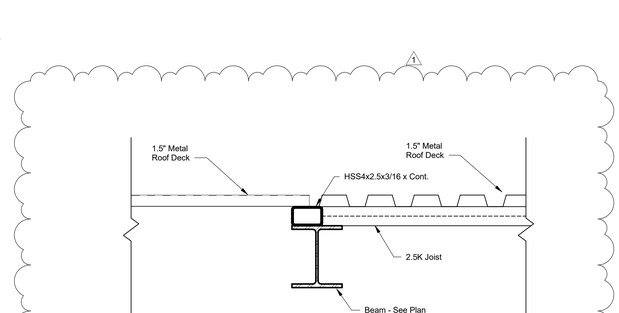
9 Masonry Lintel
3/4" = 1'-0"



10 Typical Joist Bearing on CMU
1 1/2" = 1'-0"



11 Section @ New Opening
3/4" = 1'-0"



12 Section @ Change in Deck Direction
1 1/2" = 1'-0"

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JEREMY RANDOLPH SCALLION
REGISTERED
No. 104897
STATE OF TENNESSEE
10/11/2019

REVISIONS	
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PROJECT NUMBER
SSE #: 18-065

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S5.0

Framing Sections & Details

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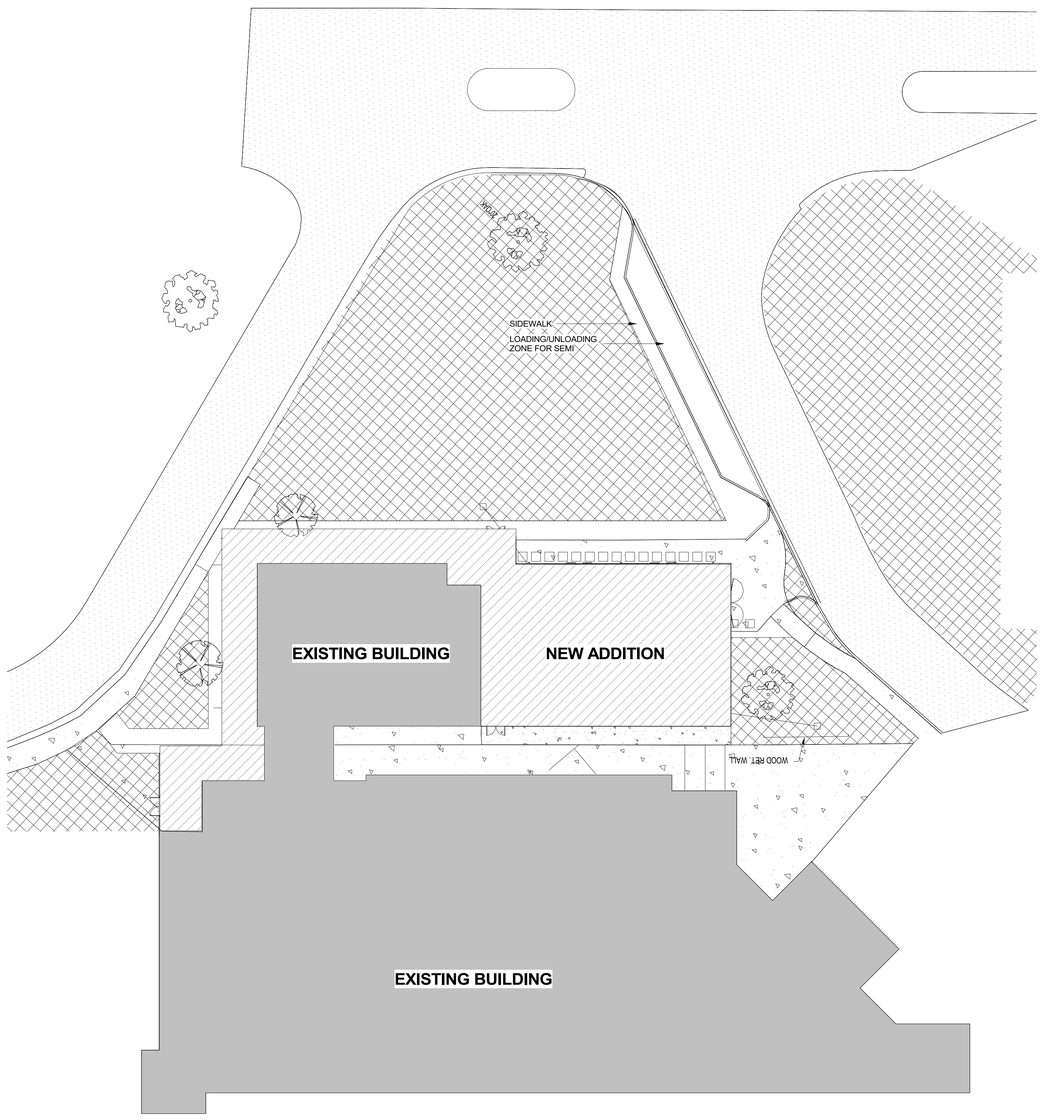

1 **ARCHITECTURAL SITE PLAN**
1" = 20'-0"

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STEVEN N. LANDSMAN
REGISTERED ARCHITECT
ARCHITECT
No. 101019
STATE OF TENNESSEE

ARCHITECTURAL SITE PLAN

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1

PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
October 11, 2019

SHEET NUMBER
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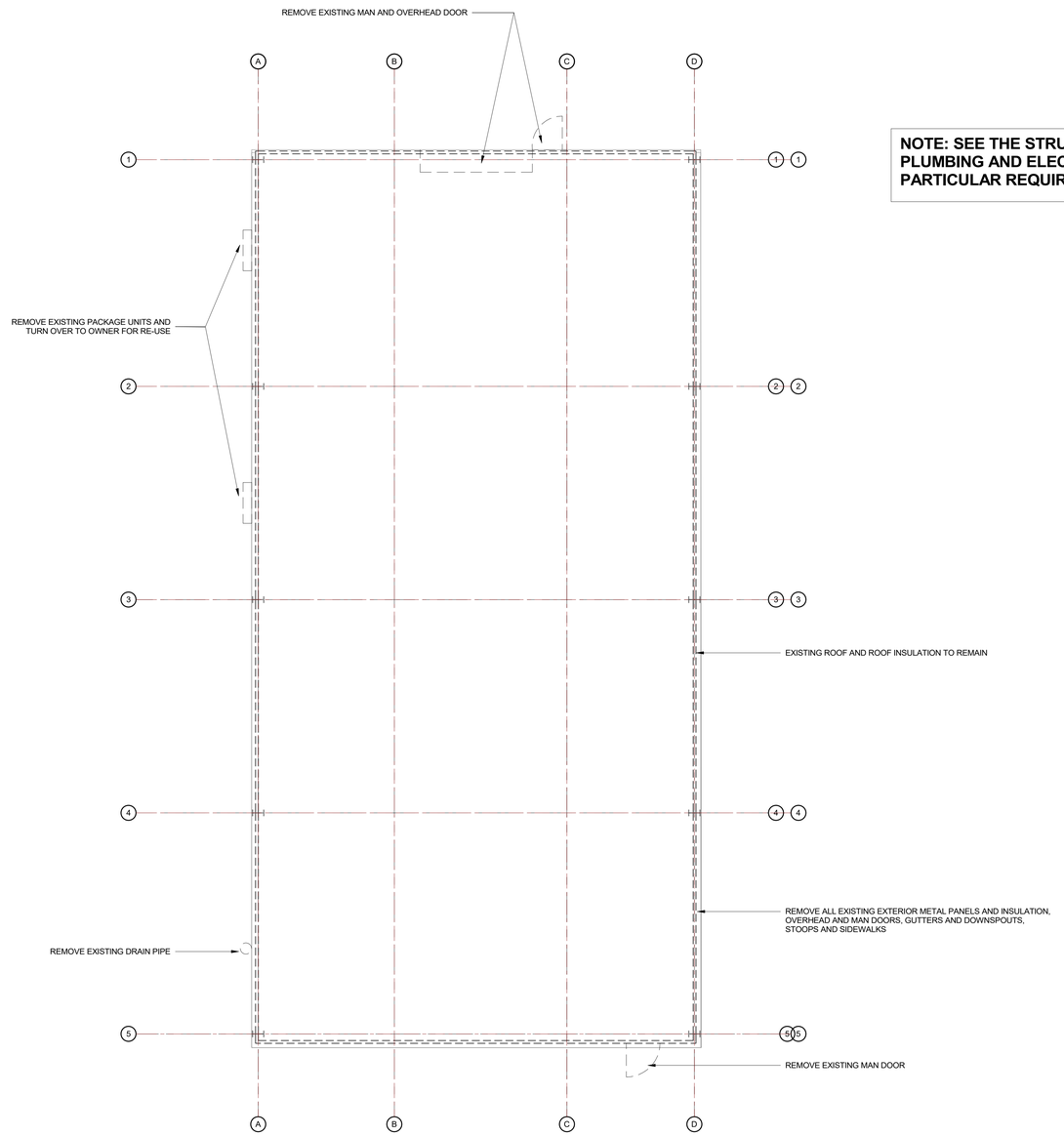

NOTE: SEE THE STRUCTURAL, MECHANICAL, PLUMBING AND ELECTRICAL SHEETS FOR PARTICULAR REQUIREMENTS FOR DEMOLITION.

1 CONCESSION STAND DEMOLITION PLAN
3/16" = 1'-0"

10/14/2019 11:23:05 AM

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AGRICULTURE
No. 102679
STATE OF TENNESSEE

ARCHITECTURAL DEMOLITION PLAN

REVISIONS

Revision Date	Rev. #	Revision Description
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PROJECT NUMBER
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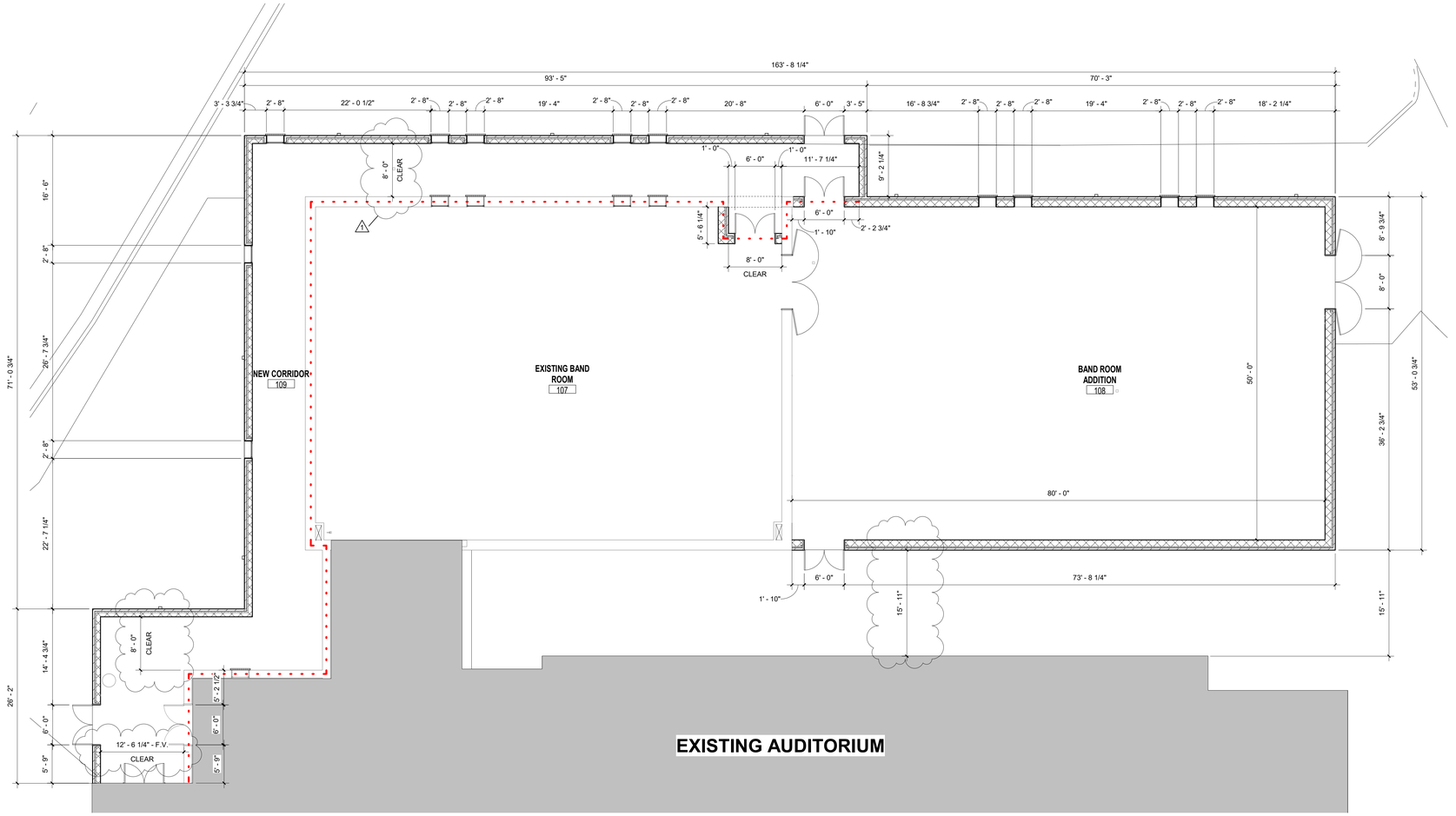
October 11, 2019

SHEET NUMBER
AD1.1



1 **BAND ROOM DIMENSION PLAN**
1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. INTERIOR DIMENSIONS ARE TO FACE OF FINISHED WALL UNLESS NOTED OTHERWISE.
2. EXTERIOR DIMENSIONS ARE TO FACE OF CONC. FOUNDATION WALLS, FACE OF BRICK OR OPENINGS UNLESS NOTED OTHERWISE.
3. REFER TO ENLARGED FLOOR PLAN SHEETS CONTAINING MORE DETAILED DIMENSIONS AND INFORMATION.
4. DO NOT SCALE DRAWINGS.
5. PROVIDE BLOCKING AT ALL WALL HUNG CABINETS, MIRRORS, WALL MOUNTED TOILET ACCESSORIES, TOILET PARTITIONS, DRINKING FOUNTAINS, AND FLAT SCREEN MONITORS.
6. USE MOISTURE RESISTANT GYP. BD. ON ALL WET WALLS IN JANITOR CLOSETS AND ON ALL NON-CMU WALLS IN FIRE PUMP ROOM.
7. SEE TOILET ENLARGEMENTS FOR LOCATIONS OF CEMENT BOARD AND MOISTURE RESISTANT GYP. BD. IN TOILET ROOMS.
8. SLOPE FLOORS TO FLOOR DRAINS AS INDICATED.
9. DOORS TO BE 4" FROM INTERIOR GYPSUM WALL CORNER UNLESS OTHERWISE NOTED.
10. DOORS TO BE 4" FROM INTERIOR CMU WALL CORNER UNLESS OTHERWISE NOTED.
11. E.J. = EXPANSION JOINT. SEE FLOOR FINISH PLANS FOR DETAILS
12. EVERY DOOR TO HAVE 18" CLEARANCE ON PULL SIDE. DOORS WITH CLOSER TO HAVE 12" CLEARANCE ON PUSH SIDE.
13. NOT ALL WALL FURRING IS NECESSARILY DIMENSIONED ON THESE PLANS. VARIOUS CONDITIONS EXIST SUCH AS COLUMNS, PIPES, CONDUIT, ETC. WHICH ARE LOCATED OUTSIDE THE PARAMETERS OF THE TYPICAL WALLS. IT IS INTENDED THAT ALL SUCH ITEMS BE ENCLOSED IN WALL FURRING.
    A. WALL FURRING SHALL CONSIST OF 2 1/2", 3 5/8", OR 6" METAL STUDS AS CONDITIONS DETERMINE, AND 5/8" GYP. BD.
    B. SEE PLAN ENLARGEMENTS FOR ATYPICAL WALL FURRING CONDITIONS.
    C. G.C. SHALL FIELD VERIFY SIZES OF WALL FURRING AT COLUMNS, PIPING, CONDUIT, ETC. - INSTALL FRAMING AND GYP. BD. AS TIGHT AS POSSIBLE WHILE MAINTAINING REQUIRED CLEARANCES. - COORDINATE WITH MECH., PLUMB., & ELEC.
    D. COMTACT ARCHITECT FOR UNFORESEEN COORDINATION ITEMS BEFORE INSTALLING FRAMING & GYP. BD.
    E. WALL FURRING IS INTENDED TO EXTEND 6" ABOVE THE CEILING FOR VISUAL CONCEALMENT OF COLUMNS, PIPING, CONDUIT, ETC.
14. EX = EXISTING. WINDOWS & DOORS MARKED AS EXISTING ARE FOR REFERENCE ONLY & ARE NOT ACCOUNTED FOR IN SCHEDULES.

SYMBOL LEGEND

- NORTH ARROW
- SIM — 1 / A101 — ENLARGED PLAN OR PLAN DETAIL
- ROOM NAME / 4000A — ROOM NAME & NUMBER
- 1 Ref / Ref 1 / A101 / Ref 1 / 1 Ref — ELEVATION
- SIM — 1 / A101 — SECTION
- COLUMN GRID
- 101 — DOOR NUMBER
- AA — WINDOW TYPE TAG
- A1Y — WALL TYPE TAG
- CENTERLINE
- SPOT ELEVATION
- FD — FLOOR DRAIN
- SMOKE TIGHT PARTITION

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BAND ROOM ADDITION & CONCESSION STAND
9755 Wolf River Blvd
Germantown, TN 38139

STEVEN W. LANDWEHR — REGISTERED ARCHITECT — No. 102019 — STATE OF TENNESSEE — 10/11/19

BAND ROOM DIMENSION PLAN

REVISIONS

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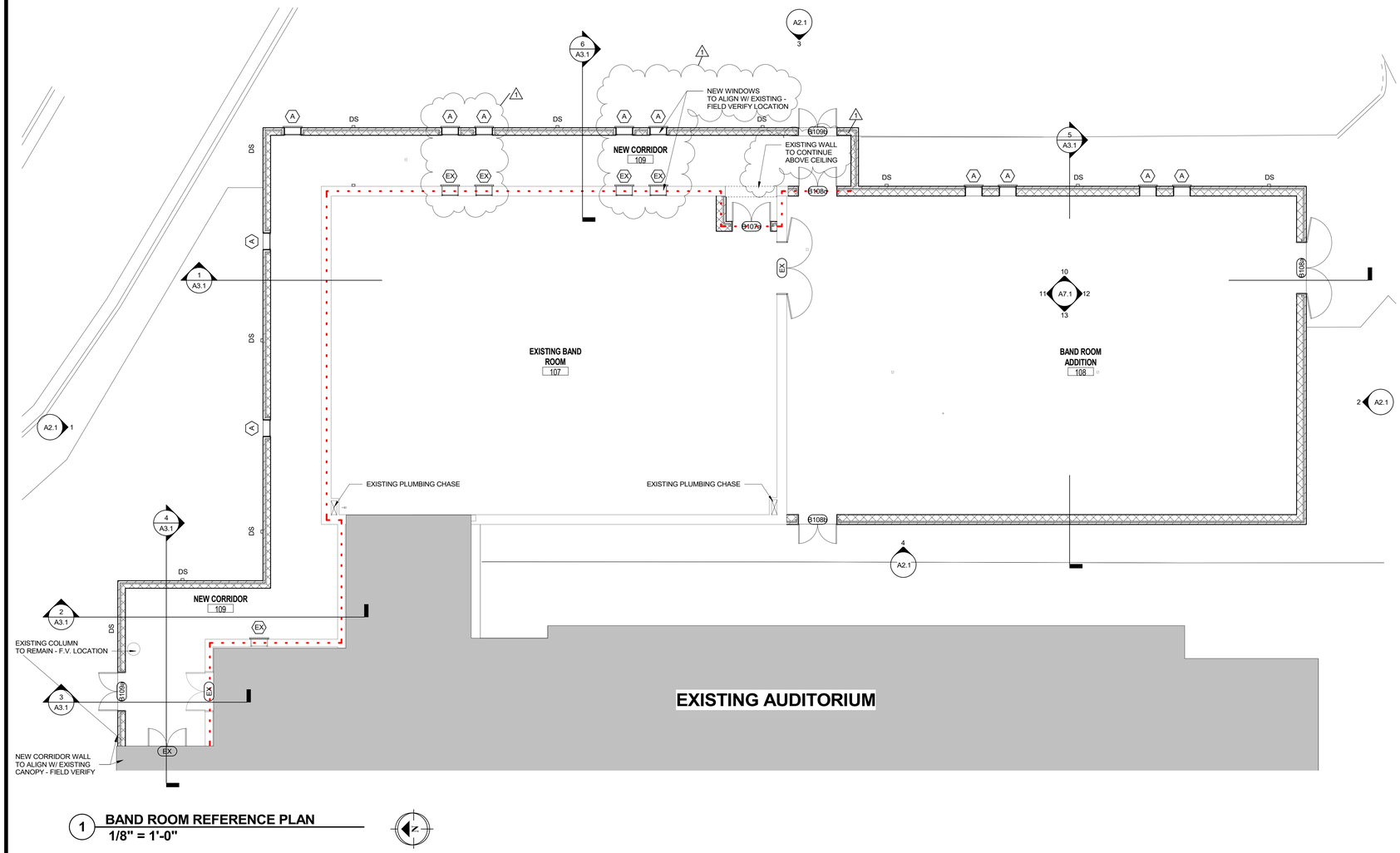

1 **BAND ROOM REFERENCE PLAN**
1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. INTERIOR DIMENSIONS ARE TO FACE OF FINISHED WALL UNLESS NOTED OTHERWISE.
2. EXTERIOR DIMENSIONS ARE TO FACE OF CONC. FOUNDATION WALLS, FACE OF BRICK OR OPENINGS UNLESS NOTED OTHERWISE.
3. REFER TO ENLARGED FLOOR PLAN SHEETS CONTAINING MORE DETAILED DIMENSIONS AND INFORMATION.
4. DO NOT SCALE DRAWINGS.
5. PROVIDE BLOCKING AT ALL WALL HUNG CABINETS, MIRRORS, WALL MOUNTED TOILET ACCESSORIES, TOILET PARTITIONS, DRINKING FOUNTAINS, AND FLAT SCREEN MONITORS.
6. USE MOISTURE RESISTANT GYP. BD. ON ALL WET WALLS IN JANITOR CLOSETS AND ON ALL NON-CMU WALLS IN FIRE PUMP ROOM.
7. SEE TOILET ENLARGEMENTS FOR LOCATIONS OF CEMENT BOARD AND MOISTURE RESISTANT GYP. BD. IN TOILET ROOMS.
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9. DOORS TO BE 4" FROM INTERIOR GYPSUM WALL CORNER UNLESS OTHERWISE NOTED.
10. DOORS TO BE 4" FROM INTERIOR CMU WALL CORNER UNLESS OTHERWISE NOTED.
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12. EVERY DOOR TO HAVE 18" CLEARANCE ON PULL SIDE. DOORS WITH CLOSER TO HAVE 12" CLEARANCE ON PUSH SIDE..
13. NOT ALL WALL FURRING IS NECESSARILY DIMENSIONED ON THESE PLANS. VARIOUS CONDITIONS EXIST SUCH AS COLUMNS, PIPES, CONDUIT, ETC, WHICH ARE LOCATED OUTSIDE THE PARAMETERS OF THE TYPICAL WALLS. IT IS INTENDED THAT ALL SUCH ITEMS BE ENCLOSED IN WALL FURRING.
    A. WALL FURRING SHALL CONSIST OF 2 1/2", 3 5/8", OR 6" METAL STUDS AS CONDITIONS DETERMINE, AND 5/8" GYP. BD.
    B. SEE PLAN ENLARGEMENTS FOR ATYPICAL WALL FURRING CONDITIONS.
    C. G.C. SHALL FIELD VERIFY SIZES OF WALL FURRING AT COLUMNS, PIPING, CONDUIT, ETC. - INSTALL FRAMING AND GYP. BD. AS TIGHT AS POSSIBLE WHILE MAINTAINING REQUIRED CLEARANCES. - COORDINATE WITH MECH., PLUMB., & ELEC.
    D. CONTACT ARCHITECT FOR UNFORESEEN COORDINATION ITEMS BEFORE INSTALLING FRAMING & GYP. BD.
    E. WALL FURRING IS INTENDED TO EXTEND 6" ABOVE THE CEILING FOR VISUAL CONCEALMENT OF COLUMNS, PIPING, CONDUIT, ETC.
14. EX = EXISTING. WINDOWS & DOORS MARKED AS EXISTING ARE FOR REFERENCE ONLY & ARE NOT ACCOUNTED FOR IN SCHEDULES.

WALL TAGS DESCRIPTION

A1Y — WALL TYPE TAG

WALL TAGS LETTER ID

C — CMU

WALL TAGS DESCRIPTION

structure material (CMU) — specific wall type — NOT to deck

C1N

SYMBOL LEGEND

- NORTH ARROW
- SIM / 1 / A101 — ENLARGED PLAN OR PLAN DETAIL
- ROOM NAME 4000A — ROOM NAME & NUMBER
- 1 Ref / –Ref / A101 — ELEVATION
- SIM / 1 / A101 — SECTION
- COLUMN GRID
- 101 — DOOR NUMBER
- AA — WINDOW TYPE TAG
- A1Y — WALL TYPE TAG
- CENTERLINE
- SPOT ELEVATION
- FD — FLOOR DRAIN
- SMOKE TIGHT PARTITION

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BAND ROOM REFERENCE PLAN

REVISIONS

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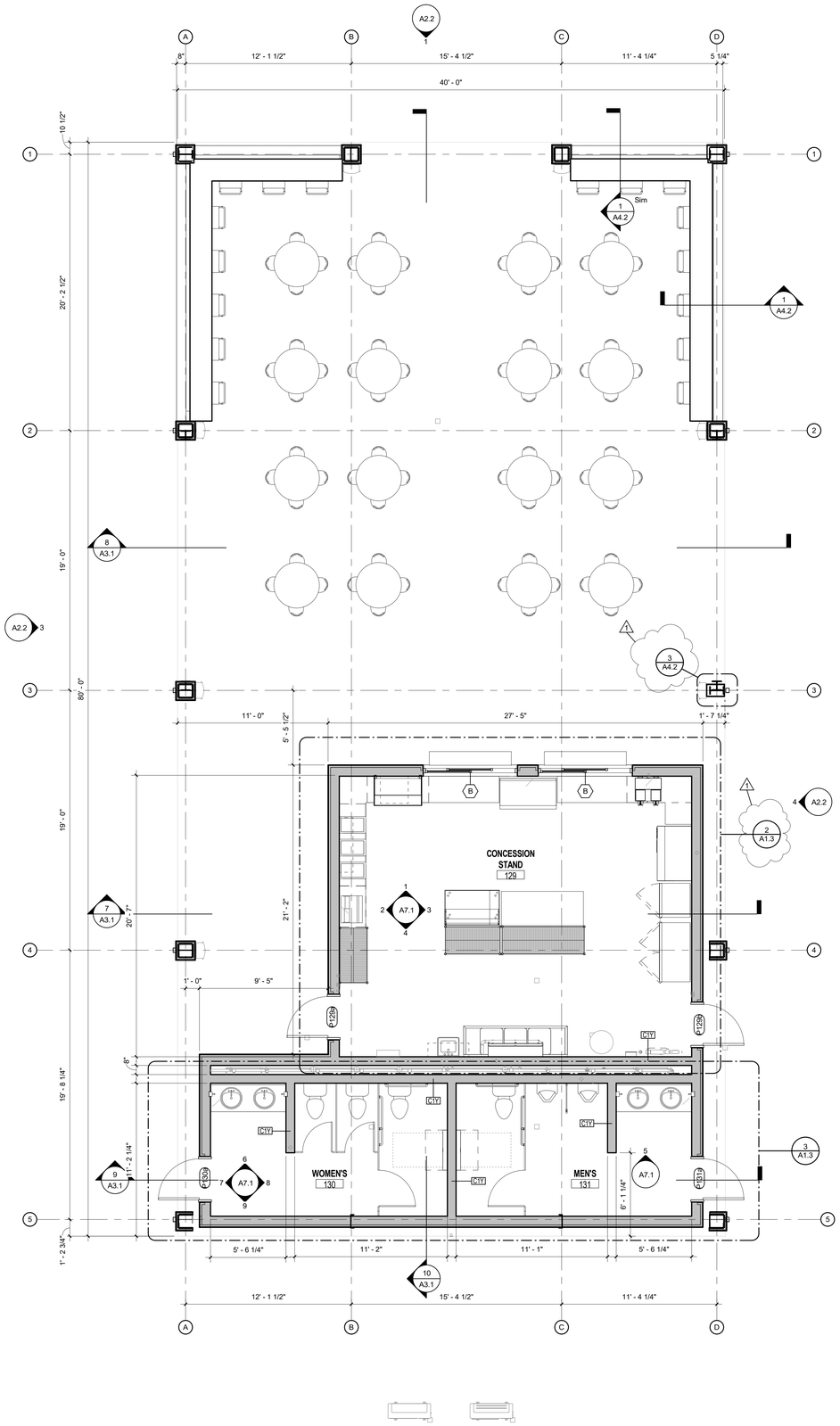
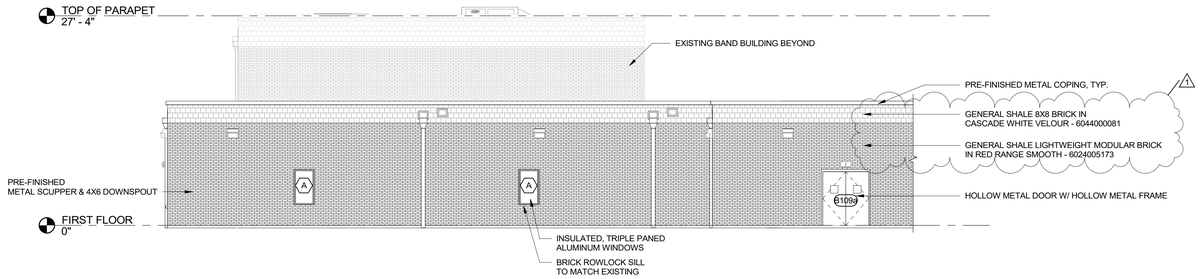
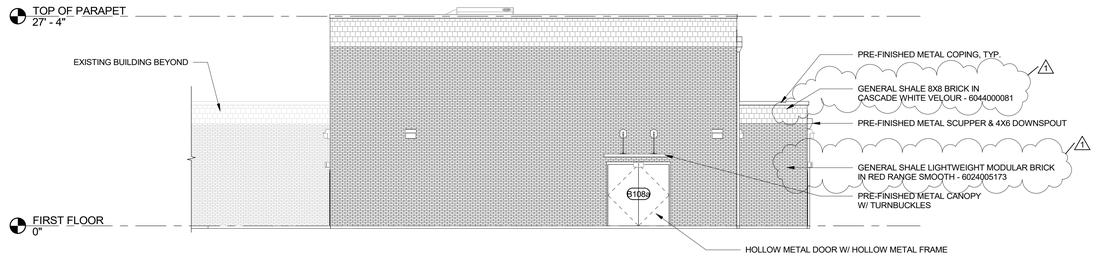
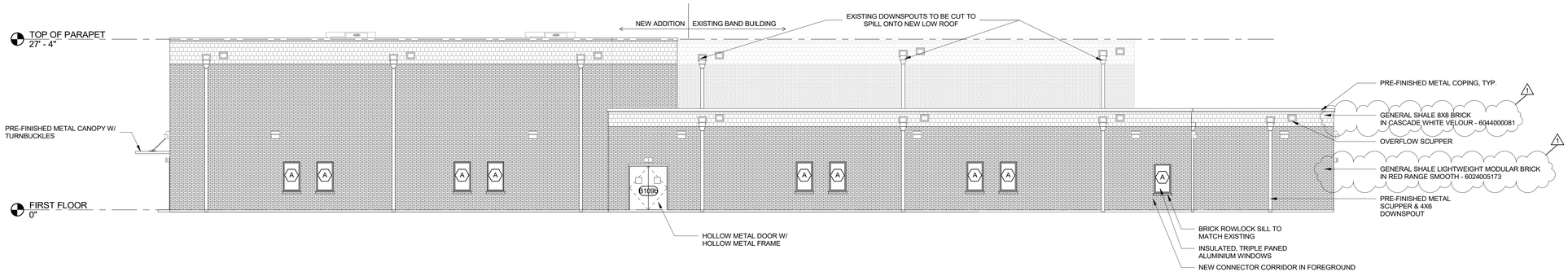

A2.2
A
B
C
D
8"
12' - 1 1/2"
15' - 4 1/2"
11' - 4 1/4"
5 1/4"
40' - 0"
10 1/2"
20' - 2 1/2"
19' - 0"
8'0" - 0"
1
2
3
Sim
1
A4.2
8
A3.1
A2.2
3
3
A4.2
1' - 7 1/4"
11' - 0"
27' - 5"
5' - 5 1/2"
19' - 0"
CONCESSION
STAND
129
1
2
A7.1
3
4
A2.2
4
2
A1.3
7
A3.1
20' - 7"
21' - 2"
1' - 0"
9' - 5"
C1Y
C1Y
C1Y



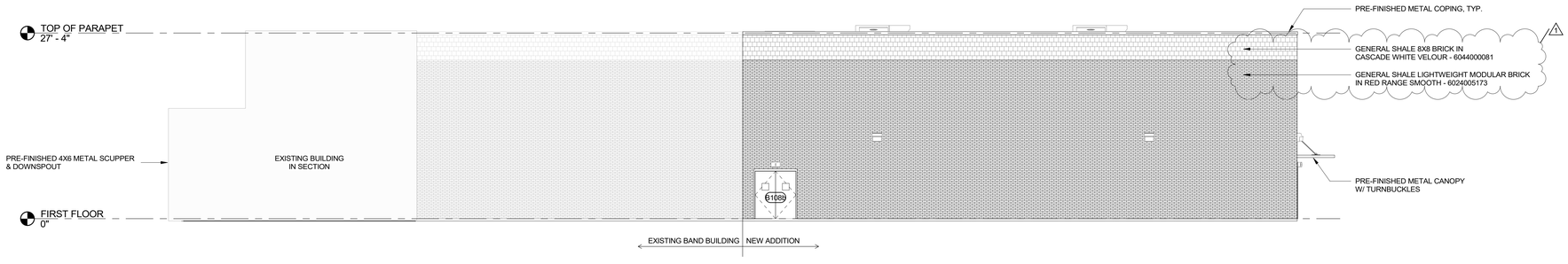
1 BAND ROOM NORTH ELEVATION
1/8" = 1'-0"



2 BAND ROOM SOUTH ELEVATION
1/8" = 1'-0"



3 BAND ROOM EAST ELEVATION
1/8" = 1'-0"



4 BAND ROOM WEST ELEVATION
1/8" = 1'-0"

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No. 102519
STATE OF TENNESSEE

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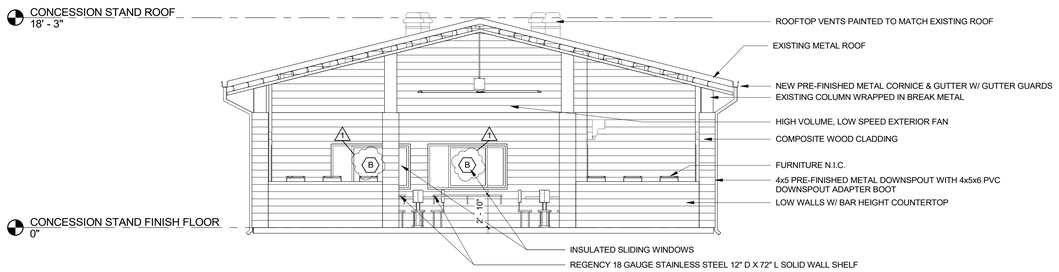
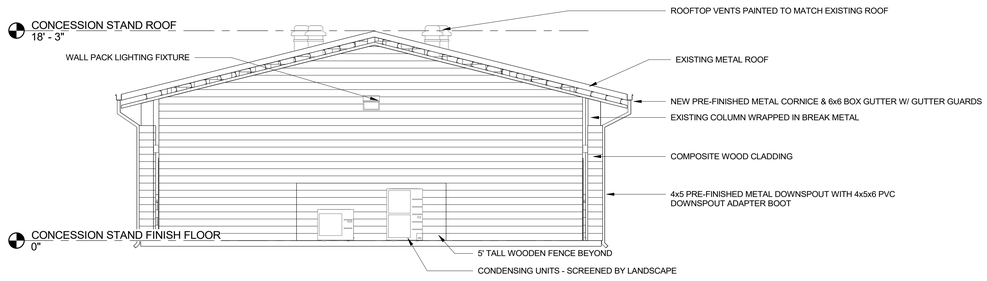
BAND ROOM EXTERIOR ELEVATIONS

NOTE: CONTRACTOR TO CLEAN EXISTING METAL ROOF.



1 CONCESSION STAND EAST ELEVATION
3/16" = 1'-0"



2 CONCESSION STAND WEST ELEVATION
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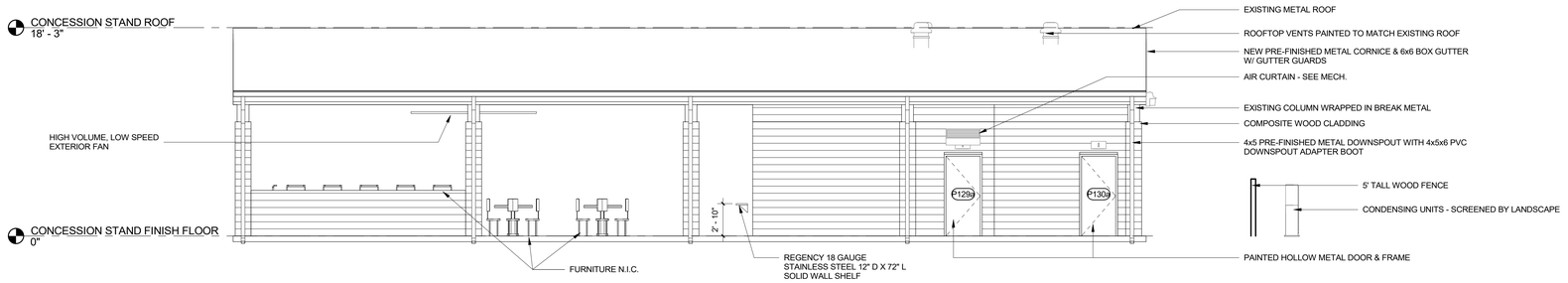
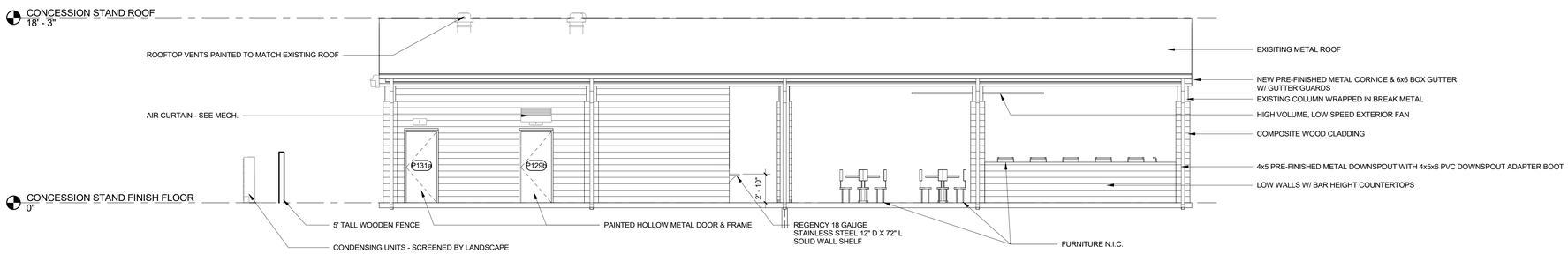


3 CONCESSION STAND NORTH ELEVATION
3/16" = 1'-0"



4 CONCESSION STAND SOUTH ELEVATION
3/16" = 1'-0"

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CONCESSION STAND EXTERIOR ELEVATIONS

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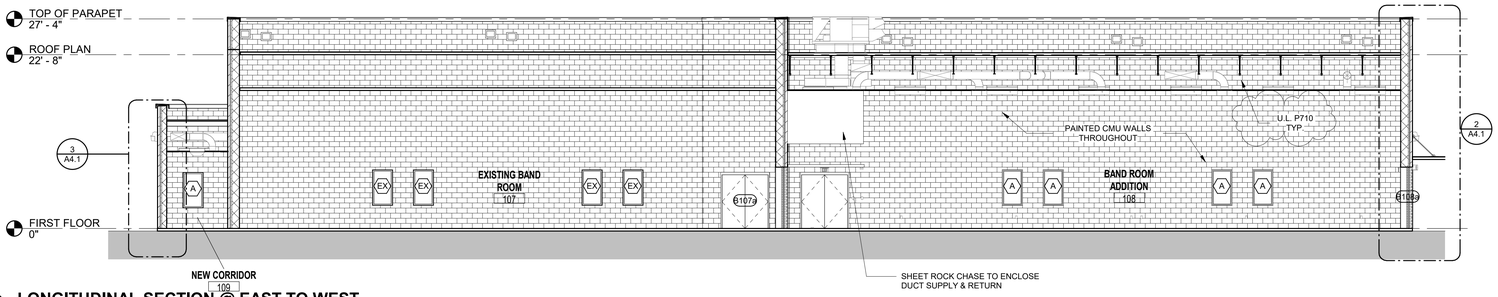
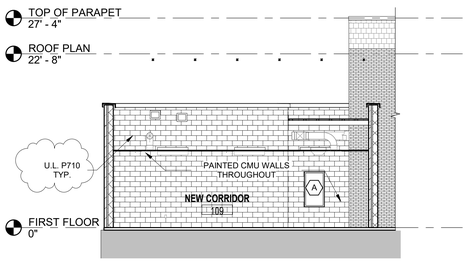
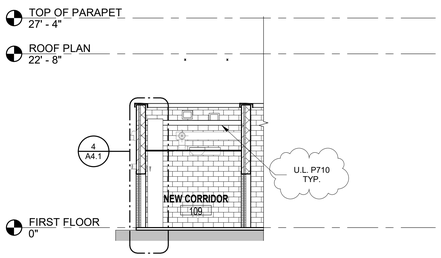


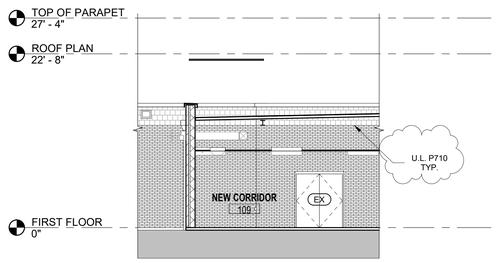
1 LONGITUDINAL SECTION @ EAST TO WEST
1/8" = 1'-0"



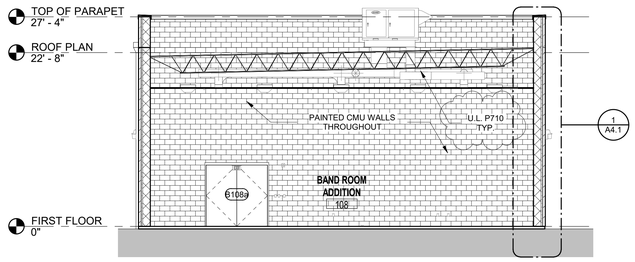
2 LONGITUDINAL SECTION @ CORRIDOR TURN
1/8" = 1'-0"



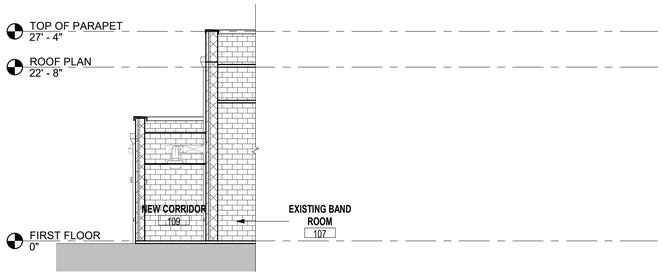
3 LONGITUDINAL SECTION @ SOUTH CORRIDOR ENTRY
1/8" = 1'-0"



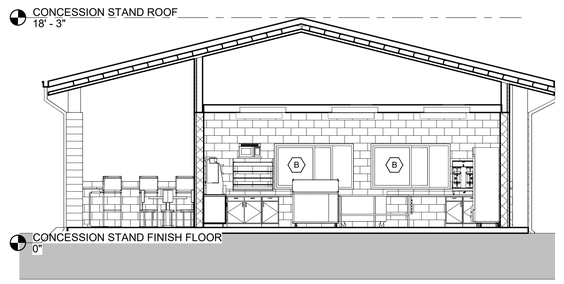
4 TRANSVERSE SECTION @ CORRIDOR TURN
1/8" = 1'-0"



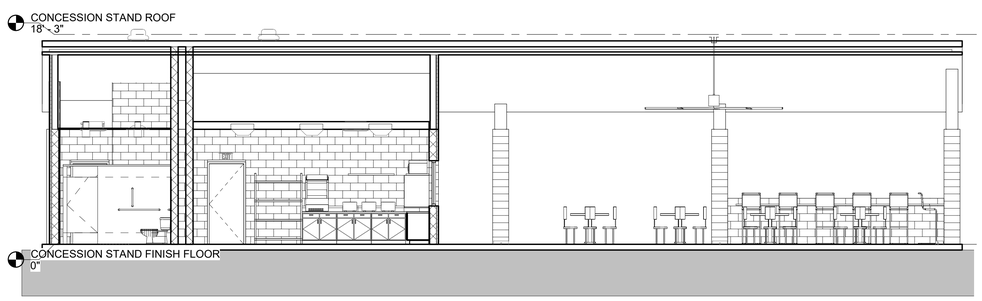
5 TRANSVERSE SECTION @ NEW ADDITION SPACE
1/8" = 1'-0"



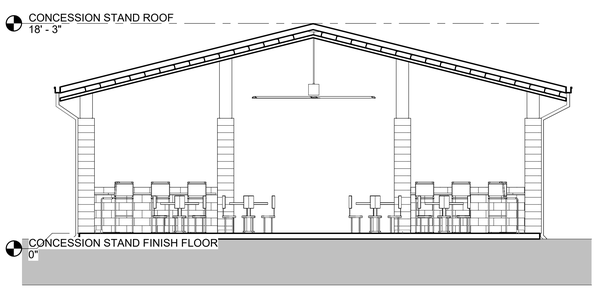
6 TRANVERSE SECTION @ EXISTING SPACE & CORRIDOR
1/8" = 1'-0"



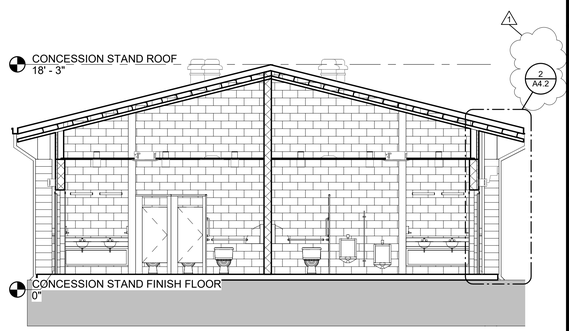
7 SECTION @ INTERIOR CONCESSION STAND
3/16" = 1'-0"



10 LONGITUDINAL CONCESSION STAND SECTION
3/16" = 1'-0"



8 SECTION @ CONCESSION STAND OUTDOOR DINING
3/16" = 1'-0"



9 SECTION @ CONCESSION STAND RESTROOMS
3/16" = 1'-0"

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No. 102162
10-11-19
STATE OF TENNESSEE

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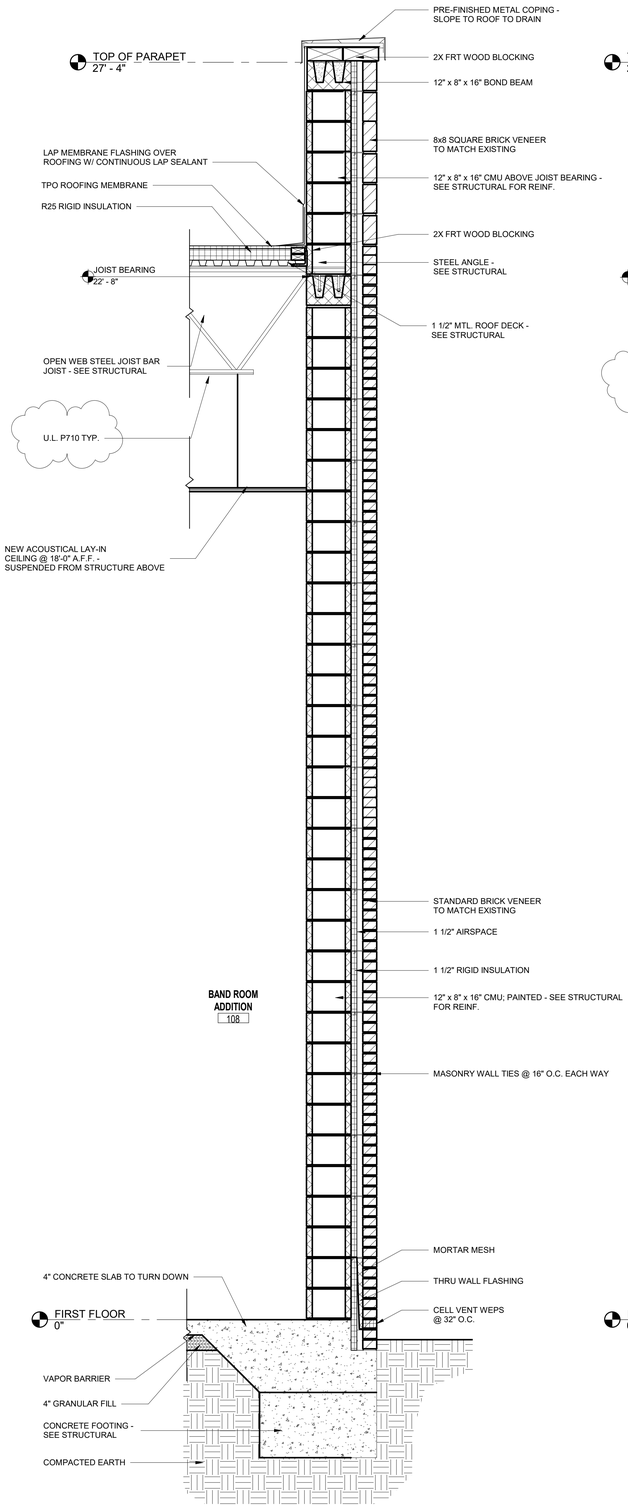
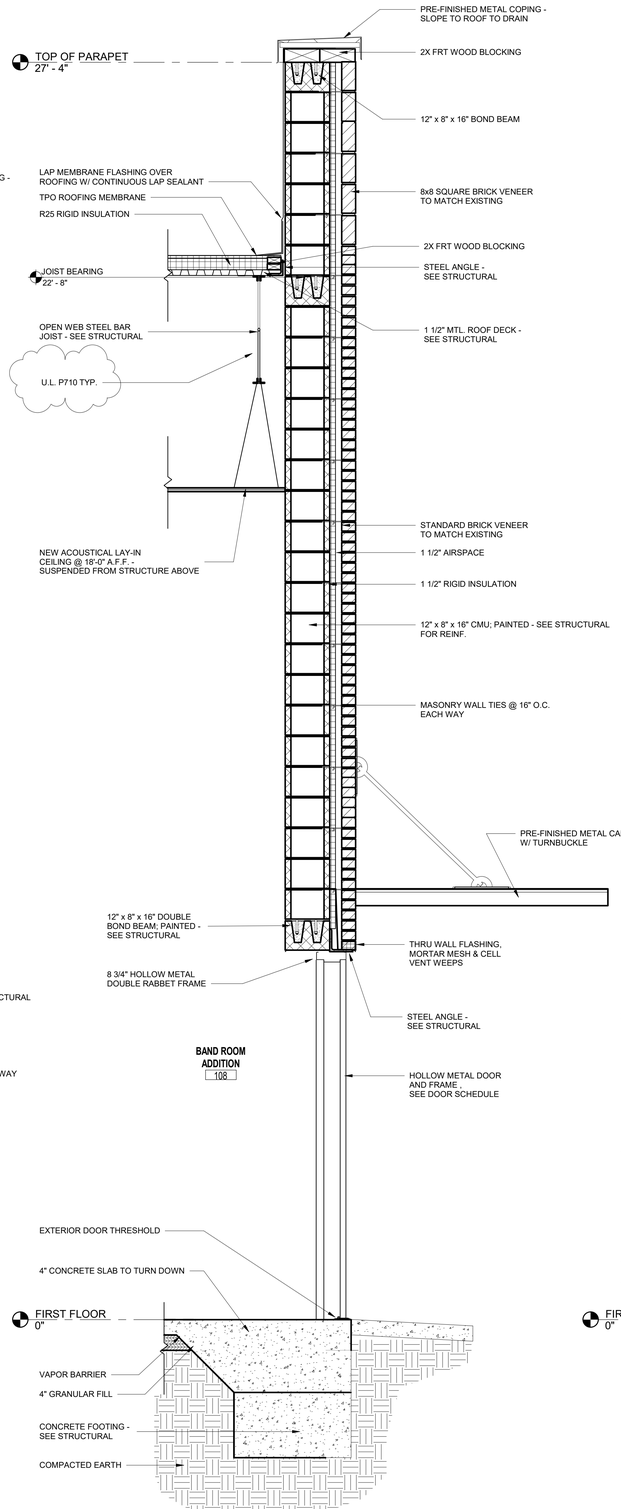
BUILDING SECTIONS

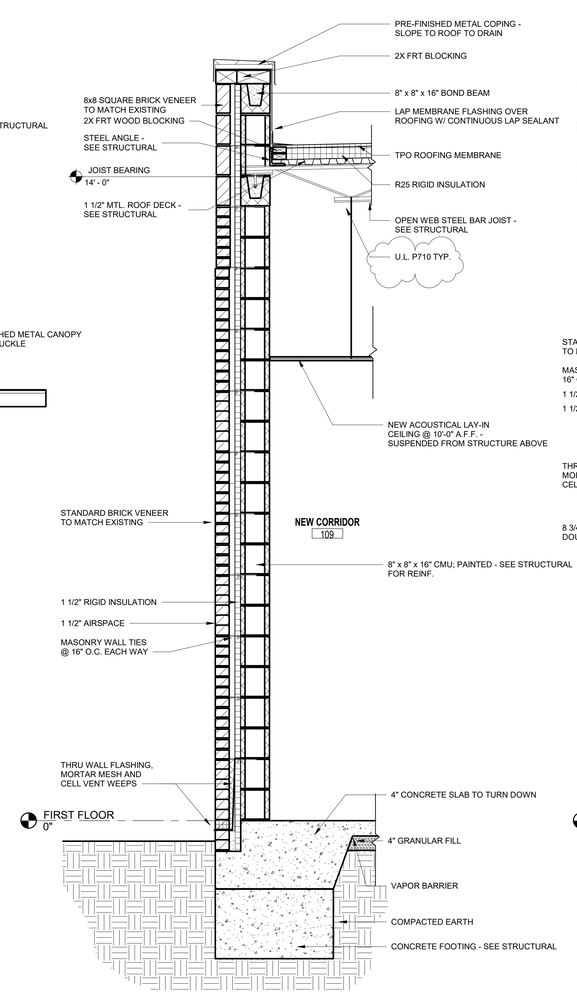
10/14/2019 2:10:09 PM



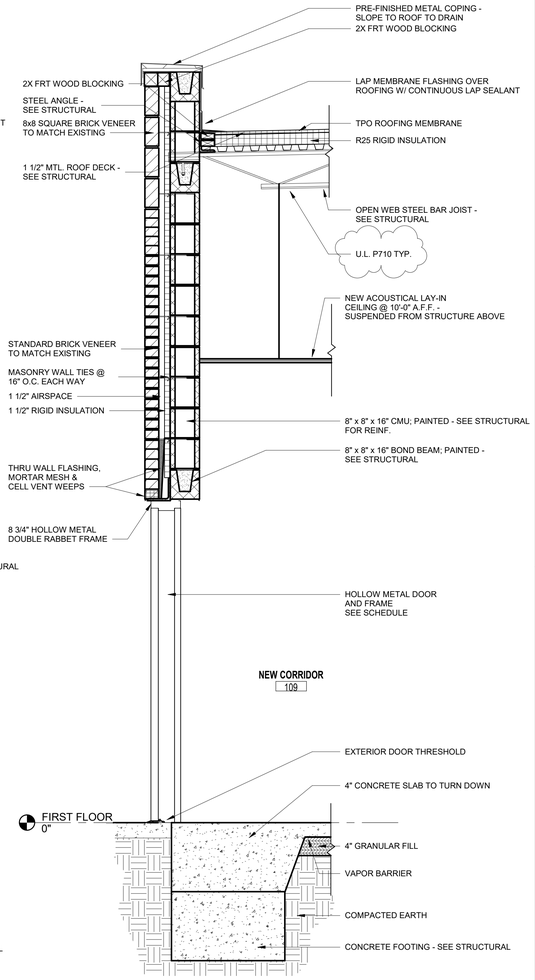
1 **TYP. WALL SECTION @ NEW ADDITION WALL**
3/4" = 1'-0"



2 **TYP. WALL SECTION @ NEW ADDITION WALL W/ DOOR**
3/4" = 1'-0"



3 **TYP. WALL SECTION @ NEW CORRIDOR WALL**
3/4" = 1'-0"



4 **TYP. WALL SECTION @ NEW CORRIDOR WALL W/ DOOR**
3/4" = 1'-0"

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No. 102019
10-11-19
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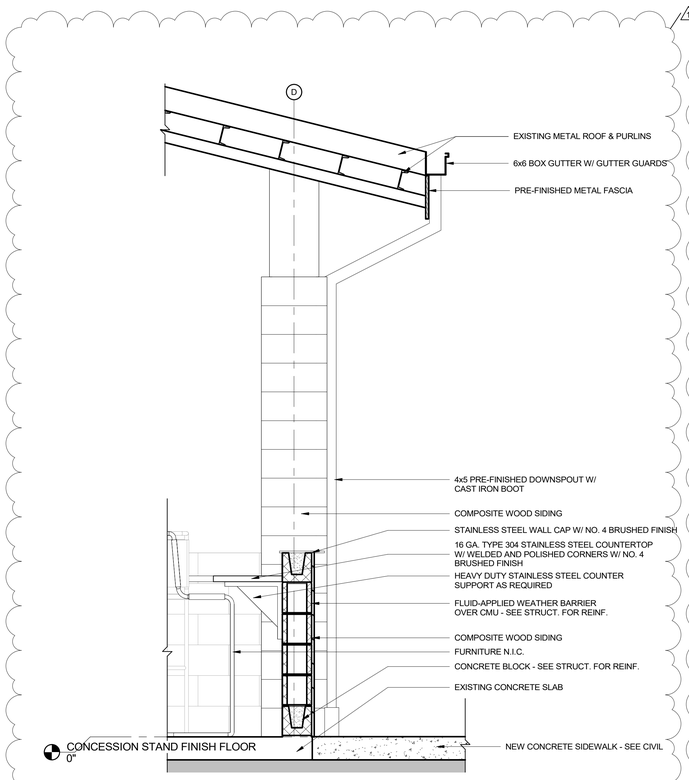
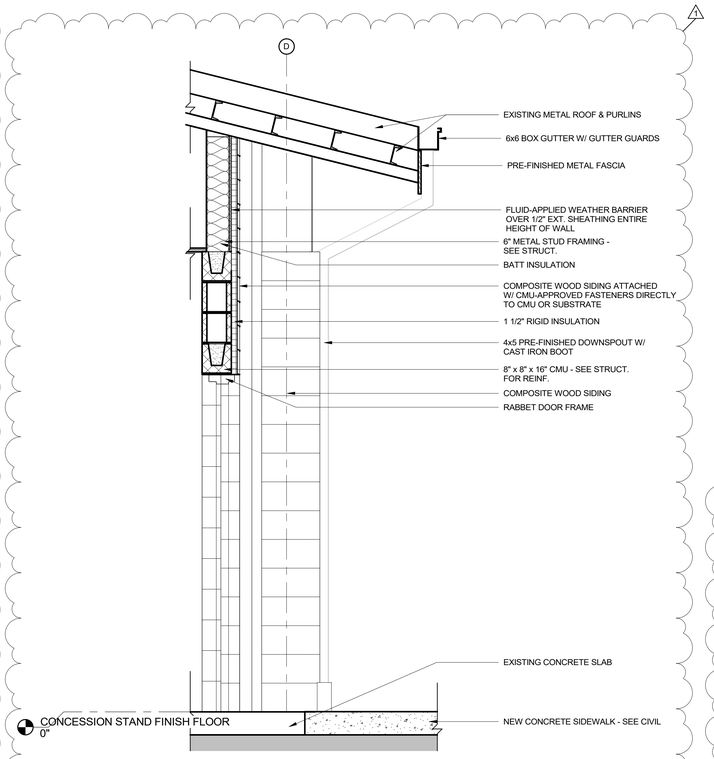
WALL SECTIONS

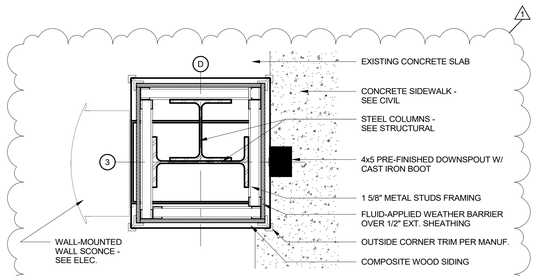
10/14/2019 2:10:10 PM



1 TYP. WALL SECTION @ CONCESSION STAND BAR WALLS
3/4" = 1'-0"



2 TYP. WALL SECTION @ CONCESSION STAND DOOR
3/4" = 1'-0"



3 TYP. CONCESSION STAND BASE COLUMN DETAIL
1 1/2" = 1'-0"

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STATE OF TENNESSEE

WALL SECTIONS AND DETAILS

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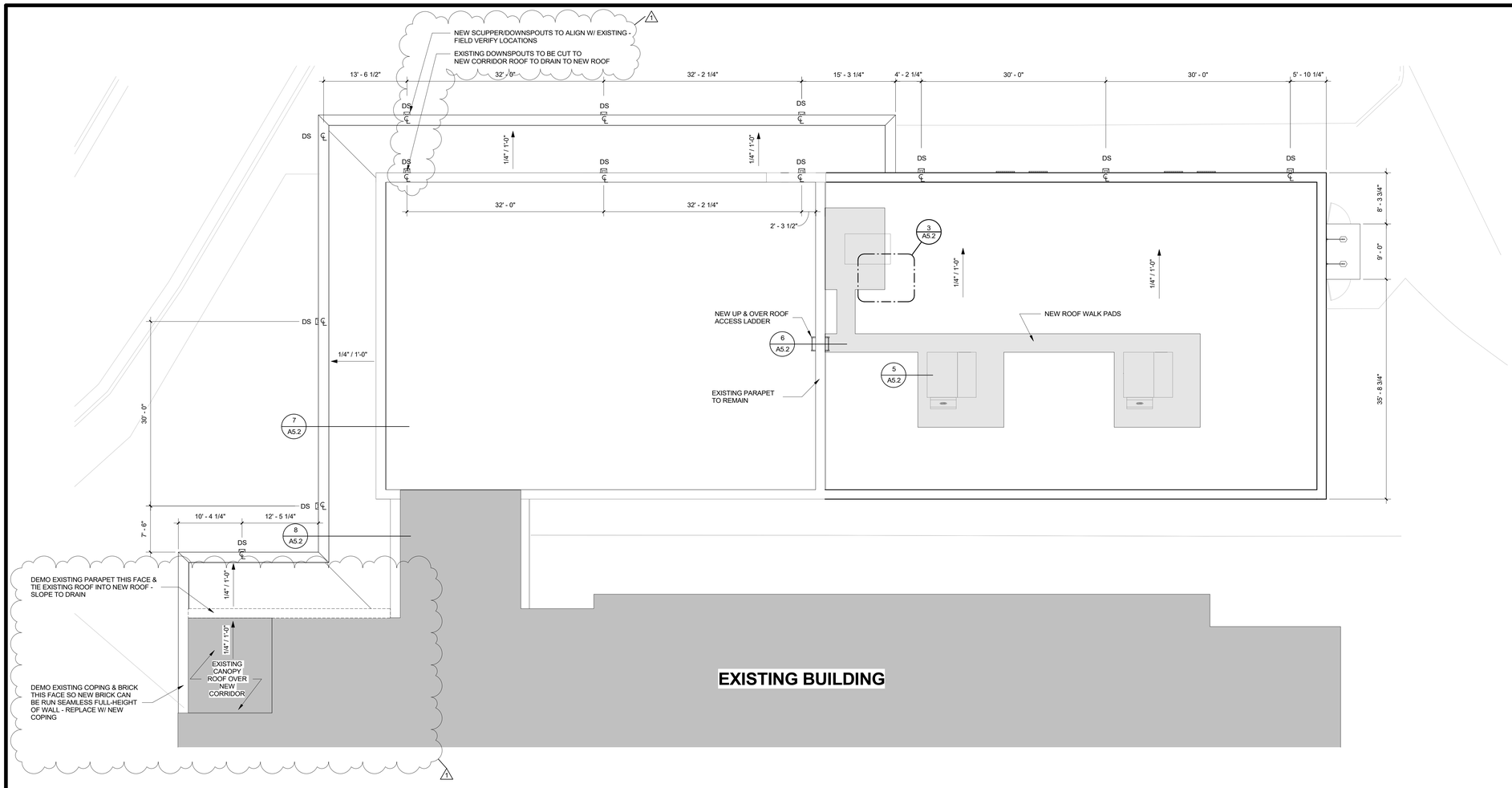

1 **BAND ROOM ROOF PLAN**
1/8" = 1'-0"

ROOF PLAN GENERAL NOTES

1. ALL ROOF PENETRATIONS SHALL BE FLASHED AND SEALED PER ROOFING MANUFACTURER'S STANDARD DETAILS. SHOP DRAWINGS OF ALL ROOFING DETAILS ARE REQUIRED WITH MATERIAL SUBMISSIONS.
2. REFER TO AND COORDINATE WITH STRUCTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR EXACT LOCATIONS OF ALL ITEMS WHICH PENETRATE THROUGH THE ROOF. DO NOT SCALE THIS DRAWING FOR EXACT LOCATIONS. NOT ALL ROOF PENETRATIONS ARE NECESSARILY ILLUSTRATED.
3. SEE WALL SECTIONS FOR DETAILS RELATING TO THE ROOF.
4. RIDGE, VALLEY AND HIP FLASHING SHALL BE PER SHINGLE MFR.'S WARRANTY REQUIREMENTS AND STANDARD DETAILS. RIDGE AND HIP SHINGLES TO BE LAPPED AWAY FROM DIRECTION OF PREVAILING WINDS.
5. PAINT ALL ROOF PENETRATIONS. COLOR TO BE SELECTED BY ARCHITECT.
6. ALL JOINTS TO BE LAPPED 1", RIVETED AND SOLDERED.

ROOF PLAN LEGEND

PV — PLUMBING VENT

DS — SCUPPER & DOWNSPOUT

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10/11/19

ROOF PLAN

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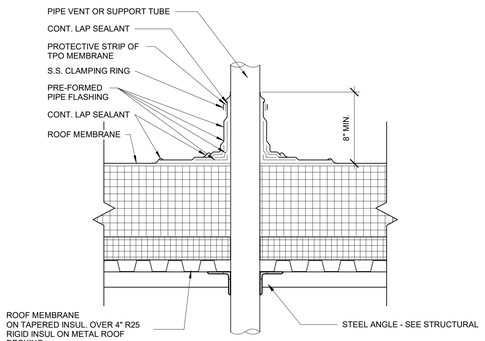
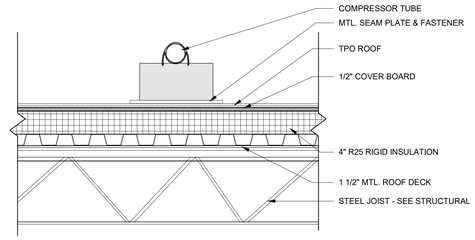
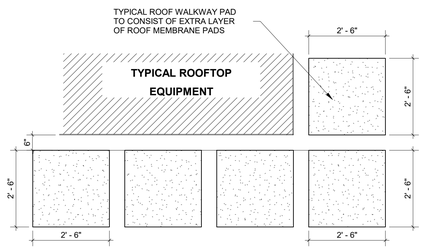


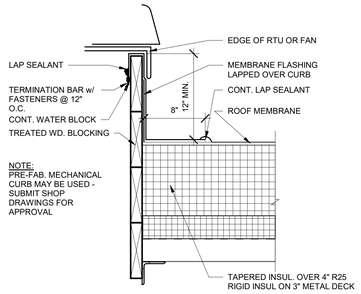
1 TYP. PIPE PENETRATION DETAIL
1 1/2" = 1'-0"



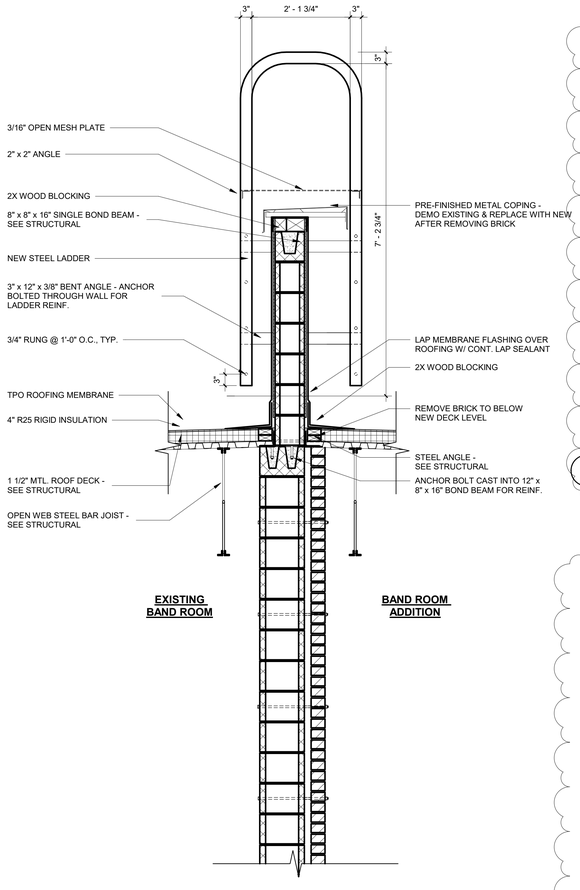
2 TYP. PIPE ANCHOR DETAIL
1 1/2" = 1'-0"



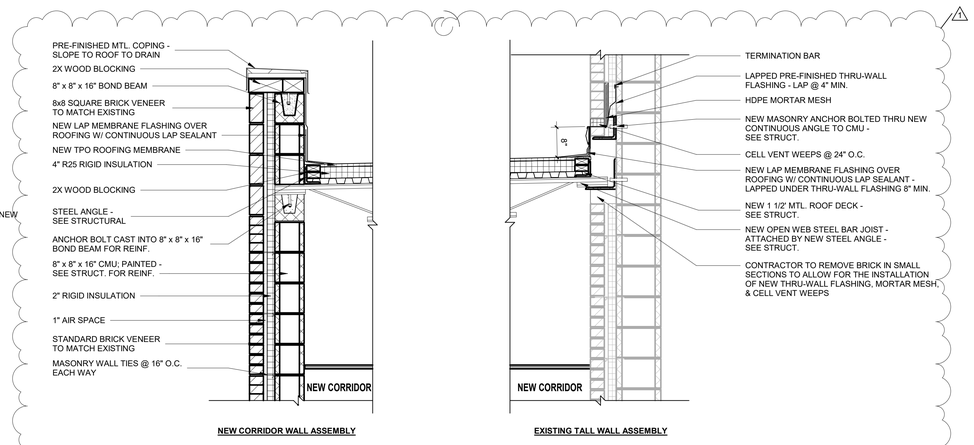
3 TYP. ROOF WALK PADS DETAIL
1/2" = 1'-0"



5 TYP. MECHANICAL CURB DETAIL
1 1/2" = 1'-0"

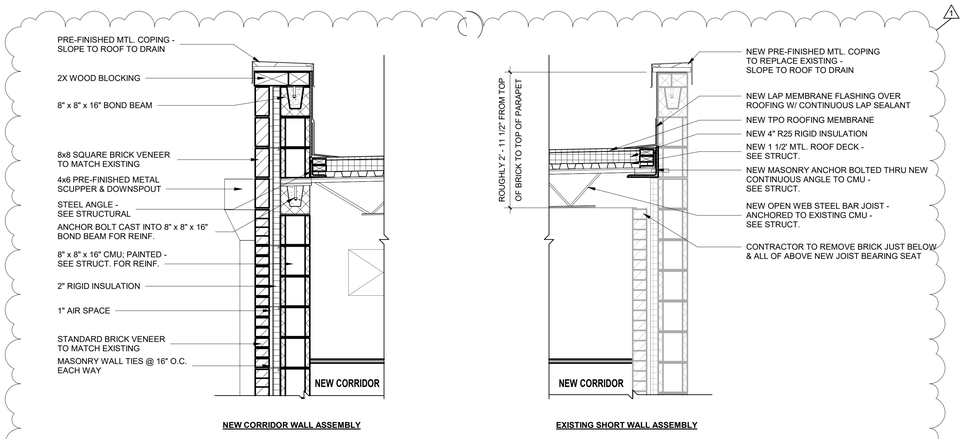


6 ROOF ACCESS LADDER DETAIL
3/4" = 1'-0"



7 TYP. JOIST ATTACHMENT @ EXISTING TALL WALL
3/4" = 1'-0"

NOTE: ALL NEW STRUCTURE AND DECK ARE 1 HOUR PROTECTED - U.L. P710



8 TYP. JOIST ATTACHMENT @ EXISTING SHORT WALL
3/4" = 1'-0"

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HOUSTON HIGH SCHOOL
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9755 Wolf River Blvd
Germantown, TN 38139

STEVEN W. LANDWEHR
REGISTERED ARCHITECT
ARCHITECT
No. 102358
STATE OF TENNESSEE
10/11/19

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1

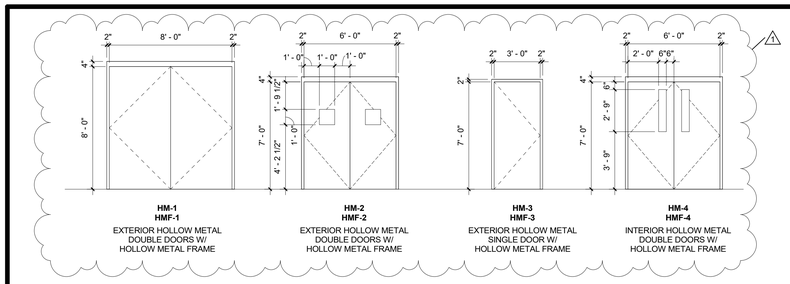
PROJECT NUMBER
150119

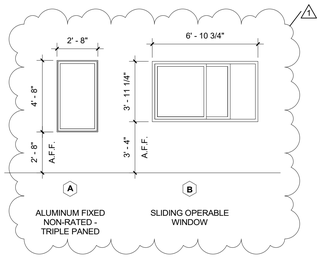
DATE OF ORIGINAL ISSUE
October 11, 2019

SHEET NUMBER
A5.2

ROOF DETAILS

10/14/2019 2:10:11 PM





DOOR & WINDOW SCHEDULE GENERAL NOTES

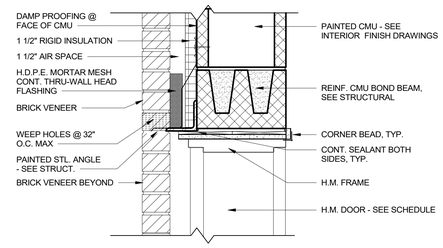
1. HOLLOW METAL FRAMES TO HAVE SILENCERS (TYPICAL).
2. VERIFY KEYING REQUIREMENTS WITH OWNER (TYPICAL)
3. H.M. FRAMES TO BE PAINTED.
4. SEE DOOR SCHEDULE FOR DOOR FINISHES.
5. PROVIDE ASTRAGALS AND COORDINATORS AT RATED INTERIOR PAIR DOORS.
6. PROVIDE SMOKE SEALS AT ALL SMOKE AND FIRE RATED INTERIOR DOORS.
7. COORDINATE LATCHING FOR ALL DOORS WITH HOLD OPENS.
8. CONTRACTOR SHALL COORDINATE FRAME THROAT DIMENSIONS WITH WALL TYPE LEGEND.
9. ALL DOOR SURFACES SHALL BE FINISHED INCLUDING TOP AND BOTTOM EDGES.
10. ALL EXTERIOR HOLLOW METAL DOORS ARE TO BE INSULATED.
11. FIRE-RESISTANCE RATED DOORS MUST HAVE FIRE RATED FRAMES, HARDWARE, CLOSERS, AND OTHER RATED ACCESSORIES. [1999 NFPA 80 1-4 DEFINITION OF "FIRE DOOR," 1-6.1, 2-4.7, AND IBC 715.4]
12. CLOSERS AND POSITIVE LATCHING HARDWARE ARE REQUIRED ON DOORS IN SMOKE PARTITIONS OR BARRIERS. [NFPA 101 7.2.1.8, 8.3.3.3., 8.4.3.5, 1999 NFPA 80 3-4, AND IBC 715.4.7]
13. HOLLOW METAL FRAMES IN STUD & GYP. BD. WALLS SHALL WRAP THE WALL ENDS, TYP.
14. SEE DOOR AND WINDOW TYPE ELEVATIONS FOR GLAZING TYPES

TEMPERED GLASS IS REQUIRED IN THE FOLLOWING LOCATIONS BY CODE:

1. GLAZING IN AN INDIVIDUAL FIXED OR OPERABLE PANEL ADJACENT TO A DOOR WHERE THE NEAREST EXPOSED EDGE OF THE GLAZING IS WITHIN A 24" ARC OF EITHER VERTICAL EDGE OF A DOOR IN CLOSED POSITION AND WHERE THE BOTTOM EXPOSED EDGE OF THE GLAZING IS LESS THAN 60" ABOVE THE WALKING SURFACE. GLAZING IN PERPENDICULAR PLANE TO DOORS WHEN CLOSED ARE EXEMPT ON THE LATCH SIDE OF THE DOOR IN GROUP R-2 [IBC 2406.3.6]

2. GLAZING IN AN INDIVIDUAL FIXED OR OPERABLE PANEL IN WHICH THE EXPOSED AREA OF AND INDIVIDUAL PANE IS GREATER THAN 9 SF., THE BOTTOM EDGE IS LESS THAN 18" ABOVE THE FLOOR, THE EXPOSED TOP EDGE IS GREATER THAN 36" ABOVE THE FLOOR, AND ONE OR MORE WALKING SURFACES ARE WITHIN 36" HORIZONTALLY OF THE PLANE OF THE GLAZING [IBC 2406.3.7]

3. GLAZING ADJACENT TO STAIRWAYS, LANDINGS AND RAMPS WITHIN 36" HORIZONTALLY OF A WALKING SURFACE, WITHIN 60" HORIZONTALLY OF THE BOTTOM TREAD OF A STAIRWAY IN ANY DIRECTION, AND THE BOTTOM EDGE IS LESS THAN 60" ABOVE THE PLANE OR THE ADJACENT WALKING SURFACE. [IBC 2406.3.10 & 2406.3.11]



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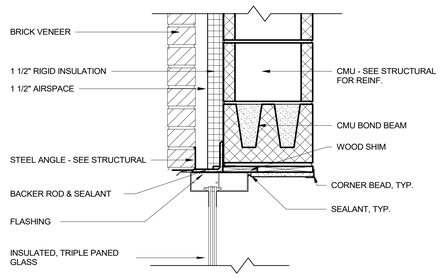

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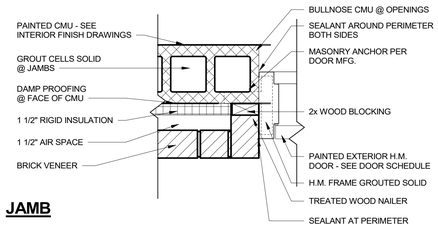

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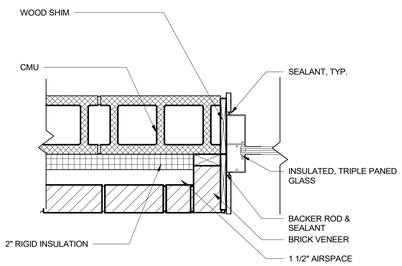

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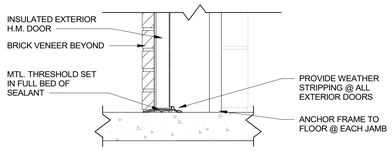
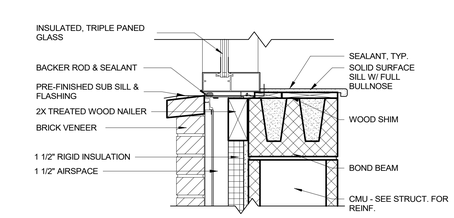


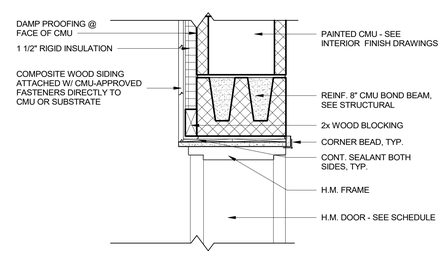
THRESHOLD

1 TYP. EXTERIOR HM @ CMU W/ BRICK DETAILS
1 1/2" = 1'-0"



SILL @ WALL

3 TYP. WINDOW @ CMU DETAILS
1 1/2" = 1'-0"



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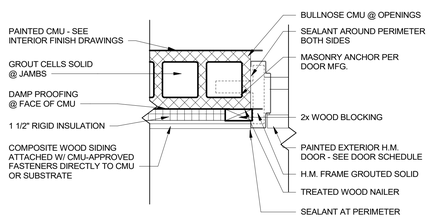

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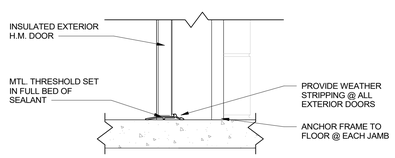

THRESHOLD

2 TYP. EXTERIOR HM @ CMU W/ COMPOSITE WOOD SIDING DETAILS
1 1/2" = 1'-0"

DOOR SCHEDULE

Mark	DOOR Width	DOOR Height	DOOR Thickness	Door Type	Door Finish	Frame Type	Frame Finish	Fire Rating	Comments
B107a	6' - 0"	7' - 0"	1 3/4"	HM-4	PAINT	HMF-4	PAINT	SMOKE SEALED	PANIC HARDWARE, CLOSERS, SMOKE SEALS, CLASSROOM LOCK, ASTRAGAL
B108a	8' - 0"	8' - 0"	1 3/4"	HM-1	PAINT	HMF-1	PAINT	N/A	PANIC HARDWARE, CLOSERS, SMOKE SEALS, CLASSROOM LOCK, ASTRAGAL
B108b	6' - 0"	7' - 0"	1 3/4"	HM-2	PAINT	HMF-2	PAINT	N/A	PANIC HARDWARE, CLOSERS, SMOKE SEALS, CLASSROOM LOCK, ASTRAGAL
B108c	6' - 0"	7' - 0"	1 3/4"	HM-4	PAINT	HMF-4	PAINT	SMOKE SEALED	PANIC HARDWARE, CLOSERS, SMOKE SEALS, CLASSROOM LOCK, ASTRAGAL
B109a	6' - 0"	7' - 0"	1 3/4"	HM-2	PAINT	HMF-2	PAINT	N/A	PANIC HARDWARE, CLOSERS, CARD READERS, ELECTRIC STRIKE W/ KEY EMERGENCY ACCESS, WEATHER STRIPPING AND DRIPS
B109b	6' - 0"	7' - 0"	1 3/4"	HM-2	PAINT	HMF-2	PAINT	N/A	PANIC HARDWARE, CLOSERS, CARD READERS, ELECTRIC STRIKE W/ KEY EMERGENCY ACCESS, WEATHER STRIPPING AND DRIPS
P129a	3' - 0"	7' - 0"	1 3/4"	HM-3	PAINT	HMF-3	PAINT	N/A	CLOSERS, STORE ROOM LOCK, WEATHER STRIPPING AND DRIPS
P129b	3' - 0"	7' - 0"	1 3/4"	HM-3	PAINT	HMF-3	PAINT	N/A	CLOSERS, STORE ROOM LOCK, WEATHER STRIPPING AND DRIPS
P130a	3' - 0"	7' - 0"	1 3/4"	HM-3	PAINT	HMF-3	PAINT	N/A	CLOSERS, STORE ROOM LOCK, WEATHER STRIPPING AND DRIPS
P131a	3' - 0"	7' - 0"	1 3/4"	HM-3	PAINT	HMF-3	PAINT	N/A	CLOSERS, STORE ROOM LOCK, WEATHER STRIPPING AND DRIPS

DOOR / WINDOW LEGEND

HM = HOLLOW METAL
HMF = HOLLOW METAL FRAME
ALF = ALUMINUM FRAME
INS = TEMPERED INSULATING GLAZING

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STEVEN W. LANDWEHR
REGISTERED ARCHITECT
AGRICOLA
OCTOBER
STATE OF TENNESSEE

REVISIONS		
Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1

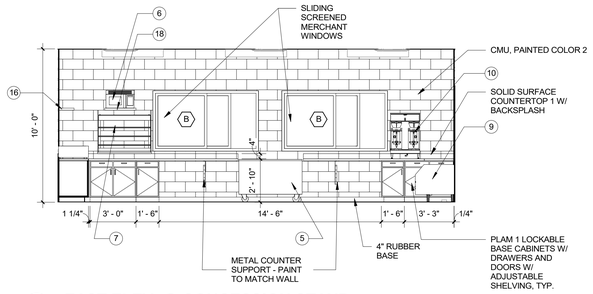
PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
October 11, 2019

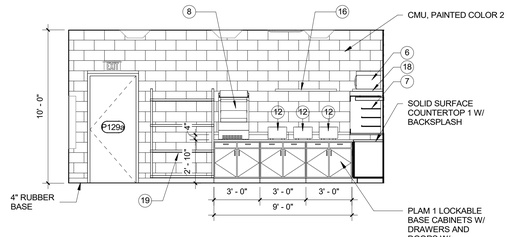
SHEET NUMBER
A6.1

DOOR & WINDOW SCHEDULES AND DETAILS

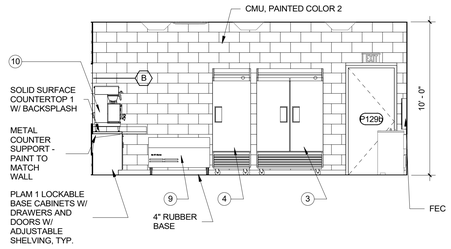
10/14/2019 11:22:57 AM



1 EAST ELEV. @ CONCESSION STAND
1/4" = 1'-0"



2 NORTH ELEV. @ CONCESSION STAND
1/4" = 1'-0"



3 SOUTH ELEV. @ CONCESSION STAND
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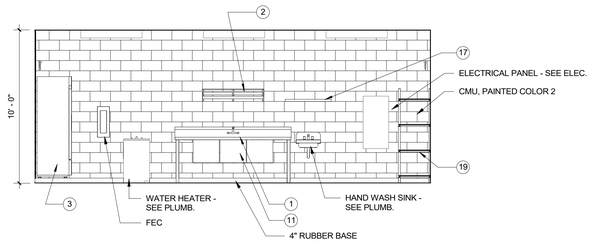

4 WEST ELEV. @ CONCESSION STAND
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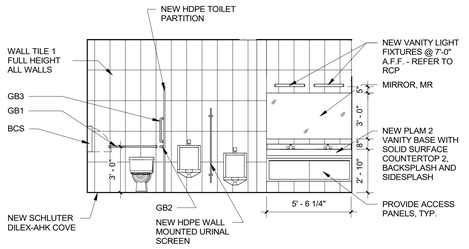
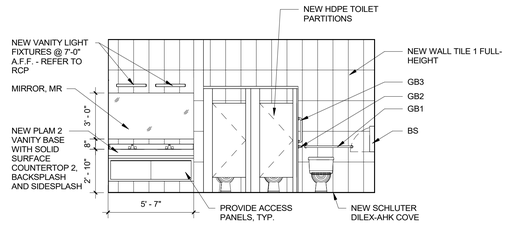
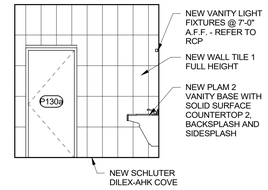


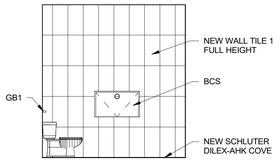
5 EAST ELEV. @ MEN'S
1/4" = 1'-0"



6 EAST ELEV. @ WOMEN'S
1/4" = 1'-0"



7 NORTH ELEV. @ WOMEN'S
1/4" = 1'-0"



8 SOUTH ELEV. @ WOMEN'S
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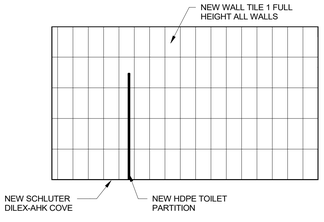

9 WEST ELEV. @ WOMEN'S
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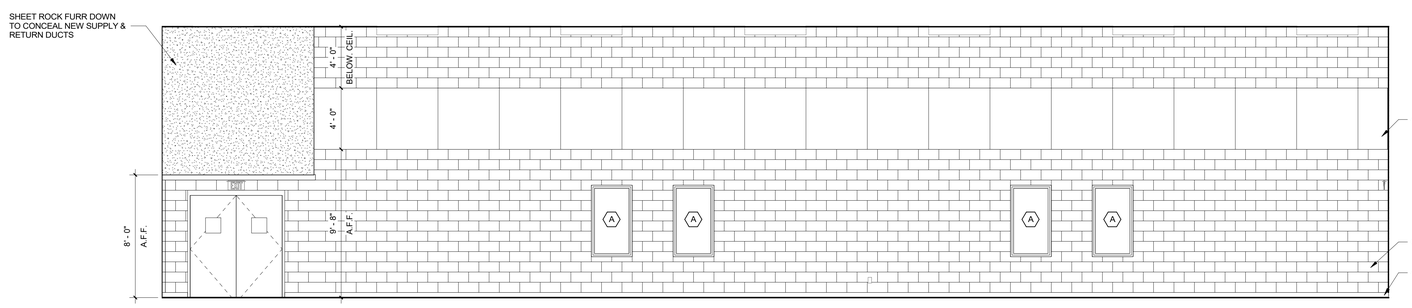
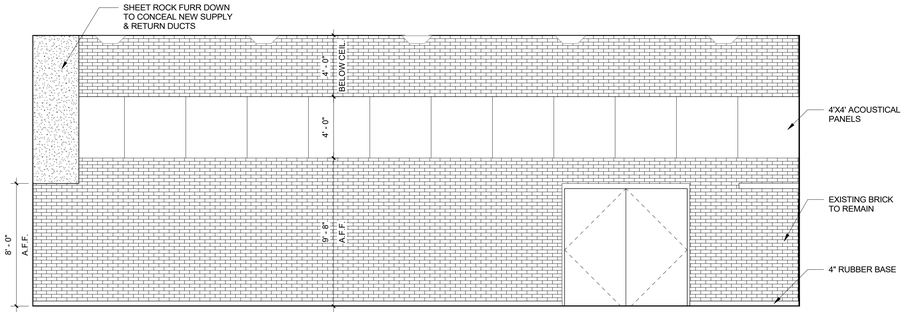


10 EAST ELEV. @ BAND ROOM ADDITION
1/4" = 1'-0"



11 NORTH ELEV. @ BAND ROOM ADDITION
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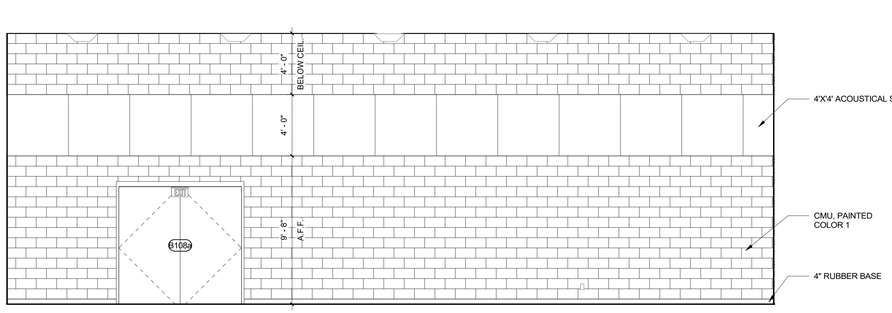

12 SOUTH ELEV. @ BAND ROOM ADDITION
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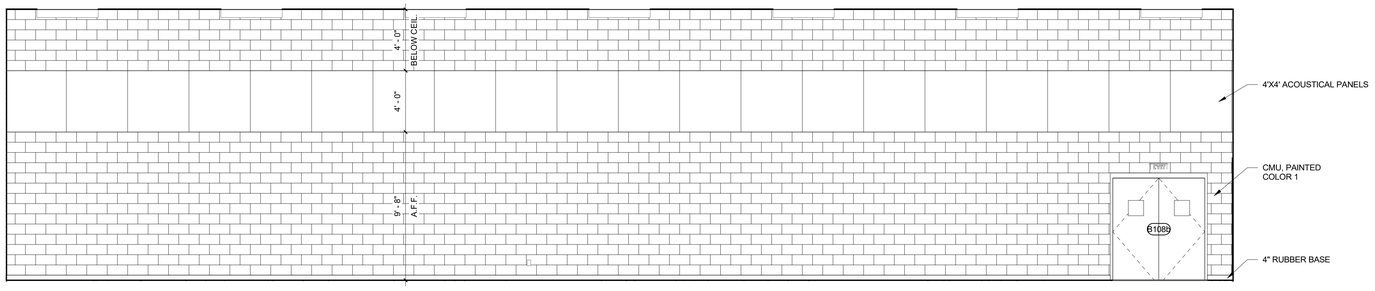

13 WEST ELEV. @ BAND ROOM ADDITION
1/4" = 1'-0"

THE BAND ROOM INTERIOR ELEVATIONS AND EQUIPMENT FOR THE CONCESSION STAND WAS ADDED TO THE PROJECT.

TOILET ACCESSORY LEGEND

MARK	DESCRIPTION - SERIAL NUMBER	SUPPLIER/ INSTALLER	QTY.
MR	WALL MOUNTED MIRROR - REFER TO INT. ELEV. FOR SIZE	CSCI	2
GB1	GRAB BAR 36" - BOBRICK B-6806 X 36, 1-1/4" DIA. STAINLESS STEEL W/ SNAP FLANGE	CSCI	2
GB2	GRAB BAR 42"- BOBRICK B-6806 X 42, 1-1/4" DIA. STAINLESS STEEL W/ SNAP FLANGE	CSCI	2
GB3	GRAB BAR 18" VERTICAL - BOBRICK B-6806 X 18, 1-1/4" DIA. STAINLESS STEEL W/ SNAP FLANGE	CSCI	2
SD	SOAP DISPENSER - LOCKABLE STAINLESS STEEL COMMERCIAL GRADE REFILLABLE BY BULK JUG	CSCI	4
TT	TOILET TISSUE DISPENSER - LOCKABLE STAINLESS STEEL 1,000 FT. ROLL 3-1/4"W x 9"D W/ 3-1/4" CORE	CSCI	4
SN	SANITARY NAPKIN DISPOSAL - BOBRICK B-270 SURFACE-MOUNTED	CSCI	3
PTD	PAPER TOWEL DISPENSER - LOCKABLE STAINLESS STEEL 800 FT. ROLL 17-1/2"W x 8"D	CSCI	2
BCS	BABY CHANGING STATION - BOBRICK KB110-SSWM WALL-MOUNTED	CSCI	2

EQUIPMENT LEGEND

MARK	DESCRIPTION - SERIAL NUMBER	SUPPLIER/ INSTALLER	QTY.
1	3-COMPARTMENT SINK - ADVANCE TABCO 94-3-54-18RL	CSCI	1
2	WALL-MOUNTED POT RACK - ADVANCE TABCO SW-48-EC-X	CSCI	1
3	REACH-IN FREEZER - TRAULSEN G22010	CSCI	1
4	REACH-IN REFRIGERATOR - TRAULSEN G10010	CSCI	1
5	BOTTLE COOLER - TRUE MANUFACTURING CO., INC. TD-50-18-HC	CSCI	1
6	MICROWAVE OVEN - MENUMASTER MCS10TS	CSCI	1
7	DISPLAY MERCHANDISER, HEATED, FOR MULTI-PRODUCT - HATCO GR2DS-36D	CSCI	1
8	HOT DOG GRILL - APW WYOTT HR-31SBD	CSCI	1
9	ICE MAKER, CUBE-STYLE - ICE-OMATIC CIM0530HA	CSCI	1
10	COFFEE BREWER - BUNN 04275.0031	CSCI	1
11	DISPOSER - SALVAJOR 100-SA-3-ARSS	CSCI	1
12	HOT FOOD WELL - NEMCO FOOD EQUIPMENT 6055A	CSCI	3
13	WORK TABLE - ADVANCE TABCO VKS-306	CSCI	1
14	SANDWICH/SALAD PREPARATION REFRIGERATOR - HOSHIZAKI SR48A-12	CSCI	1
15	WIRE SHELVING - ADVANCE TABCO EG-2472	CSCI	1
16	SHELVING, WALL-MOUNTED - ADVANCE TABCO WS-12-48	CSCI	1
17	SHELVING, WALL-MOUNTED - ADVANCE TABCO WS-12-36	CSCI	1
18	MICROWAVE OVEN SHELF - ADVANCE TABCO MS-24-24	CSCI	1
19	WIRE SHELVING - ADVANCE TABCO EG-2448	CSCI	2

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BAND ROOM ADDITION & CONCESSION STAND
9755 Wolf River Blvd
Germantown, TN 38139

STEVEN M. LANDWEHR — REGISTERED ARCHITECT — ARCHITECTURE — 10 11 19 — STATE OF TENNESSEE

INTERIOR ELEVATIONS

REVISIONS

Revision Date	Rev. #	Revision Description
10/11/19	1	ADD. #1

PROJECT NUMBER
150119

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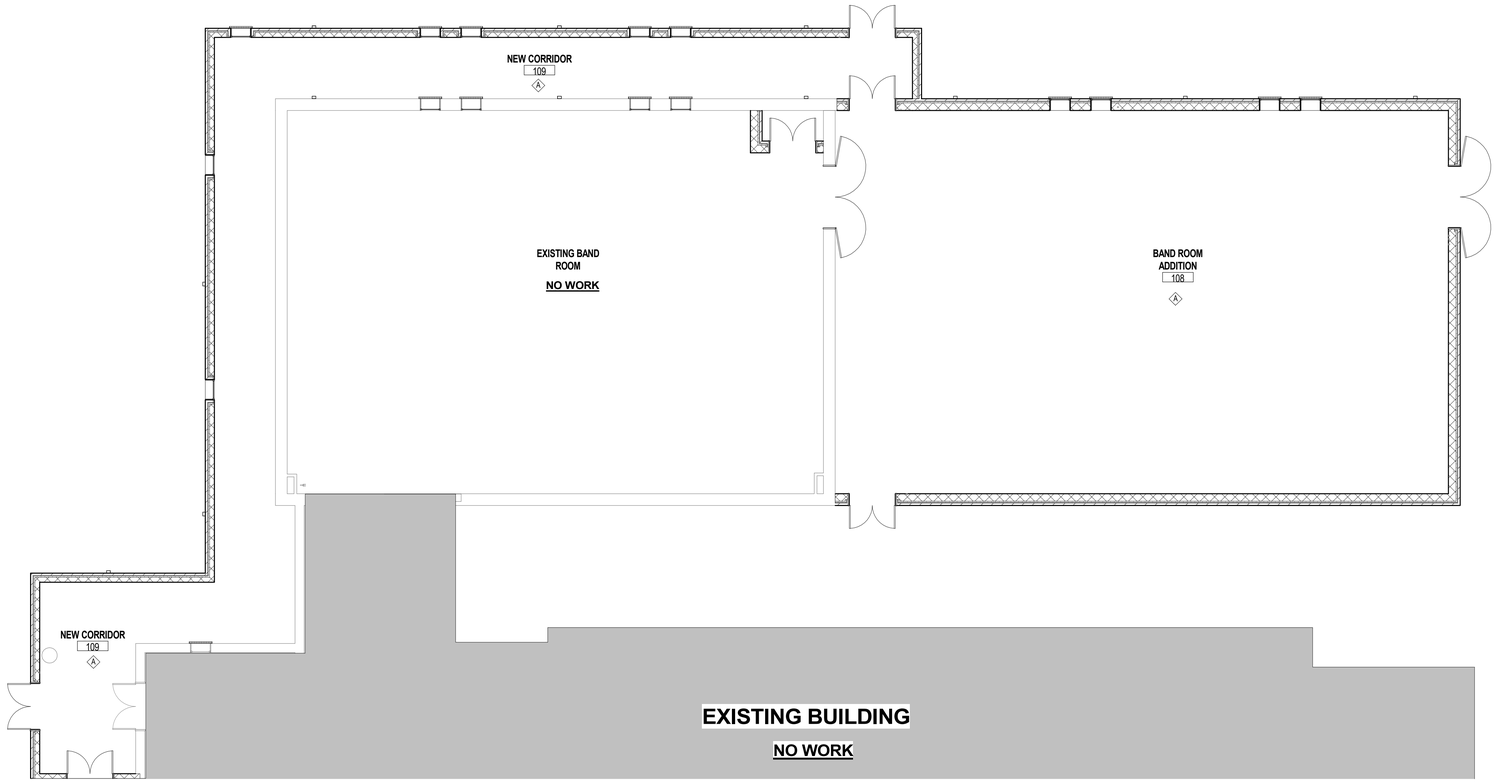
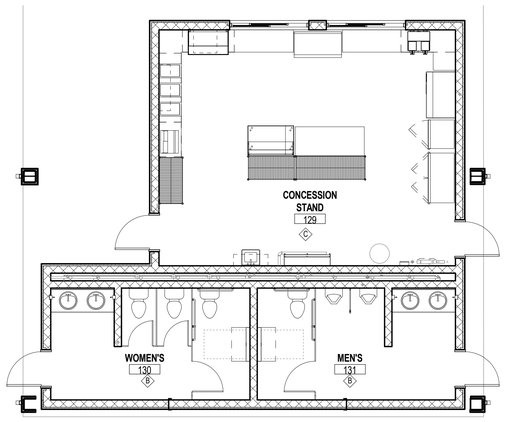
10/14/2019 11:23:01 AM



1 **BAND ROOM FINISH PLAN**
1/8" = 1'-0"



2 **CONCESSION STAND FINISH PLAN**
3/16" = 1'-0"

FINISH LEGEND

- A — VCT
  4" RUBBER BASE
  PAINT - COLOR 1
- B — FLOOR TILE 1
  SCHLUTER DILEX-AHK COVE BASE
  PORCELAIN FULL-HEIGHT WALL TILE
- C — SEALED CONCRETE
  4" RUBBER BASE
  PAINT - COLOR 2

1 **FINISH PLANS FOR BOTH THE CONCESSION STAND AND BAND ROOM ADDITION WERE ADDED TO THE PROJECT.**

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FINISH PLANS

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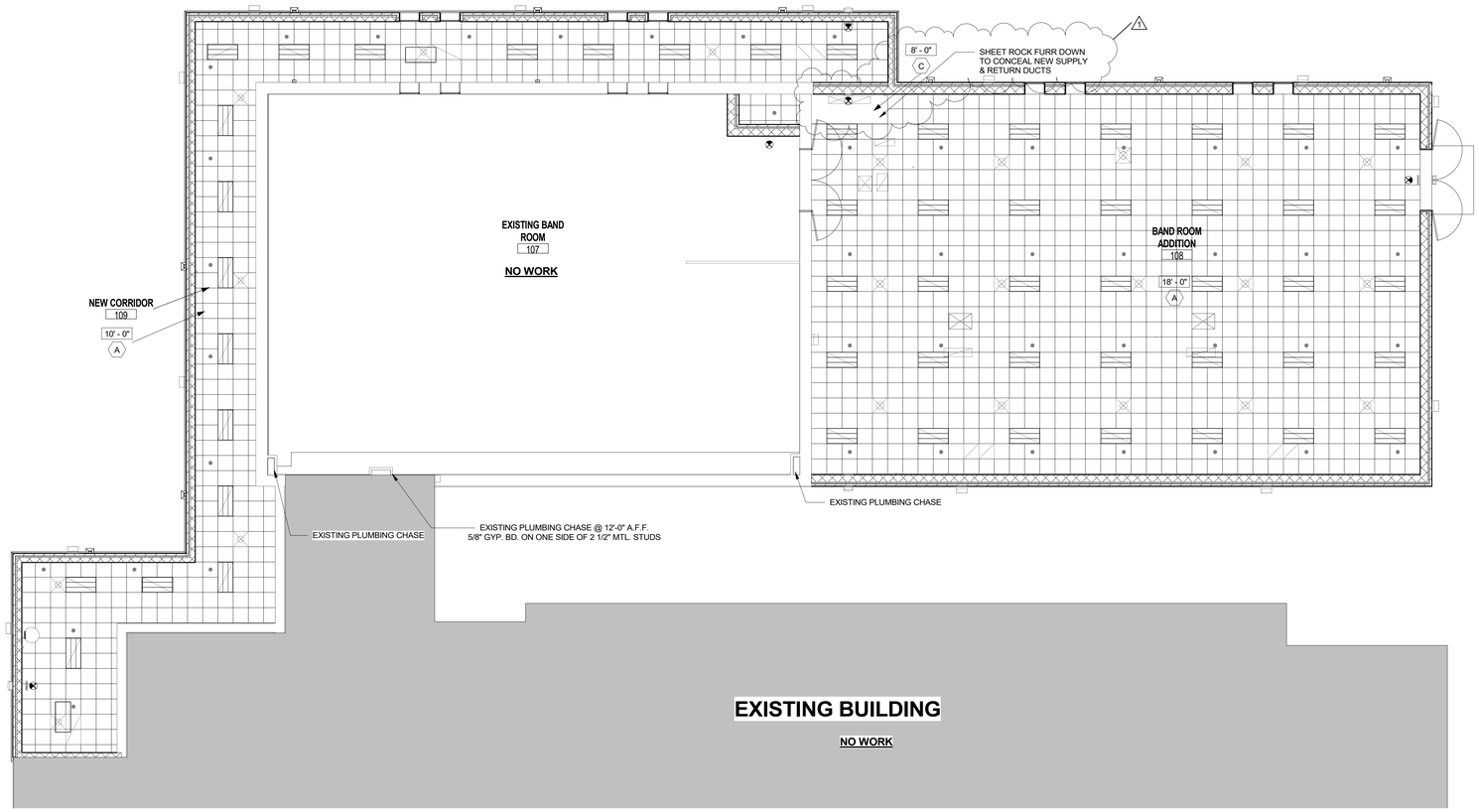
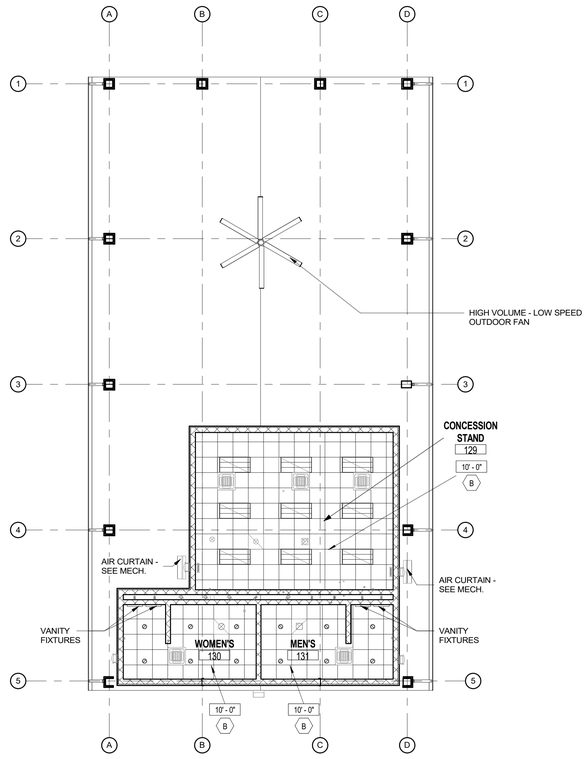


1 **BAND ROOM REFLECTED CEILING PLAN**
1/8" = 1'-0"



2 **CONCESSION STAND REFLECTED CEILING PLAN**
1/8" = 1'-0"

REFLECTED CEILING PLAN LEGEND

- 2 X 4 RECESSED FIXTURE
- VANITY FIXTURE
- EXTERIOR WALL-MOUNT LED FIXTURE
- SUPPLY DIFFUSER
- RETURN DIFFUSER
- S — SMOKE DETECTOR
- SPRINKLER HEAD
- EXIT SIGN
- 1'-0" — CEILING HEIGHT
- A — CEILING MATERIAL
- A — 24"x24" ROCKFON KORAL LAY-IN CEILING TILE IN CHICAGO METALLIC 1200 15/16" EXPOSED GRID SYSTEM
- B — 24"x24" HYGENIC PLUS LAY-IN CEILING TILE IN CHICAGO METALLIC G90 EXTERIOR GRADE GRID SYSTEMS
- C — GYP. BD. CEILING - PAINTED COLOR 3

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REFLECTED CEILING PLANS

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HPG	HIGH PRESSURE GAS PIPING (2 PSIG)
LPG	LOW PRESSURE GAS PIPING (0.5 PSIG)
SA	SUPPLY AIR
SAD	SUPPLY AIR DUCT
SAG	SUPPLY AIR GRILLE
RA	RETURN AIR
RAD	RETURN AIR DUCT
RAG	RETURN AIR GRILLE
OAD	OUTSIDE AIR DUCT
OSA	OUTSIDE AIR
EA	EXHAUST AIR
EAD	EXHAUST AIR DUCT
EAG	EXHAUST AIR GRILLE
TAD	TRANSFER AIR DUCT
TAG	TRANSFER AIR GRILLE
DN	DOWN
LAT	LEAVING AIR TEMP
EAT	ENTERING AIR TEMP
DX	DIRECT EXPANSION
ESP	EXTERNAL STATIC PRESSURE
MCA	MINIMUM CURRENT AMPS
MOCP	MAXIMUM OVER-CURRENT PROTECTION
AFF	ABOVE FINISHED FLOOR
CFM	CUBIC FEET PER MINUTE
TYP	TYPICAL
8"ϕ	ROUND DUCTWORK
10"x6"	RECTANGULAR DUCT (WIDTHxDEPTH)
PRV	PRESSURE REDUCING VALVE
MFR	MANUFACTURER
TSTAT	THERMOSTAT
RTU-1	PACKAGED ROOFTOP UNIT

1 ABBREVIATIONS - MECHANICAL
NOT TO SCALE

	PRESSURE REDUCING VALVE
	EXHAUST DUCT IN SECTION
	SUPPLY DUCT IN SECTION
	RETURN DUCT IN SECTION
	TURNING VANES
	SUPPLY DIFFUSER
A / 500	DIFFUSER CFM AND TYPE
	RETURN/EXHAUST AIR DEVICE
T	THERMOSTAT

2 SYMBOLS - MECHANICAL
NOT TO SCALE

1. FURNISH AND INSTALL ALL NECESSARY LABOR AND MATERIALS FOR A COMPLETE SYSTEM. ANY APPLIANCES OR MATERIALS OBVIOUSLY A PART OF THE SYSTEM AND NECESSARY FOR ITS PROPER OPERATION, ALTHOUGH NOT SPECIFICALLY MENTIONED HEREIN, SHALL BE FURNISHED AND INSTALLED AS IF CALLED FOR IN DETAIL.
2. WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH ALL STATE AND LOCAL CODES.
3. ATTAIN AND PAY FOR ALL REQUIRED PERMITS AND FEES.
4. DRAWINGS ARE GENERALLY DIAGRAMMATIC AND DO NOT NECESSARILY SHOW FITTING AND DETAIL. INSTALL DUCTS, EQUIPMENT, PIPING, ETC., IN A NEAT WORKMANLIKE MANNER, AND IN ACCORDANCE WITH GOOD PRACTICE FOR A COMPLETE WORKABLE INSTALLATION. AVOID CONFLICT WITH OTHER WORK; MAKE ADEQUATE PROVISIONS FOR PREVENTING NOISE AND VIBRATION. ARRANGE EQUIPMENT INTO THE AVAILABLE SPACE IN A MANNER TO MAKE ALL WORKING PARTS ACCESSIBLE FOR MAINTENANCE AND SERVICE.
5. MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED AGAINST DEFECTS FOR ONE YEAR.
6. PROTECT ALL MATERIALS AND EQUIPMENT FROM DAMAGE.
7. CONSTRUCT AIR DUCTS IN ACCORDANCE WITH SMACNA DUCT MANUALS LATEST EDITION.
8. HVAC WORK INDICATED DIAGRAMATICALLY. EXACT LOCATION OF ALL COMPONENTS ARE TO BE DETERMINED IN THE FIELD AND BY THE ACTUAL BUILDING CONDITIONS.
9. ALL WORK SHALL BE COORDINATED WITH ALL OTHER TRADES BEFORE ANY INSTALLATION IS MADE.
10. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH STATE CODES, MANUFACTURER'S APPROVED PUBLISHED LITERATURE, AND AUTHORITIES HAVING JURISDICTION. A COPY OF THE MFR'S INSTALLATION INSTRUCTIONS SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
11. INSTALLATION OF ALL EQUIPMENT SHALL PERMIT ACCESSIBILITY FOR SERVICE AND/OR REPLACEMENT.
12. COORDINATE VOLTAGE AND PHASE OF EACH PIECE OF EQUIPMENT WITH ELECTRICAL CONTRACTOR BEFORE ORDERING.
13. FLEXIBLE DUCT RUNOUTS TO CEILING DIFFUSERS SHALL BE INSTALLED FREE OF KINKS AND SAGS. MAXIMUM LENGTH OF FLEXIBLE DUCT SHALL BE 3'-0".
14. COMPLETION AND TESTS SHALL INCLUDE CLEANING AND LUBRICATION OF ALL EQUIPMENT, AND ADJUSTMENTS FOR PROPER OPERATION. ADJUST DAMPERS, REGISTERS AND DIFFUSERS FOR PROPER AIR DISTRIBUTION. CHECK SYSTEM UNDER ACTUAL OPERATING CONDITIONS AND MAKE ADJUSTMENTS FOR A UNIFORM TEMPERATURE THROUGH THE CONDITIONED SPACE.
15. LOCATIONS SHOWN FOR EQUIPMENT ARE APPROXIMATE LOCATIONS. CONTRACTOR SHALL COORDINATE WITH THE FIELD CONDITIONS FOR THE EXACT LOCATION AND MODIFY DUCTS/PIPES ACCORDINGLY.
16. CONTRACTOR SHALL FIELD VERIFY AVAILABLE SPACE FOR DUCTWORK BEFORE FABRICATING. CONTRACTOR SHALL MODIFY DUCTWORK TO FIT AVAILABLE FIELD CONDITIONS.
17. SIZE REFRIGERANT PIPING PER MANUFACTURERS RECOMMENDATIONS FOR ACTUAL LINE LENGTHS AND VERTICAL LIFT REQUIRED.
18. ALL EXTERIOR WALL AND ROOF PENETRATIONS SHALL BE SEALED WATERPROOF.
19. PROVIDE FIRESTOP WHERE PIPES, CONDUITS, BUS DUCTS, WIRES, DUCTS, AND SIMILAR BUILDING SERVICE EQUIPMENT PENETRATING RATED FLOORS AND WALLS.
20. ALL CEILING EQUIPMENT SHALL BE INSTALLED IN SUCH A WAY THAT LIGHTS, PIPING, AND DUCTWORK DO NOT BLOCK ACCESS TO UNITS AND RELATED ACCESSORIES.
21. ALL DUCT SIZES SHOWN ARE NET INSIDE CLEAR DIMENSIONS.
22. PROVIDE VOLUME DAMPERS AT EACH BRANCH TAKEOFF AND IN SUCH OTHER LOCATIONS WHERE REQUIRED TO PROPERLY BALANCE THE SYSTEM.
23. PROVIDE INSTRUMENT TEST HOLES WITH CAPS IN AIR DISTRIBUTION SYSTEMS WHEREVER VOLUME DAMPER ARE SHOWN.
24. ALL MISCELLANEOUS STRUCTURAL SUPPORTS REQUIRED FOR HVAC EQUIPMENT INSTALLATIONS SHALL BE PROVIDED BY HVAC CONTRACTOR.
25. ALL TRANSFER DUCT SHALL BE INTERNALLY LINED.
26. ALL THE MITERED ELBOWS SHALL BE PROVIDED WITH TURNING VANES. ALL THE ROUND ELBOWS SHALL A CENTER TO FACE OF 1.5 X THE DUCT WIDTH.
27. ALL PIPING AND DUCTS IN FINISHED ROOMS OR SPACES SHALL BE CONCEALED IN FURRED CHASES OR SUSPENDED CEILINGS UNLESS OTHERWISE NOTED.
28. ACCESS PANELS IN SUSPENDED CEILINGS ARE REQUIRED FOR ALL VALVES, DAMPERS, CONTROLS, ETC., AND SHALL BE FURNISHED UNDER ARCHITECTURAL SPECIFICATIONS.
29. PROVIDE ONE 12"x12" TAD FOR EVERY 400 CFM AS REQUIRED FOR RA PATH BACK TO UNIT IN ROOMS WHERE WALLS GO TO DECK.
30. ALL MATERIAL INSTALLED IN RETURN AIR PLENUM SHALL HAVE FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE DEVELOPED INDEX OF NOT MORE THAN 50. INSTALL PLENUM RATED ELECTRICAL AND LOW VOLTAGE CABLE IN RETURN AIR PLENUM.
31. ALL MOTORIZED DAMPERS SHALL BE LOW VOLTAGE AND POWERED BY THE ASSOCIATED EQUIPMENT.

3 NOTES - MECHANICAL
NOT TO SCALE

1. REFER TO 2015 INTERNATIONAL BUILDING CODE.
2. SEISMIC RESTRAINTS SHALL NOT BE REQUIRED FOR THE FOLLOWING INSTALLATIONS:
   - A. PIPING IN MECHANICAL ROOMS (EXCEPT GAS PIPING) LESS THAN 1-1/4 INCH INSIDE DIAMETER
   - B. ALL OTHER PIPING (EXCEPT GAS PIPING) LESS THAN 2-1/2 INCH INSIDE DIAMETER.
   - C. ALL RECTANGULAR DUCTS LESS THAN 6 SQ. FT. IN CROSS-SECTIONAL AREA.
   - D. ALL ROUND DUCTS LESS THAN 28 INCHES IN DIAMETER.
   - E. ALL PIPING SUSPENDED BY INDIVIDUAL HANGERS 12 INCHES OR LESS IN LENGTH FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE SUPPORT FOR THE HANGER.
   - F. ALL DUCTS SUSPENDED BY HANGERS 12 INCHES OR LESS IN LENGTH FROM THE TOP OF THE DUCT TO THE BOTTOM OF THE SUPPORT FOR THE HANGER.

4 SEISMIC NOTES - MECHANICAL
NOT TO SCALE

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No. 117486
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HNA ENGINEERING

ABBREVIATIONS, SYMBOLS, NOTES - MECHANICAL

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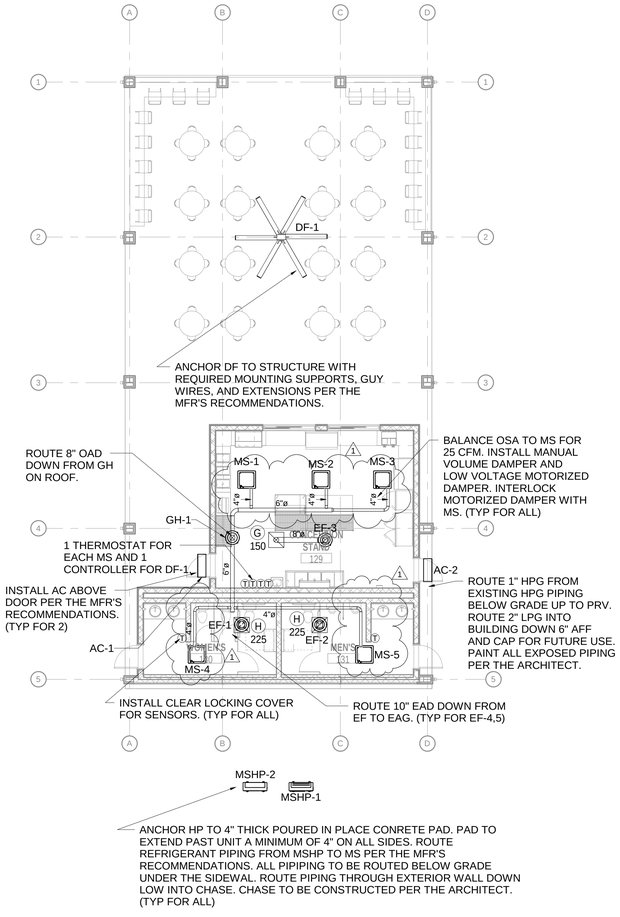
NOTE: CONCESSION STAND IS NOT A SPACE WHERE STUDENTS EARN CREDIT HOURS.

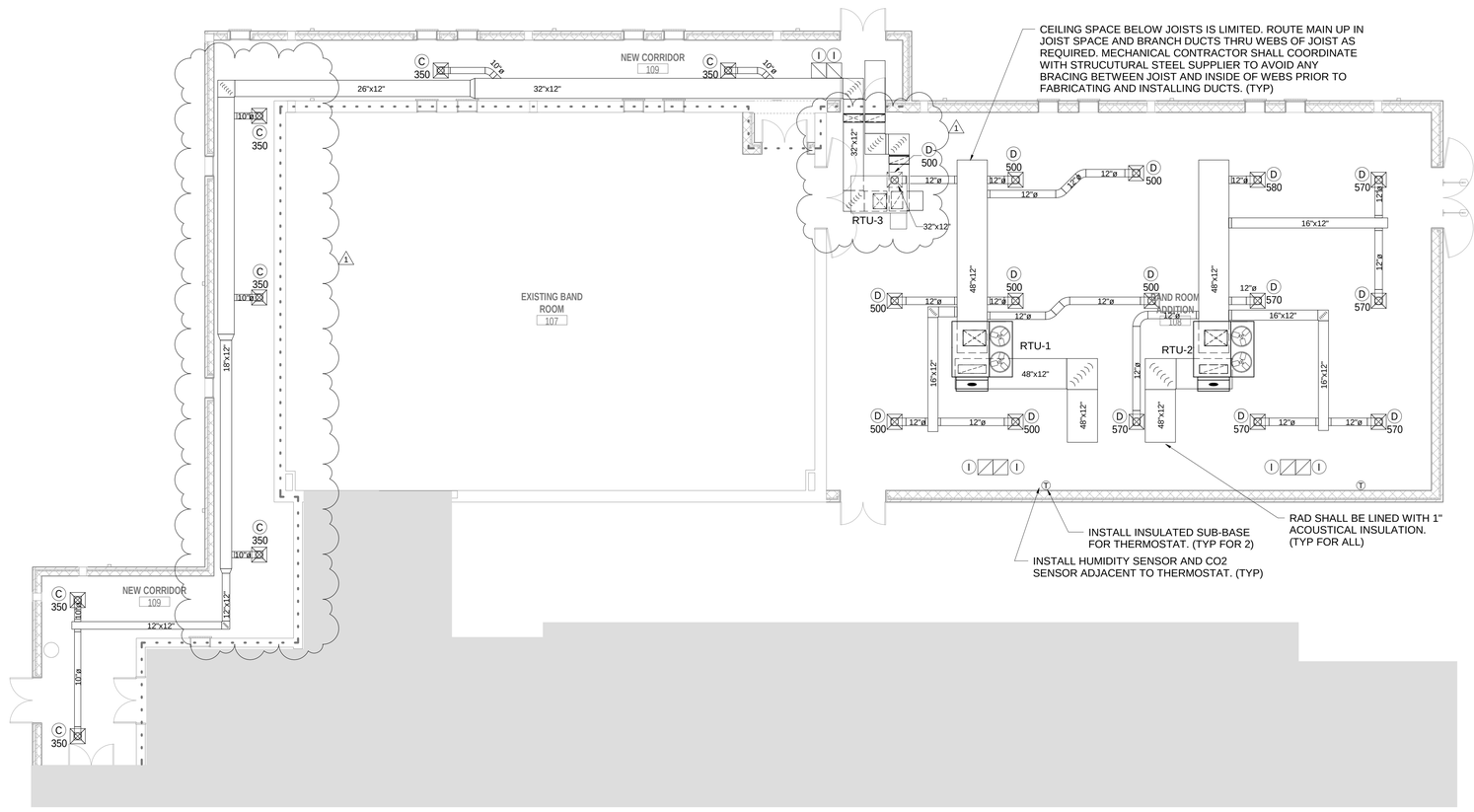


2 CONCESSION STAND FLOOR PLAN - MECHANICAL

1/8" = 1'-0"

WALL RATING LEGEND

- SMOKE TIGHT PARTITION
- ONE HOUR RATED FIRE BARRIER
- TWO HOUR RATED FIRE BARRIER



1 BAND ROOM FLOOR PLAN - MECHANICAL

1/8" = 1'-0"

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FLOOR PLANS - MECHANICAL

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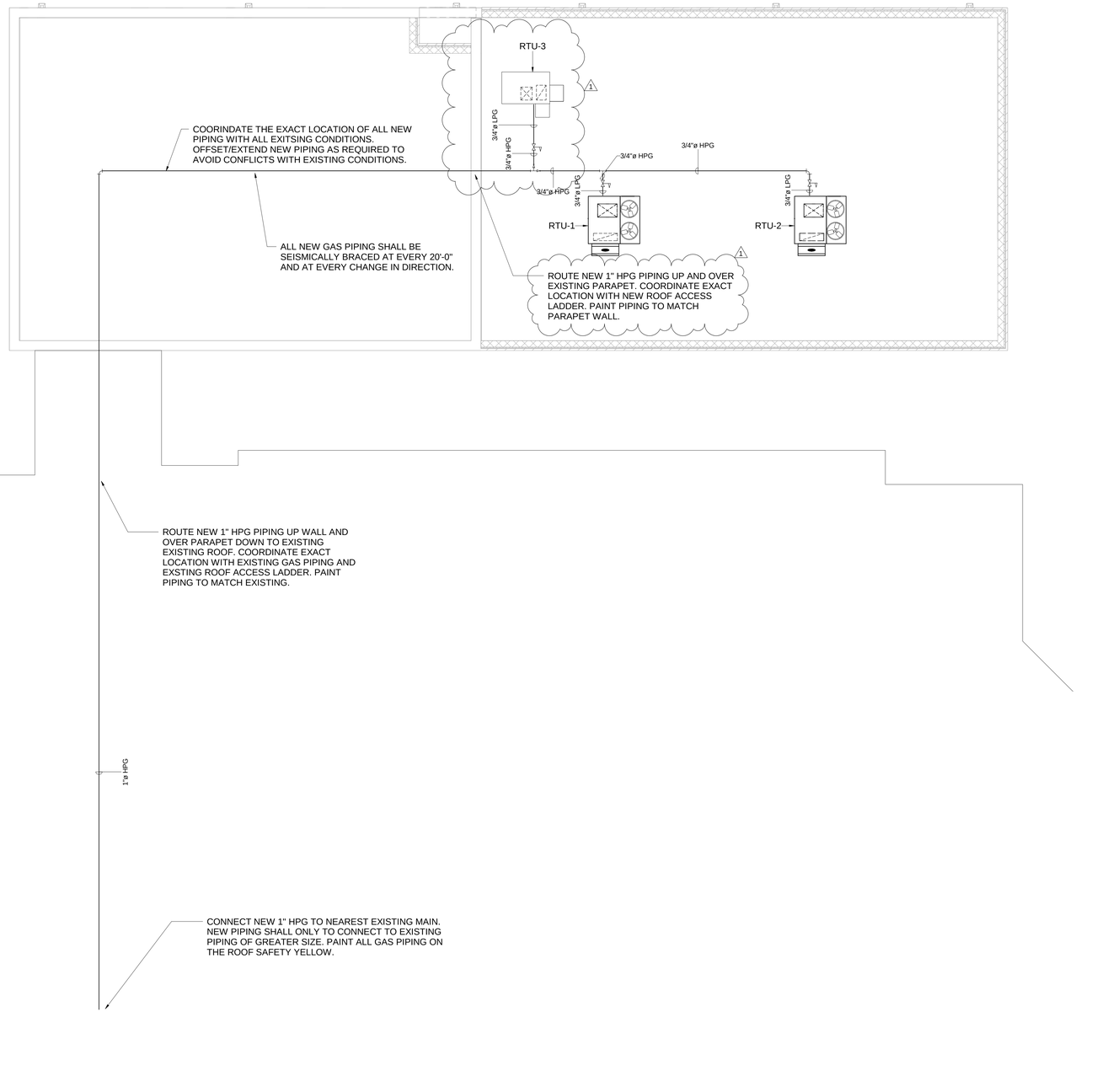

1 BAND ROOM ROOF PLAN - MECHANICAL

1/8" = 1'-0"

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ROOF PLAN - MECHANICAL

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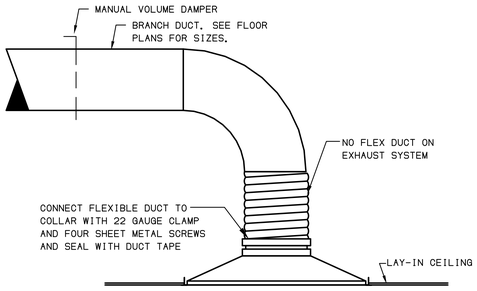
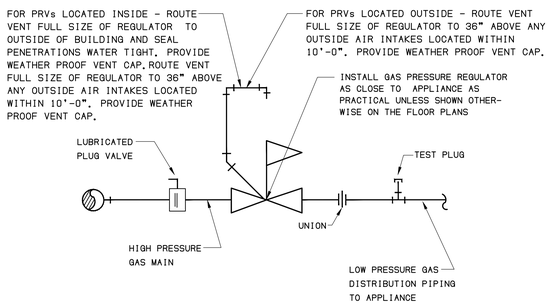
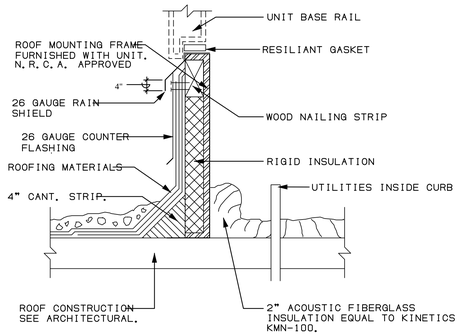


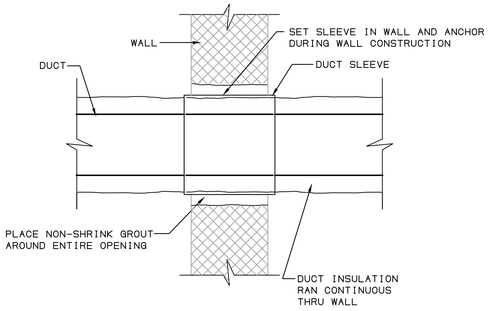
1 DIFFUSER CONNECTION DETAIL
NOT TO SCALE



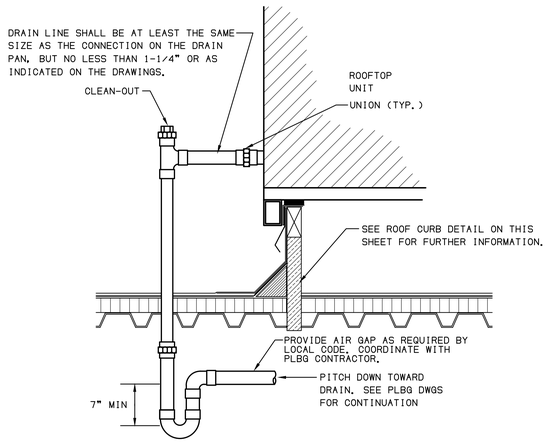
2 GAS PRESSURE REGULATOR DETAIL
NOT TO SCALE



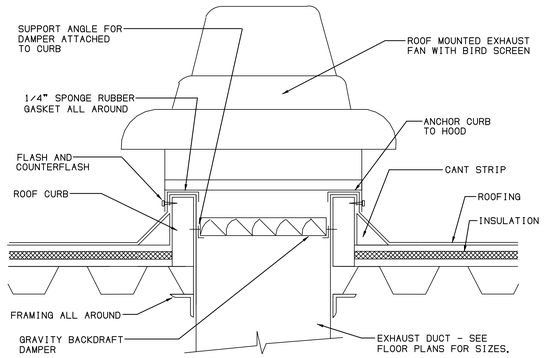
3 ROOF CURB DETAIL
NOT TO SCALE



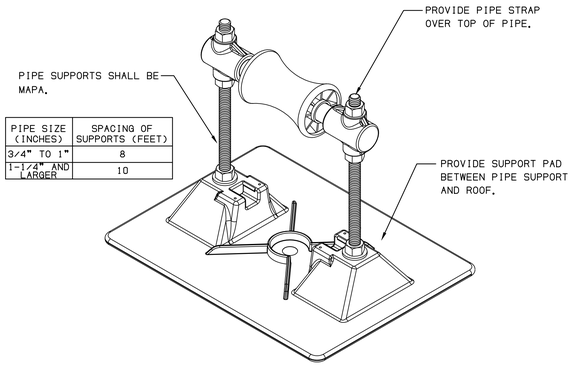
4 EXTERNALLY INSULATED DUCT THRU WALL DETAIL
NOT TO SCALE



5 ROOFTOP EQUIPMENT CONDENSATE DRAIN TRAP DETAIL
NOT TO SCALE

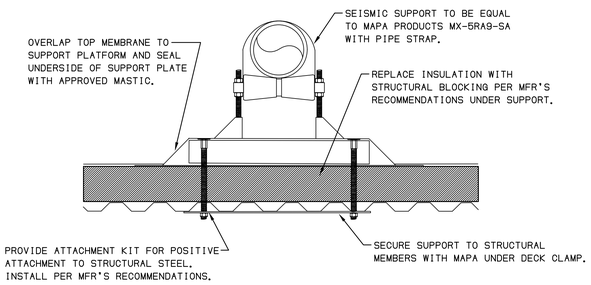


6 DOWNBLAST EXHAUST FAN DETAIL
NOT TO SCALE



PIPE SIZE (INCHES)	SPACING OF SUPPORTS (FEET)
3/4" TO 1"	8
1-1/4" AND LARGER	10

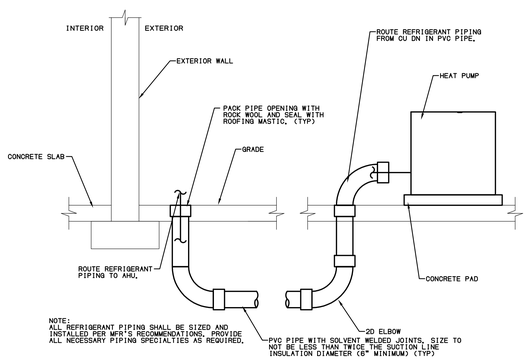
7 ROOF PIPING SUPPORT DETAIL
NOT TO SCALE



COORDINATION NOTES:

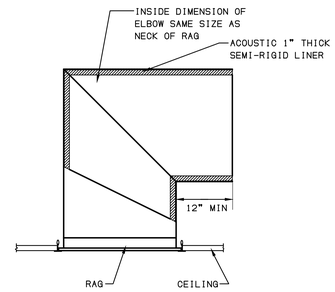
1. MECHANICAL CONTRACTOR SHALL PROVIDE ROOF GAS PIPE SEISMIC BRACING AND SHALL COORDINATE LOCATIONS WITH JOIST SUPPLIER.
2. JOIST SUPPLIER SHALL DESIGN JOISTS FOR 700 FT-LB OF MOMENT AT LOCATIONS OF SEISMIC BRACING.
3. LOCATIONS OF SEISMIC BRACING SHALL BE COORDINATED WITH GENERAL CONTRACTOR FOR ROOF FLASHING OF PIPE SUPPORTS.

8 EXTERIOR GAS PIPING SEISMIC BRACING DETAIL
NOT TO SCALE



NOTE:
ALL REFRIGERANT PIPING SHALL BE SIZED AND INSTALLED PER MFR'S RECOMMENDATIONS. PROVIDE ALL NECESSARY PIPING SPECIALTIES AS REQUIRED.

9 REFRIGERANT PIPE BELOW GRADE ROUTING DETAIL
NOT TO SCALE



NOTES:
1. ELBOWS IN ADJACENT VICINITIES SHALL NOT POINT IN THE SAME DIRECTION.
2. THIS DETAIL APPLIES ALL RETURN AIR DEVICES UNLESS OTHERWISE NOTED.

10 RAG BOOT DETAIL
NOT TO SCALE

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DETAILS - MECHANICAL

HNA ENGINEERING

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PACKAGED ROOFTOP UNIT SCHEDULE

GENERAL DATA					ELECTRICAL DATA				DX COOLING COIL DATA					GAS HEATING SECTION DATA				COMMENTS
MARK	SA CFM	OSA CFM	EXT SP IN. WG	SEER/EER	MOTOR HP	MCA	MOCP	VOLTS/ PHASE	REFRIGERANT	ENT AIR TEMP °Fdb	ENT AIR TEMP °Fwb	SENSIBLE BTU/HR	TOTAL BTU/HR	ENT AIR TEMP °Fdb	NUMBER OF STAGES	INPUT BTU/HR	OUTPUT BTU/HR	
RTU-1	4000	1060	0.6	12.1 EER	3	31	40	460/3	R-410A	80.3	66.8	106,400	150,020	57.8	10:1 TURNDOWN	195,000	156,000	1 3 4
RTU-2	4000	1060	0.6	12.1 EER	3	31	40	460/3	R-410A	80.3	66.8	106,400	150,020	57.8	10:1 TURNDOWN	195,000	156,000	1 3 4
RTU-3	2450	230	1.0	11.8 EER	2	18.5	20	460/3	R-410A	76.7	63.6	54,800	75,100	60	2	120,000	96,000	2 3 4

1. UNIT TO BE EQUAL TO AAON RN-013 WITH 2-STAGE GAS HEAT WITH STAINLESS STEEL HEAT EXCHANGERS, 0-100% ECONOMIZER WITH BAROMETRIC RELIEF, MODULATING HOT GAS REHEAT, DEMAND CONTROL VENTILATION, MODULATING COMPRESSORS (1 ON/OFF AND 1 FULLY MODULATING), EC CONDENSER FAN MOTORS WITH HEAD PRESSURE CONTROLS, HAIL GUARDS, INTEGRAL DISCONNECT, FACTORY MOUNTED VFD WITH DISCONNECT ON SUPPLY FANS FOR SINGLE ZONE VAV OPERATION, 18" HIGH SEISMIC ROOF CURB WITH FLEXIBLE DUCT CONNECTIONS, TOUCH SCREEN INTERFACE PANEL, BACNET CONTROLLER, CONDENSATE LEVEL MONITORING DEVICE, 120/1 CONVENIENCE OUTLET, AND STAINLESS STEEL DRAIN PAN.
2. UNIT TO BE EQUAL TO LUXAIRE ZW-06 WITH DUAL COMPRESSORS, GAS HEAT WITH STAINLESS STEEL HEAT EXCHANGERS, 0-100% ECONOMIZER WITH BAROMETRIC RELIEF, HAIL GUARDS, INTEGRAL DISCONNECT, 18" HIGH SEISMIC ROOF CURB WITH FLEXIBLE DUCT CONNECTIONS, BACNET CONTROLLER, CONDENSATE LEVEL MONITORING DEVICE, AND STAINLESS STEEL DRAIN PAN. 1
3. ELECTRICAL CONTRACTOR TO PROVIDE AND WIRE SUPPLY AND RETURN DUCT SMOKE DETECTORS. WIRING SHALL INCLUDE, BUT NOT LIMITED TO WIRING BETWEEN DETECTOR AND RTU AND WIRING BETWEEN DETECTOR AND FIRE ALARM PANEL. MECHANICAL CONTRACTOR TO MOUNT DETECTORS.
4. RTU TO CONNECT TO THE OWNER'S EXISTING CONTROL SYSTEM FOR MONITORING AND SCHEDULING. UNIT MANUFACTURER AND CONTROL CONTRACTOR SHALL COORDINATE AND SHALL PROVIDE ALL NECESSARY ACCESSORIES AS REQUIRED FOR RTU TO CONNECT TO THE OWNER'S EXISTING CONTROL SYSTEM FOR MONITORING AND SCHEDULING.

EXHAUST FAN SCHEDULE

GENERAL DATA						FAN WHEEL		ELECTRICAL DATA		COMMENTS
MARK	CFM	MAX SONE RATING	EST ESP IN. WG	DISCHARGE	TYPE	DRIVE	FAN SPEED RPM	MOTOR HP	VOLTS/ PHASE	
EF-1	225	5.7	0.5	ROOF	DOWNBLAST	DIRECT	1725	1/10	120/1	1 INTERLOCK WITH LIGHTS
EF-2	225	5.7	0.5	ROOF	DOWNBLAST	DIRECT	1725	1/10	120/1	1 INTERLOCK WITH LIGHTS
EF-3	150	5.6	0.5	ROOF	DOWNBLAST	DIRECT	1725	1/10	120/1	1 INTERLOCK WITH SWITCH

1. FAN TO BE EQUAL TO GREENHECK MODEL G-070-VG WITH 18" HIGH PITCHED ROOF CURB (CONTRACTOR TO VERIFY ROOF PITCH PRIOR TO ORDERING), INTEGRAL DISCONNECT, BACKDRAFT DAMPER, BIRD SCREEN, SPEED CONTROLLER, AND ALL ACCESSORIES AS REQUIRED FOR INTERLOCKING. FAN AND CURB TO BE PAINTED PER THE ARCHITECT.

AIR CURTAIN SCHEDULE

GENERAL DATA				ELECTRICAL DATA		COMMENTS
MARK	LOCATION	AIRFLOW CFM	VELOCITY FPM	VOLTS/ PHASE	FAN HP	
AC-1	CONCESSION	2100	1750	120/1	1/2	1 2
AC-2	CONCESSION	2100	1750	120/1	1/2	1 2

1. AIR CURTAIN TO BE EQUAL TO MARS STD2 WITH DISCONNECT AND DOOR SWITCH. CUSTOM COLOR TO BE SELECTED BY THE ARCHITECT.
2. INTERLOCK WITH DOOR SWITCH.

AIR DISTRIBUTION DEVICE SCHEDULE

MARK	NECK SIZE	FACE SIZE	MAX. N.C. RATING	MAXIMUM S.P. DROP, IN.	COMMENTS
A	6"ϕ	12x12	30	0.1	1
B	8"ϕ	24x24	30	0.1	1
C	10"ϕ	24x24	30	0.1	1
D	6"ϕ	24x24	30	0.1	1
E	6"ϕ	12x12	30	0.1	2
F	8"ϕ	24x24	30	0.1	2
G	10"ϕ	24x24	30	0.1	2
H	12"ϕ	24x24	30	0.1	2
I	22x22	24x24	30	0.1	2

1. SUPPLY AIR DEVICE TO BE EQUAL TO NAILOR RNS WITH FACTORY INSULATED BACK.
2. RETURN/EXHAUST AIR DEVICE TO BE EQUAL TO NAILOR 4260 EGG CRATE.

MINI SPLIT HEAT PUMP SCHEDULE

GENERAL DATA			COOLING DATA			HEATING DATA			ELECTRICAL DATA			COMMENTS
MARK	SERVES	NOMINAL TONNAGE	MIN SEER	AMBIENT AIR (°F)	COOLING CAPICITY (BTU/HR)	AMBIENT AIR (°F)	HEATING CAPICITY (BTU/HR)	MIN HSPF	MCA	MOCP	VOLTAGE/ PHASE	
MSHP-1	MS-1, 2, 3	4	14	105	48,000	47	54,000	8.2	30	50	208/1	1 2 3 4
MSHP-2	MS-4, 5	2	14	105	18,000	47	20,800	8.2	19.6	30	208/1	2 3 4 5

1. HEAT PUMP TO BE EQUAL TO LG ARUN048GSS4.
2. SIZE REFRIGERANT PIPE PER MANUFACTURER'S RECOMMENDATIONS. REFRIGERANT PIPING SHALL BE TYPE ACR DRAWN COPPER TUBING WITH WROUGHT COPPER FITTINGS. REFRIGERANT PIPING TO HAVE 1/2" ARMAFLEX INSULATION. EXTERIOR EXPOSED INSULATION SHALL BE UV RESISTANT OR PROVIDED WITH PAINT/SHIELD TO PROTECT AGAINST UV RADIATION. PROVIDE VALVES AND SPECIALTIES IN ACCORDANCE WITH EQUIPMENT MFR.'S RECOMMENDATIONS.
3. MECHANICAL CONTRACTOR TO PROVIDE DISCONNECT. ELECTRICAL CONTRACTOR TO WIRE AND INSTALL DISCONNECT.
4. UNIT TO BE PLACED ON A 4" THICK POURED IN PLACE CONCRETE PAD. PAD TO EXTEND PAST UNIT A MINIMUM OF 4" ON ALL SIDES.
5. HEAT PUMP TO BE EQUAL TO LG ARUN024GSS4.

MINI SPLIT SCHEDULE

GENERAL DATA		COOLING DATA		HEATING DATA	COMMENTS
MARK	SUPPLY CFM	REFRIGERANT TYPE	TOTAL BTU/HR	TOTAL BTU/HR	
MS-1	424	R-410A	18,000	20,800	1
MS-2	283	R-410A	12,000	13,800	1
MS-3	424	R-410A	18,000	20,800	1
MS-4	265	R-410A	9,000	10,400	1
MS-5	265	R-410A	9,000	10,400	1

1. UNIT TO BE EQUAL TO LG CEILING CASSETTE. PROVIDE THERMOSTAT AND CONDENSATE PUMP. INDOOR UNIT TO RECEIVE POWER FROM OUTDOOR UNIT THROUGH FIELD-SUPPLIED INTERCONNECTED WIRING PROVIDED AND INSTALLED BY CONTRACTOR. PROVIDE LOW AMBIENT CONTROL.

GRAVITY HOOD SCHEDULE

MARK	THROAT (IN.)	CFM	SP DROP IN. WG	COMMENTS
GH-1	8ϕ	125	0.03	1

1. GRAVITY HOOD TO BE EQUAL TO GREENHECK MODEL GRSI. PROVIDE BACKDRAFT DAMPER, 18" HIGH PITCHED ROOF CURB (CONTRACTOR TO VERIFY ROOF PITCH PRIOR TO ORDERING) WITH DAMPER TRAY, AND INSECT SCREEN. HOOD AND ROOF CURB TO BE PAINTED TO MATCH ROOF.

DE-STRATIFICATION FAN SCHEDULE

MARK	DIAMETER	CFM	MOTOR HP	AMPS	VOLTS/ PHASE	COMMENTS
DF-1	12 FT	158,000	1.05	11.6	120/1	1

1. FAN TO BE TO MACRO AIR AIRVOLUTION OR APPROVED EQUAL. PROVIDE STARTER, DISCONNECT, EXTENSION KIT AS REQUIRED, ALL REQUIRED SUPPORTS, AND WALL CONTROLLER.

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MICHAEL DILLON KEYS
REGISTERED ARCHITECT
No. 117498
STATE OF TENNESSEE

HNA ENGINEERING

REVISIONS

Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1

PROJECT NUMBER
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SCHEDULES - MECHANICAL

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PLUMBING FIXTURE SCHEDULE

TAG	FIXTURE TYPE	FLUSH / FAUCET / SHOWER HEAD	TRIM AND REMARKS	TRAP SIZE	MIN. SIZE CONN. SW	SV	CW	HW
WC-1	WATER CLOSET, REGULAR, WHITE VITREOUS CHINA, ELONGATED BOWL, FLOOR MOUNTED, 1-1/2" TOP SPUD, SIPHON JET ACTION, AMERICAN STANDARD 2234.001 OR EQUAL.	1.6 GPF, INTEGRAL VACUUM BREAKER, SCREWDRIVER/CHECK STOP, BATTERY POWERED ZURN ZER6000 OR EQUAL. PROVIDE TRAP PRIMER OPTION WHERE REQUIRED.	SEAT TO BE ELONGATED, OPEN FRONT, SOLID PLASTIC WITH SELF SUSTAINING CHECK HINGES, COLOR WHITE, BEMIS 1955SSC.	INT.	4"	2"	3/4"	---
WC-2	WATER CLOSET, ADA, WHITE VITREOUS CHINA, ELONGATED BOWL, FLOOR MOUNTED, 1-1/2" TOP SPUD, SIPHON JET ACTION, AMERICAN STANDARD 3043-001 OR EQUAL.	1.6 GPF, INTEGRAL VACUUM BREAKER, SCREWDRIVER/CHECK STOP, BATTERY POWERED ZURN ZURN ZER6000 OR EQUAL, PROVIDE TRAP PRIMER OPTION WHERE REQUIRED.	SEAT TO BE ELONGATED, OPEN FRONT, SOLID PLASTIC WITH SELF SUSTAINING CHECK HINGES, COLOR WHITE, BEMIS 1955SSC.	INT.	4"	2"	3/4"	---
U-1	URINAL, REGULAR AND DISABLED, WHITE VITREOUS CHINA, WALL MOUNTED, WASHOUT ACTION, 3/4" TOP SPUD, 0.5 GPF, AMERICAN STANDARD 6550.001.	0.5 GPF, ADA COMPLIANT, INTEGRAL VACUUM BREAKER, SCREWDRIVER/CHECK STOP, BATTERY POWERED ZURN ZER6003AV	PROVIDE FLOOR MOUNTED CONCEALED CARRIER.	INT.	2"	1-1/4"	3/4"	---
L-1	LAVATORY, ADA COMPLIANT, WHITE VITREOUS CHINA, DROP-IN, SINGLE HOLE DRILLED, AMERICAN STANDARD.	POLISHED CHROME PLATED, DECK MOUNTED, LEVER HANDLES, 0.5 GPM FLOW, EQUAL TO DELTA 2503LF. PROVIDE WITH ZURN ZW3870XLT MIXING VALVE BELOW DECK.	1-1/4" GRID WITH TAILPIECE, ZURN Z8743-PC. P-TRAP TO BE 1-1/2" BRASS (17 GA. MIN), ZURN ZR361-RB. PROVIDE SUPPLIES AND STOPS, ZURN Z8800 SERIES. PROVIDE "LAV-GUARD" INSLUATION BY TRUBRO ON ALL EXPOSED TRIM.	1-1/2"	1-1/2"	1-1/2"	1/2"	1/2"
S-1	SINK, 1-COMP, STAINLESS STEEL (TYPE 304, 16 GA.), SELF RIMMING, 1 HOLE DRILLED, ELKAY LR2521PD.	DECK MOUNTED, SINGLE HANDLE WITH GOOSNECK SPOUT WITH PULL DOWN SPRAY, 1.8 GPM, DELTA 9159-DST.	INSTALL STANDARD DRAIN. PROVIDE APPLICABLE WHEEL HANDLE STOPS AND SUPPLIES, ZURN Z8800 SERIES. DRAIN BOARDS ARE NOT TO BE INCLUDED WITH SINK. BADGER 5 'INSINKERATOR' DISPOSAL TO BE PROVIDED.	1-1/2"	1-1/2"	1-1/2"	1/2"	1/2"
DF-1	DUAL HEIGHT ELECTRIC WATER COOLER WITH BOTTLE FILLER, ADA COMPLIANT, WALL HUNG WITH 8.0 GPH CAPACITY OF 50°F DRINKING WATER AT 80°F INLET AND 90° AMBIENT TEMPERATURE, ELKAY LZSTL8WSLP. SEE ARCH SERIES FOR MOUNTING HEIGHTS.	--	PUSH BARS AND PUSHBAR ATTACHMENT HARDWARE TO BE METAL. FOUNTAIN AND CABINETS TO BE SATIN STAINLESS STEEL. P-TRAP TO BE 1-1/2" BRASS (17 GA. MIN), ZURN ZR365-PC. PROVIDE SUPPLIES AND STOPS. INSTALL CONCEALED FLOOR MOUNTED ARM CARRIER.	1-1/2"	1-1/2"	1-1/2"	1/2"	---
NFWH	WALL HYDRANT (NON-FREEZE), KEY OPERATED WITH CHROME PLATED FACE, INTEGRAL VACUUM BREAKER, ZURN Z1324XL	--	3/4" HOSE CONNECTION, ALL BRONZE HEAD, SEAT CASTING AND INTERNAL WORKING PARTS, GALVANIZED WALL CASING AND HYDRANT KEY. MOUNT 24"AFF TO BOTTOM OF HYDRANT.	--	--	--	3/4"	--
CM-1	COFFEE MAKER (OFCI): PROVIDE AND INSTALL 1/2" SOFT COPPER TYPE "K" COILED WATER LINE. INSTALL IN-LINE SHUT-OFF VALVE AND BACKFLOW PREVENTER EQUAL TO WATTS 9BD PRIOR TO CONNECTION TO COFFEE MACHINE.	--		--	--	--	1/2"	--
FD-1	FLOOR DRAIN: CAST IRON FLOOR DRAIN WITH BOTTOM OUTLET, COMBINATION INVERTIBLE MEMBRANE CLAMP, ADJUSTABLE COLLAR, SEEPAGE OPENINGS, POLISHED NICKEL BRONZE LIGHT DUTY LEVELING STRAINER WITH VANDAL PROOF SCREW - ZURN Z415BZ.		SET TOP OF DRAINS 1/2" BELOW FINISHED FLOOR. PROVIDE AND INSTALL TRAP GUARD INSERTS ON ALL FLOOR DRAINS NOT SERVED BY TRAP PRIMER.	DWG	DWG	2"	---	---
FCO	FLOOR CLEANOUT: CAST IRON CLEANOUT WITH THREADED ADJUSTABLE HOUSING, FLANGED FERRULE WITH TAPERED BRASS PLUG, ROUND, SECURED, SCORIATED NICKEL BRONZE TOP - ZURN Z1400.		SET TOP OF CLEANOUT COVER FLUSH WITH FINISHED FLOOR.	DWG	DWG	---	---	---
WCO	WALL CLEANOUT: CAST IRON CLEANOUT WITH TAPERED BRASS PLUG, ROUND STAINLESS STEEL COVER PLATE WITH SCREW - ZURN Z1441.			DWG	DWG	---	---	---

PIPING SYSTEM SPECIFICATION

SYSTEM	ABOVE GROUND	BELOW GROUND	JOINT METHOD	PIPE INSULATION
SANITARY WASTE	SCH 40 PVC	SCH 40 PVC	SOLVENT WELD WITH MANUFACTURERS APPROVED CEMENT.	--
	HUBLESS CAST IRON	HUBLESS CAST IRON	COUPLING WITH STAINLESS STEEL BANDS AND ELASTOMERIC GASKET	
SANITARY VENT	---	SCH 40 PVC	SOLVENT WELD WITH MANUFACTURERS APPROVED CEMENT.	--
	HUBLESS CAST IRON	HUBLESS CAST IRON	COUPLING WITH STAINLESS STEEL BANDS AND ELASTOMERIC GASKET	
COLD WATER	TYPE L COPPER	TYPE K COPPER	LEAD-FREE NICKEL BEARING SOLDER ABOVE SLAB.	1/2" THICK FIBERGLASS
HOT WATER	TYPE L COPPER	TYPE K COPPER	LEAD-FREE NICKEL BEARING SOLDER ABOVE SLAB.	1" THICK FIBERGLASS
CONDENSATE	DWV COPPER	SCH 40 PVC	SOLVENT WELD IF PVC, SAME AS ABOVE IF COPPER.	1/2" THICK FIBERGLASS

SPECIFICATION NOTES:

- CONTRACTOR SHALL COORDINATE WITH ARCHITECTURAL SERIES PRIOR TO INSTALLATION OF FIXTURES AND SYSTEMS.
- CONTRACTOR SHALL MAKE ALL APPLICATIONS FOR PERMITS AND PAY ALL RELATED FEES FOR THE PERMIT, INSPECTIONS AND TEST AS REQUIRED BY THE LOCAL AHJ. ALL ASSOCIATED FEES SHALL BE INCLUDED IN CONTRACT BID.
- DRAINAGE PIPING SHALL BE TESTED WITH A WATER TEST IN ACCORDANCE WITH THE INTERNATIONAL PLUMBING CODE AND LOCAL CODE ENFORCEMENT.
- WATER PIPING SHALL BE TESTED IN ACCORDANCE WITH THE INTERNATIONAL PLUMBING CODE AND LOCAL CODE ENFORCEMENT. ALL PIPING SYSTEMS SHALL BE CLEANED, FLUSHED, TESTED PRIOR TO OCCUPANCY.
- JOINTS IN FIRE PROTECTION PIPING SHALL HAVE A WORKING PRESSURE OF 165 PSI.
- USE DIELECTRIC FITTINGS AND UNIONS IN UN SIMILAR MATERIALS.
- BALL VALES SHALL BE RATED FOR MINIMUM OF 125 PSI AND SHALL BE FULL PORT 2 PIECE WITH STAINLESS STEEL BALL EQUAL TO WATTS.
- HANGERS SHALL BE CLEVIS OR SPLIT RING FOR COPPER PIPING. HANGERS SHALL BE COATED TO PROTECT AGAINST CORROSION AS REQUIRED. HANGERS FOR WASTE AND DRAIN PIPING SHALL BE CLEVIS TYPE.
- ONCE FIXTURES HAVE BEEN INSTALLED THEY SHALL BE INSPECTED AND TESTED AND SHALL BE CLEANED PRIOR TO LEAVING THE SITE.

PLUMBING NOTES:

- CONTRACTOR SHALL COORDINATE THE UTILITY SERVICE CONNECTIONS WITH CIVIL PRIOR TO INSTALLATION OF UTILITIES.

-CONTRACTOR SHALL COORDINATE WITH OWNER THE DISRUPTION OF ANY SERVICE A MINIMUM OF 72 HOURS IN ADVANCE.

- CONTRACTOR SHALL COORDINATE THE INSTALLATION OF THE PLUMBING SYSTEM AS A WHOLE WITH ALL THE TRADES INVOLVED TO AVOID ROUTING CONFLICTS/PROBLEMS. IF COFLICTS/PROBLEMS ARE FOUND AND CAN NOT BE RESOLVED BY THE INVOLVED TRADES THEN THE ARCHITECT SHALL BE CONSULTED AND THEIR DECISION SHALL GOVERN.

-IF THE VENT PENETRATIONS OF THE ROOF ARE REQUIRED TO BE 3" AND LARGER BY CODE, THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL REQUIRED INCREASERS BELOW ROOF DECK AND PENETRATE THE ROOF WITH THE MINIMUM REQUIRED PIPE SIZE.

-CONTRACTOR SHALL PROVIDE AND INSTALL PISTON TYPE WATER HAMMER ARRESTORS ON WATER LINES SERVING FLUSH VALVES AND QUICK CLOSING VALVES. CONTRACTOR SHALL SIZE AND INSTALL WATER HAMMER ARRESTORS WITH THE REQUIREMENTS OF THE PLUMBING AND DRAINAGE INSTITUTE GUIDELINES.

- CONTRACTOR SHALL COORDINATE ALL VENTS AND ROOF PENETRATIONS WITH MECHANICAL EQUIPMENT PRIOR TO INSTALLATION. ALL VENT THROUGH ROOFS SHALL BE ROUTED A MINIMUM OF 15 FEET AWAY FROM FRESH AIR INTAKES FROM MECHANICAL EQUIPMENT.

- FURNISH AND INSTALL DEEP SEAL P-TRAPS & TRAP GUARD INSERTS ON FLOOR DRAINS NOT FED BY AN AUTOMATIC TRAP PRIMER SYSTEM, WHERE REQUIRED BY CODE.

- CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURERS EQUIPMENT CUT SHEETS AND LAYOUT OF ALL EQUIPMENT THAT WILL BE PROVIDED BY OWNER AND GENERAL CONTRACTOR PRIOR TO THE INSTALLATION OF PLUMBING ROUGH-INS. CONTRACTOR SHALL PROVIDE AND INSTALL PLUMBING ROUGH IN FOR ALL EQUIPMENT. CONTRACTOR SHALL PROVIDE AND INSTALL ALL REQUIRED GAUGES, PRESSURE REDUCING VALVES, WATER HAMMER ARRESTORS, SHUT-OFF VALVES, CHECK VALVES, BACK FLOW PREVENTION DEVICES ETC THAT ARE REQUIRED BY THE MANUFACTURER FOR THEIR EQUIPMENT. CONTRACTOR SHALL ALSO PROVIDE AND INSTALL ALL ITEMS REQUIRED BY LOCAL, STATE AND FEDERAL CODES FOR PLUMBING ROUGH-INS.

- ALL FIXTURES, EQUIPMENT AND PIPING SHOWN ON THESE DRAWINGS SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODE REQUIREMENTS.

- PENETRATIONS THROUGH NEW WALLS AND FLOORS SHALL BE SLEEVED AND/OR PATCHED. REFER TO ARCHITECTURAL SERIES FOR FINISH INFORMATION.

- ALL NEW PIPE PENETRATIONS OF FIRE RATED WALLS, AS SHOWN BY THE LIFE SAFETY PLANS, SHALL HAVE A UL LISTED F RATING EQUAL TO THE WALL FIRE RATING. SEE PLUMBING PLANS FOR UL PENETRATION DETAILS.

- ALL WORK SHOWN IS PART OF BASE BID EXCEPT WHERE OTHERWISE DESIGNATED.

- SEISMICALLY BRACE ALL PIPE AS REQUIRED BY LOCAL CODE REQUIREMENTS.

- PIPING SHALL NOT BE INSTALLED OVER ELECTRICAL EQUIPMENT.

- CAULK AROUND ALL PLUMBING FIXTURES. CAULK COLOR SHALL MATCH PLUMBING FIXTURE COLOR.

- EXACT LOCATIONS OF MECHANICAL EQUIPMENT SHALL BE VERIFIED WITH THE MECHANICAL CONTRACTOR. ALL REQUIRED CONDENSATE PIPING SHALL BE COORDINATED WITH THIS EQUIPMENT.

- SANITARY SEWER PIPING SHALL BE SLOPED AS FOLLOWS: 3" SANITARY WASTE PIPING AND LARGER SHALL BE ROUTED AT 1/8" PER FOOT MINIMUM. 2" SANITARY WASTE PIPING AND SMALLER SHALL BE ROUTED AT 1/4" PER FOOT MINIMUM.

- CONTRACTOR TO PROVIDE PROPERLY SIZED ISOLATION VALVES AT ALL DOMESTIC WATER BRANCH PIPING AND ALL DOMESTIC WATER PIPING SERVING INDIVIDUAL FIXTURES OR RESTROOMS. VALVES TO BE INSTALLED IN AN ACCESSIBLE LOCATION ABOVE TILE CEILING.

- CONTRACTOR TO PROPERLY BALANCE DOMESTIC HOT WATER AND HOT WATER RETURN SYSTEMS. CONTRACTOR TO PROVIDE CALINBRATED BALANCING VALVES ON HOT WATER RETURN PIPING AS NECESSARY.

- ALL CONDENSATE PIPING ROUTED ABOVE CEILING SHALL HAVE A CLEANOUT AT ALL 90 DEGREE TURNS AND EVERY 50'.

- CONTRACTOR SHALL ESTABLISH A SEQUENCE OF INSTALLATION WITH OTHER TRADES WORKING ON THE PROJECT. CONTRACTOR SHALL THOROUGHLY COORDINATE ALL SYSTEMS WITH OTHER TRADES.

- CATHODIC PROTECTION, IF REQUIRED, IS THE CONTRACTOR'S RESPONSIBILITY. CONTRACTOR SHALL PROTECT ALL UNDERGROUND METALLIC PIPING FROM CORROSION. REFER TO SOILS REPORT. UNDERGROUND PIPING MAY ALSO BE PROTECTED WITH POLYETHYLENE ENCASEMENT CONFORMING TO ANSI/AWWA REQUIREMENTS. ALL PIPING SHALL BE WRAPPED COMPLETELY WITH ENCASEMENT TO A POINT AT LEAST 12 A.F.G OR FIN. FLOOR. ENCASEMENT SHALL BE FREE OF TEARS WITH ALL JOINTS COMPLETELY SEALED. NO PORTION OF THE PIPE SHALL BE LEFT EXPOSED TO CORROSIVE SOIL.

- PLASTIC PIPING IS NOT ALLOWED IN PLENUM SPACES.

BACKFLOW PREVENTER SCHEDULE

DESIGNATION: BFP-1	
SERVICE: DOMESTIC WATER	
TOTAL NUMBER: 1	
MANUFACTURER: WATTS	ZURN
MODEL NO: LF-919-QTS	975XL2
GPM FLOW RATE: XX	XX
SIZE: 2"	2"
PSI LOSS: 11	12

BACKFLOW NOTES:
- PROVIDE WITH AIR GAP FITTING AND STRAINER.
- TERMINATE DRAIN OVER FLOOR DRAIN WITH AIR GAP.
- SIZE DRAIN PER MANUFACTURER'S RECOMMENDATIONS.

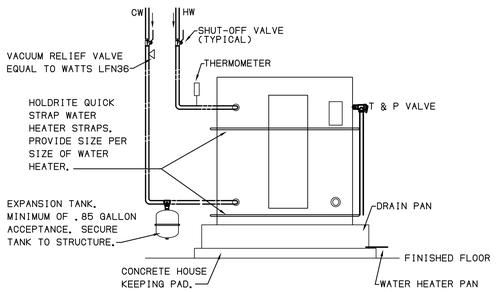
WATER HEATER SCHEDULE

DESIGNATION: WH-1	
SERVICE: DOMESTIC HOT WATER	
TOTAL NUMBER: 1	
MANUFACTURER: STATE	AO SMITH
MODEL NO: PCE 52 20RTA	DEN-52
SET WATER TEMP: 120°F	120°F
GALLON STORAGE: 50	50
RECOVERY: 23 GPH @ 80° RISE	23 GPH @ 80° RISE
ELEC CONNECTION: 4.5KW/208V/3ϕ	4.5KW/208V3ϕ

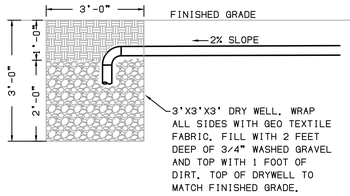
WATER HEATER NOTES:
- PROVIDE JUNCTION BOX AND DISCONNECT.
- PROVIDE AND INSTALL SEISMIC RESTRAINT ON WATER HEATER.

LEGEND

LINE TYPE	DESCRIPTION
————	SANITARY WASTE
- - - - - -	SANITARY VENT
——GW——	GREASE WASTE
-----GV-----	GREASE WASTE VENT
————	COLD WATER
————	HOT WATER
————	HOT WATER RETURN
——CD——	CONDENSATE (CD)



WATER HEATER DETAIL
NO SCALE



DRY WELL DETAIL
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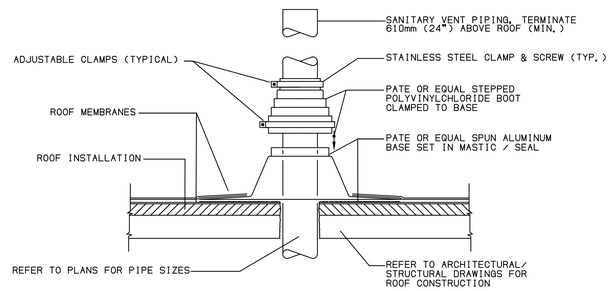

VENT THROUGH ROOF DETAIL
NO SCALE

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150119

REVISIONS

Revision Date	Rev. #	Revision Description

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September 2, 2019

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LEGENDS, NOTES AND SCHEDULES - PLUMBING

HNA ENGINEERING

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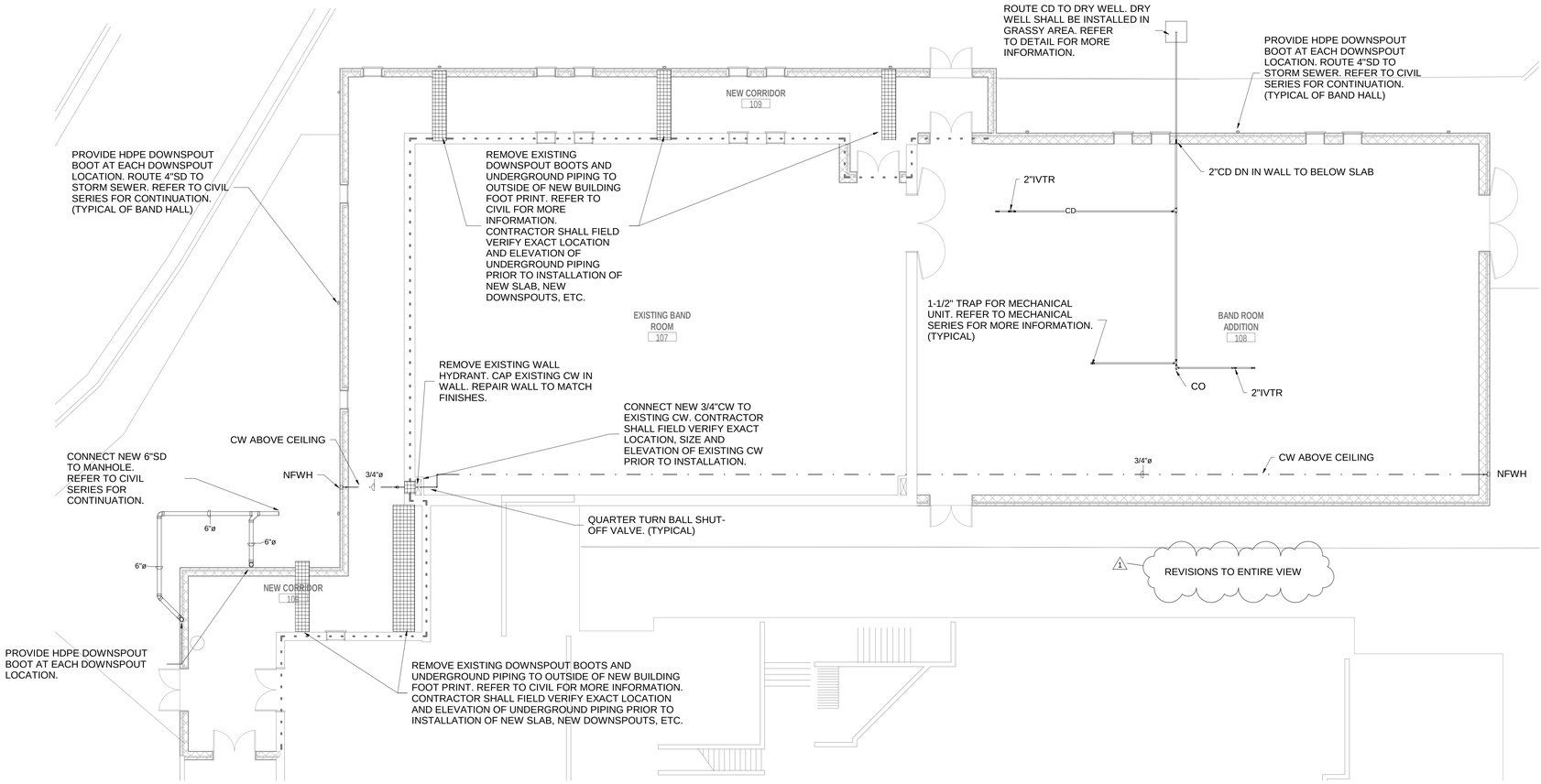
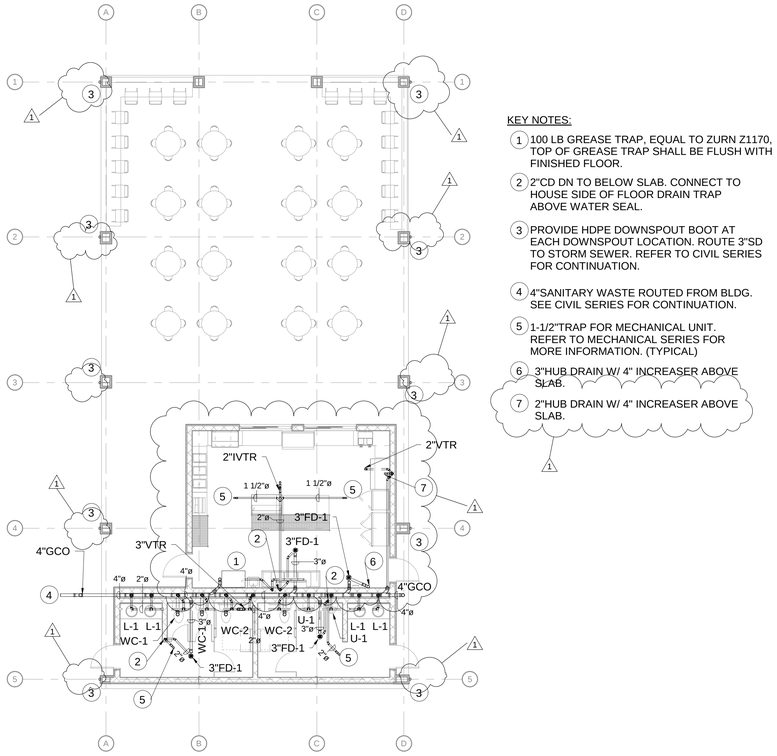


3 BAND HALL FLOOR PLAN - PLUMBING

1/8" = 1'-0"

NOTE: CONCESSION STAND IS NOT A SPACE WHERE STUDENTS EARN CREDIT HOURS.



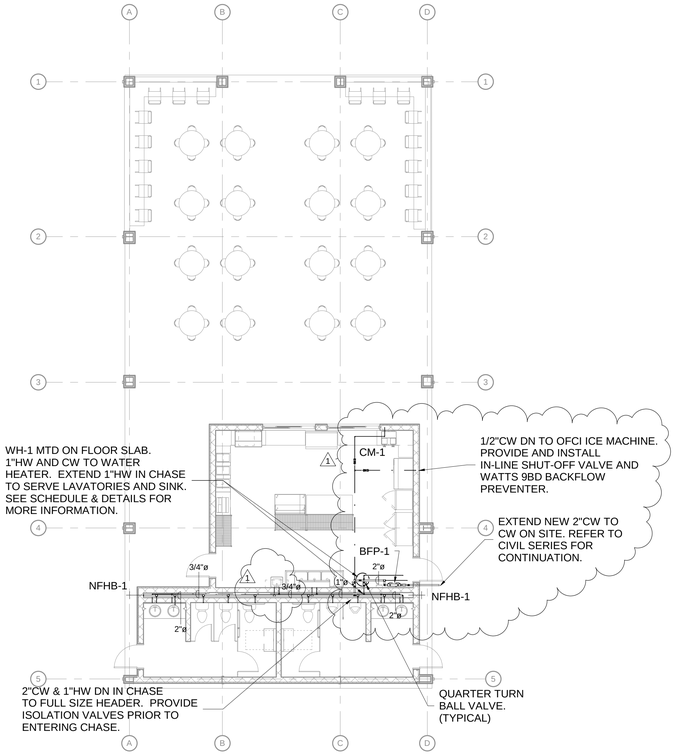
KEY NOTES:

1. 100 LB GREASE TRAP, EQUAL TO ZURN Z1170, TOP OF GREASE TRAP SHALL BE FLUSH WITH FINISHED FLOOR.
2. 2"CD DN TO BELOW SLAB. CONNECT TO HOUSE SIDE OF FLOOR DRAIN TRAP ABOVE WATER SEAL.
3. PROVIDE HDPE DOWNSPOUT BOOT AT EACH DOWNSPOUT LOCATION. ROUTE 3"SD TO STORM SEWER. REFER TO CIVIL SERIES FOR CONTINUATION.
4. 4"SANITARY WASTE ROUTED FROM BLDG. SEE CIVIL SERIES FOR CONTINUATION.
5. 1-1/2"TRAP FOR MECHANICAL UNIT. REFER TO MECHANICAL SERIES FOR MORE INFORMATION. (TYPICAL)
6. 3"HUB DRAIN W/ 4" INCREASER ABOVE SLAB.
7. 2"HUB DRAIN W/ 4" INCREASER ABOVE SLAB.

1 CONCESSIONS FLOOR PLAN - DWV - PLUMBING

1/8" = 1'-0"

NOTE: CONCESSION STAND IS NOT A SPACE WHERE STUDENTS EARN CREDIT HOURS.



2 CONCESSIONS FLOOR PLAN - WATER - PLUMBING

1/8" = 1'-0"

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150119

MICHAEL DILLON BRADFORD ENGINEER 120171 STATE OF TENNESSEE

REVISIONS		
Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1

PROJECT NUMBER 150119

DATE OF ORIGINAL ISSUE September 2, 2019

SHEET NUMBER P1.1

FLOOR PLANS - PLUMBING

HNA ENGINEERING

10/11/2019 2:14:21 PM

FIRE PROTECTION NOTES:

- A 100 PERCENT HYDRAULICALLY CALCULATED AUTOMATIC SPRINKLER SYSTEM SHALL BE INSTALLED BY FIRE PROTECTION CONTRACTOR IN ACCORDANCE WITH NFPA-13 REQUIREMENTS.
- CLASSIFICATIONS PER NFPA-13 ARE AS FOLLOWS:
  CORRIDORS, LOBBIES, VESTIBULES, OFFICES, ETC: LIGHT HAZARD
  MECHANICAL ROOMS, EQUIPMENT ROOMS, STORAGE ROOMS, ETC: ORDINARY HAZARD GRP 1
- SYSTEMS SHALL BE INSTALLED PER NFPA, FEDERAL, STATE CODES AND LOCAL AUTHORITY HAVING JURISDICTION, CONTRACT DOCUMENTS AND INSURANCE UNDERWRITER. THE INSURANCE UNDERWRITER REQUIREMENTS SHALL HAVE AUTHORITY OVER CONTRACT DOCUMENTS IF CONTRACT DOCUMENTS ARE LESS STRINGENT THAN INSURANCE UNDERWRITER REQUIREMENTS.
- CONTRACTOR SHALL INSTALL SYSTEM THAT DOES NOT VIOLATE ANY CHAPTERS OF NFPA.
- CONTRACTOR SHALL COORDINATE WITH ALL OTHER TRADES, PARTITION LAYOUTS, WALL LAYOUTS AND OBSTRUCTIONS PRIOR TO INSTALLATION OF SYSTEM TO AVOID CONFLICTS IN PIPE ROUTING, SPRINKLER HEAD PLACEMENTS AND INSTALLATION OF SYSTEM.
- EXCEPTIONS AND ADJUSTMENTS PER NFPA-13 SHALL TAKEN INTO CONSIDERATION WITH THE LAYOUT OF SPRINKLER HEADS.
- SPRINKLER HEAD SHALL BE INSTALLED 12" MAXIMUM OF FLOOR/ROOF DECK IN AREAS WITH NO CEILINGS.
- CONTRACTOR SHALL INSTALL SPRINKLER HEADS IN A NEAT AND ORDERLY FASHION AND SHALL INSTALL IN THE CENTER OF CEILING TILES WHERE THERE IS A CEILING GRID.
- CONTRACTOR SHALL PROVIDE REQUIRED AMOUNT OF SPRINKLER HEADS TO COVER AREA AROUND ALL OBSTRUCTIONS PER NFPA-13.
- CONTRACTOR SHALL OBTAIN THE REQUIRED FLOW TEST PER NFPA FROM LOCAL UTILITY COMPANY OR LOCAL FIRE DEPARTMENT.
- CONTRACTOR SHALL PROVIDE AND INSTALL AN APPROVED UL LISTED FIRE STOP SYSTEM FOR RATED PENETRATIONS.
- CONTRACTOR SHALL COORDINATE WITH ARCHITECTURAL SERIES AND SPECIFICATIONS FOR ALL SLEEVING AND SEALING OF ANY WATER PENETRATIONS.
- FLEXIBLE SPRINKLER DROPS SERVING SPRINKLERS IN CEILINGS SHALL BE ALLOWED. WHEN USED THE HOSE SHALL BE BRAIDED STAINLESS STEEL WITH MINIMUM OF 1" NPS.
- CONTRACTOR SHALL PROVIDE AND INSTALL ADDITIONAL SPRINKLER HEADS PER NFPA-13 FOR COVERAGE AROUND OBSTRUCTIONS, DUCTWORK, ETC.
- CONTRACTOR SHALL PROVIDE SHOP DRAWINGS THAT HAVE A COMPLETE SPRINKLER SYSTEM RISER SCHEMATIC WITH SYSTEM AND SUPPLY PRESSURE GAUGES, MAIN DRAIN, 4 WAY BRACING, HYDRAULIC DESIGN DATA PLATE AND TAMPERS PER NFPA 13.8.16.
- CONTRACTOR SHALL SHALL PROVIDE 10 PERCENT PRESSURE CUSHION WITH AVAILABLE STREET PRESSURE WHEN SIZING SYSTEM.

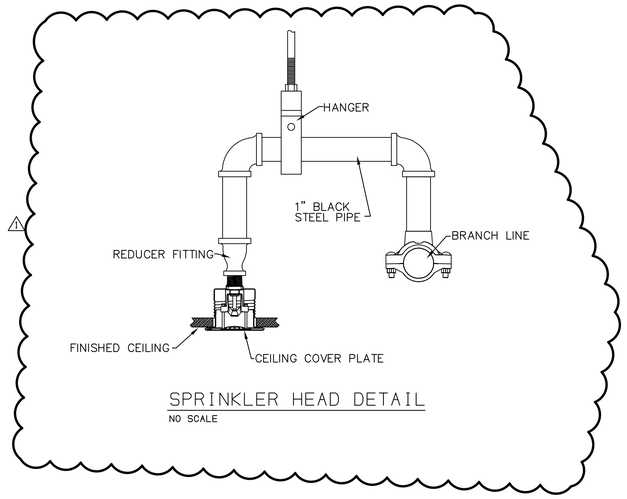
LEGEND - SPRINKLER HEADS

SYMBOL	TEMP.	DESCRIPTION & REMARKS	K	CONN.
●	VARIES	STANDARD COVERAGE QUICK RESPONSE CONCEALED PENDENT.	5.6	1/2"

NOTES:
* CONTRACTOR SHALL COORDINATE ALL TEMPERATURE REQUIREMENTS OF SPRINKLER HEADS PER NFPA-13 PRIOR TO ORDERING SPRINKLERS.
* CONTRACTOR SHALL PROVIDE AND FURNISH COVER PLATES, SPRINKLERS AND ESCUTCHEON'S COLORS PER ARCHITECT.

FIRE LEGEND

LINE TYPE	DESCRIPTION
A/S	AUTOMATIC SPRINKLER
F	FIRE



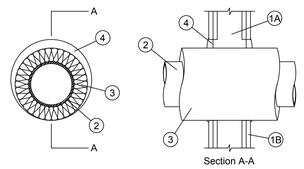
SPRINKLER HEAD DETAIL
NO SCALE

FLOW TEST DATA

DATE:	2-5-19
TIME:	11:00 A.M.
STATIC:	100 PSIG
RESIDUAL:	74 PSIG
FLOW:	1820 GPM
TEST ELEVATION:	--
PROVIDED BY:	TRI-STATE SPRINKLER CORP.

System No. W-L-5014

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings - 1 and 2 Hr (See Item 1)	F Ratings - 1 and 2 Hr (See Item 1)
T Rating - 1 Hr	FT Rating - 1 Hr
L Rating At Ambient - Less Than 1 CFM/sq ft	FH Ratings - 1 and 2 Hr (See Item 1)
L Rating At 400 F - Less Than 1 CFM/sq ft	FTH Rating - 1 Hr
	L Rating At Ambient - Less Than 1 CFM/sq ft
	L Rating At 400 F - Less Than 1 CFM/sq ft



Section A-A

1. **Wall Assembly -** The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300, U400 or V400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. **Studs -** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC.
   B. **Gypsum Board* -** 5/8 in. (16 mm) thick, 4 ft (1.2 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300, U400 or V400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 18 in. (457 mm).
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

1A. **Metallic Sleeve -** (Optional, Not Shown) - Cylindrical sleeve fabricated from min 0.016 in. (0.41 mm) to max 0.105 in. (2.7 mm) thick sheet steel. Length of steel sleeve to be equal to the thickness of wall. Longitudinal seam of sleeve welded or overlapped min 1 in. (25 mm). The ends of the steel sleeve shall be flush or recessed max 1/4 in. (6 mm) from wall surfaces.

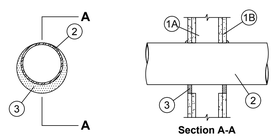
2. **Through Penetrants -** One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. **Steel Pipe -** Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe -** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Tubing -** Nom 4 in. (102 mm) diam (or smaller) Type M (or heavier) copper tube.
   D. **Copper Pipe -** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.
3. **Pipe Coverings* -** One of the following types of pipe coverings shall be used:
   A. **Pipe and Equipment Covering Materials* -** Max 2 in. (51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between insulated penetrating item and the edge of the through opening shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
   See **Pipe and Equipment Covering-Materials*** - (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   B. **Pipe Covering Materials* -** Max 2 in. (51 mm) thick unfaced mineral fiber pipe insulation sized to the outside diam of pipe or tube. Pipe insulation secured with min 18 SWG steel wire spaced max 12 in. (305 mm) OC. The annular space between insulated penetrating item and the edge of the through opening shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
   IIG MINWOOL L L C - High Temperature Pipe Insulation 1200, High Temperature Pipe Insulation BWT or High Temperature Pipe Insulation Thermaloc.
   C. **Sheathing Material* -** Used in conjunction with Item 3B. Foil-scrim-kraft or all service jacket material shall be wrapped around the outer circumference of the pipe insulation (Item 3B) with the kraft side exposed. Longitudinal joints and transverse joints sealed with metal fasteners or butt tape.
   See **Sheathing Materials** (BVDV) category in the Building Materials Directory for names of manufacturers. Any sheathing material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
4. **Fill, Void or Cavity Material* - Sealant -** Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point contact location between insulated through penetrant and gypsum board, a min 3/8 in. (10 mm) bead of fill material shall be applied to the insulated through penetrant/gypsum board interface on both sides of the wall.

SPECIFIED TECHNOLOGIES INC - SpecSeal Series SSS Sealant or SpecSeal LCI Sealant

*Bearing the UL Classification Mark

System No. W-L-1049

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings - 1 and 2 Hr (See Item 1)	F Rating - 1 and 2 Hr (See Item 1)
T Rating - 0 Hr	FT Rating - 0 Hr
L Rating At Ambient - Less Than 1 CFM/sq ft	FH Rating - 1 and 2 Hr (See Item 1)
L Rating At 400 F - Less Than 1 CFM/sq ft	FTH Rating - 0 Hr
	L Rating At Ambient - Less Than 1 CFM/sq ft
	L Rating At 400 F - Less Than 1 CFM/sq ft



Section A-A

Wall Assembly - The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
A. **Studs -** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC. When steel studs are used and the diam of opening exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between the vertical studs and screw-attached to the steel studs at each end. The framed opening in the wall shall be 4 to 6 in. (102 to 152 mm) wider and 4 to 6 in. (102 to 152 mm) higher than the diam of the penetrating item such that, when the penetrating item is installed in the opening, a 2 to 3 in. (51 to 76 mm) clearance is present between the penetrating item and the framing on all four sides.
B. **Gypsum Board* -** 5/8 in. (16 mm) thick, 4 ft (1.22 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 26 in. (660 mm) for steel stud walls. Max diam of opening is 14-1/2 in. (368 mm) for wood stud walls.
The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.

1A. **Metallic Sleeve -** (Optional, Not Shown) - Cylindrical sleeve fabricated from min 0.016 in. (0.41 mm) to max 0.105 in. (2.7 mm) thick sheet steel. Length of steel sleeve to be equal to the thickness of wall. Longitudinal seam of sleeve welded or overlapped min 1 in. (25 mm). The ends of the steel sleeve shall be flush or recessed max 1/4 in. (6 mm) from wall surfaces.

2. **Through Penetrant -** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe, conduit or tubing may be installed at an angle not greater than 45 degrees from perpendicular. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (0 mm, point contact) to max 2 in. (51 mm). For maximum 16 in. (406 mm) diam (or smaller) pipes, annular space shall be min 0 in. (0 mm, point contact) to max 2 in. (51 mm). Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe -** Nom 36 in. (914 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe -** Nom 36 in. (914 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit -** Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing, nom 6 in. (152 mm) diam (or smaller) steel conduit or nom 1 in. (25 mm) diam (or smaller) flexible steel conduit.
   D. **Copper Tubing -** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe -** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
3. **Fill, Void or Cavity Material* - Sealant -** Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At the point contact location between through penetrant and gypsum board, a min 3/8 in. (10 mm) diam bead of fill material shall be applied at the gypsum board/through penetrant interface on both surfaces of wall.

SPECIFIED TECHNOLOGIES INC - SpecSeal Series SSS Sealant or SpecSeal LCI Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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REGISTERED
ARCHITECT
STATE OF TENNESSEE
17,796

REVISIONS		
Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1

PROJECT NUMBER
150119

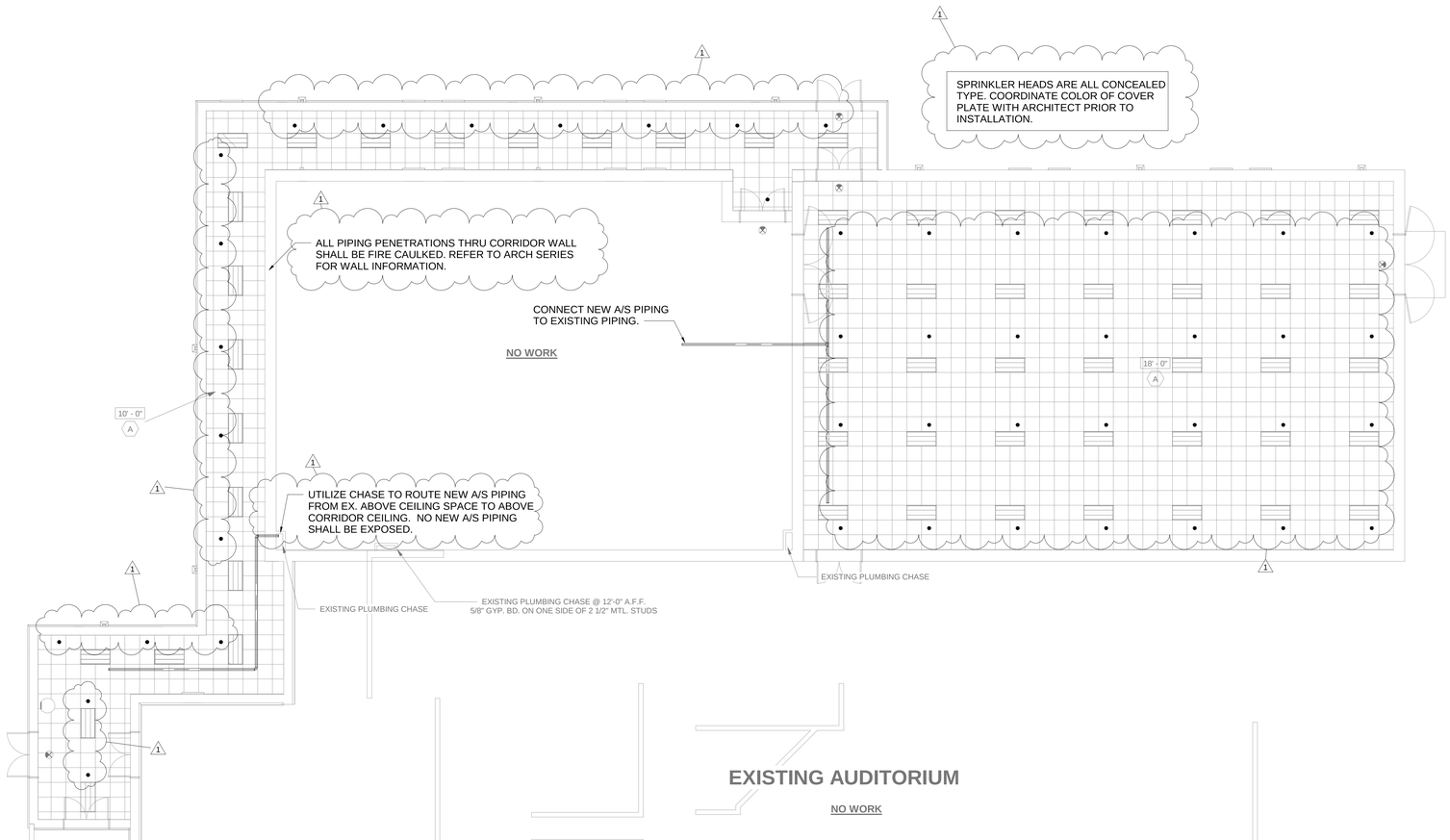
DATE OF ORIGINAL ISSUE
September 2, 2019

SHEET NUMBER
FP0.1

LEGENDS, NOTES AND SCHEDULES - FIRE PROTECTION

HNA ENGINEERING

6/17/2019 10:54:58 AM



1 BAND HALL FLOOR PLAN - FIRE PROTECTION

1/8" = 1'-0"

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MICHAEL DILLON
REGISTERED ENGINEER
STATE OF TENNESSEE

FLOOR PLAN - FIRE PROTECTION

REVISIONS

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10/11/2019 2:14:56 PM

LIGHTING		EXIT SIGN
LIGHTING		EXTERIOR SCONCE, REFER TO ARCHITECTURAL DRAWINGS FOR ELEVATIONS.
LIGHTING		STRIPLIGHT
LIGHTING		2'X4' FIXTURE, REFER TO SCHEDULE FOR MOUNTING
LIGHTING		HATCHED FIXTURE DESIGNATES A FIXTURE WITH AN EMERGENCY BATTERY BALLAST OR CONNECTED TO AN EMERGENCY BACK-UP POWER SUPPLY, REFER TO SCHEDULE FOR MOUNTING.
LIGHTING		EXTERIOR WALLPACK, REFER TO ARCHITECTURAL DRAWINGS FOR ELEVATIONS.
LIGHTING	A	DENOTES FIXTURE TAG "A" - SEE FIXTURE SCHEDULE
LIGHTING	$	SINGLE POLE, SINGLE THROW LIGHT SWITCH - CENTER MTD, 48" AFF. "3" INDICATES 3-WAY SWITCH, "OC" INDICATES DUAL TECHNOLOGY OCCUPANCY SENSOR WITH MANUAL OVERRIDE SWITCH EQUAL TO WATTSTOPPER DSW-10G, "d" INDICATES DIMMER SWITCH, "4" INDICATES 4-WAY SWITCH, "I" INDICATED ILLUMINATED SWITCH, "T" INDICATES TIMER SWITCH.
LIGHTING	OC	CEILING MOUNTED, DUAL TECHNOLOGY, LOW VOLTAGE OCCUPANCY SENSOR EQUAL TO MODEL WATTSTOPPER DT-355. PROVIDE POWER PACKS AS REQUIRED. SEE WIRING DETAILS.
LIGHTING	OC	CORNER/WALL MTD, OCCUPANCY SENSOR EQUAL TO WATTSTOPPER DT-205 SERIES. MTD 90" AFF. PROVIDE POWER PACKS AS REQUIRED. SEE WIRING DETAILS.
POWER		DUPLEX RECEPTACLE, CENTER MTD. 18" AFF., UOI.
POWER		GROUND FAULT INTERRUPTER RECEPTACLE, CENTER MTD. 18" AFF IN JANITOR ROOMS & EXTERIOR LOCATIONS. MTD. IN ROOF CURB ON THE ROOF. CENTER MTD. 44" AFF. IN BATHROOMS, AND 4" ABOVE BACKSPLASH AT MILLWORK - COORDINATE WITH ARCHITECTURAL ELEVATIONS.
POWER	IG	ISOLATED GROUND DUPLEX RECEPTACLE, CENTER MTD. 18" AFF., UOI.
POWER		ABOVE COUNTER DUPLEX RECEPTACLE, CENTER MTD. 4" ABOVE BACKSPLASH AT MILLWORK. COORDINATE WITH ARCHITECTURAL ELEVATIONS & CASEWORK VENDOR.
POWER	WP	DUPLEX RECEPTACLE WITH WEATHER-PROOF IN-USE COVER, CENTER MTD. 18" AFF, UOI.
POWER		DOUBLE DUPLEX RECEPTACLE, CENTER MTD. 18" AFF., UOI.
POWER		SPECIAL RECEPTACLE, TYPE AND MOUNTING AS INDICATED.
POWER	FB	IN-GRADE FLOORBOX W/ DUPLEX RECEPTACLE. ROUTE CONDUIT TO NEAREST ACCESSIBLE CEILING.
POWER		PANELBOARD - RATING, MOUNTING, ETC. PER SINGLE LINE DIAGRAM
POWER	J	JUNCTION BOX - USE AS INDICATED
POWER		FUSED HEAVY-DUTY DISCONNECT, SIZED & RATED AS INDICATED
POWER		NON-FUSED HEAVY-DUTY DISCONNECT, SIZED & RATED AS INDICATED
POWER		FEEDER RUN OVERHEAD - CONCEALED IN OR ABOVE CEILING IN WALL OR EXPOSED ON STRUCTURE - #12 COPPER CONDUCTORS IN 0.75"C CONDUIT, UOI. #10 INDICATES #10 AWG CU
POWER		FEEDER RUN CONCEALED BELOW FLOOR, IN WALL OR BELOW GRADE
POWER		INDICATES GROUNDING CONDUCTOR - #12 COPPER GROUNDING CONDUCTOR, UOI. #10 INDICATES #10 AWG CU
COMMUNICATIONS		TELE/DATA OUTLET CENTER MTD. 18" AFF, PROVIDE (1)-1.25"C FROM OUTLET TO NEAREST ACCESSIBLE CEILING SPACE. CONTRACTOR SHALL PROVIDE DATA DROPS TO EACH BOX AS INDICATED ON DRAWINGS. PROVIDE DOUBLE GANG DEEP BOX.
ANNOTATION	#	KEYED NOTE
FIRE ALARM	F	FIRE ALARM MANUAL PULL STATION, MTD 48" AFF TO BOTTOM.
FIRE ALARM	V	VISUAL INDICATOR DEVICE, WALL MTD.
FIRE ALARM		COMBINATION AUDIBLE & VISUAL INDICATOR ALARM, WALL MTD. DEVICES TO BE SPEAKER/STROBES.
FIRE ALARM	S	SMOKE DETECTOR, CEILING MTD.
FIRE ALARM	HD	HEAT DETECTOR, CEILING MTD.
FIRE ALARM	DH	CONNECTION TO DOOR HOLDER

1 SYMBOL LEGEND

ELECTRICAL SYMBOLS

- NONFUSED DISCONNECT SWITCH - SIZE AS INDICATED
- FUSED DISCONNECT SWITCH - SIZE AS INDICATED
- COMBINATION STARTER/DISCONNECT - SIZE AS INDICATED
- $ TOGGLE SWITCH
- ———— FEEDER/BRANCH RUN OVERHEAD - CONCEALED IN OR ABOVE CEILING, IN WALL, OR EXPOSED ON STRUCTURE
- – – – – – EMERGENCY, NIGHT LIGHT, OR FEEDER/BRANCH CONCEALED BELOW FLOOR, IN WALL, OR BELOW GRADE
- P-16 HOME RUN TO CIRCUIT PANEL, NEUTRAL/HOT/GROUND, #12 COPPER, UOI

ABBREVIATIONS

GC	GENERAL CONTRACTOR
EC	ELECTRICAL CONTRACTOR
MC	MECHANICAL CONTRACTOR
UOI	UNLESS OTHERWISE INDICATED
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
WP	WEATHERPROOF
a, b, c, etc.	DENOTES SWITCHING SCHEME
AFF	ABOVE FINISHED FLOOR
AC	MOUNT ABOVE COUNTER
MTD	MOUNTED
AFG	ABOVE FINISHED GRADE
BFG	BELOW FINISHED GRADE
SPD	SURGE PROTECTIVE DEVICE
STB	SHUNT TRIP BREAKER
EX	EXISTING
EP	EXPLOSION PROOF
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
FACP	FIRE ALARM CONTROL PANEL
FAA	FIRE ALARM ANNUNCIATOR PANEL

DRAWING LEGEND

DRAWING NO.	DESCRIPTION
E0.1	Legend & Schedules - Electrical
E0.2	One Line Diagram - Electrical
E0.3	Details - Electrical
E2.1	Floor Plan - Lighting
E3.1	Floor Plan - Power/Comm

DEVICE NOTES

1. COORDINATE FINAL DEVICE FINISHES WITH ARCHITECT/OWNER.

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REVISIONS

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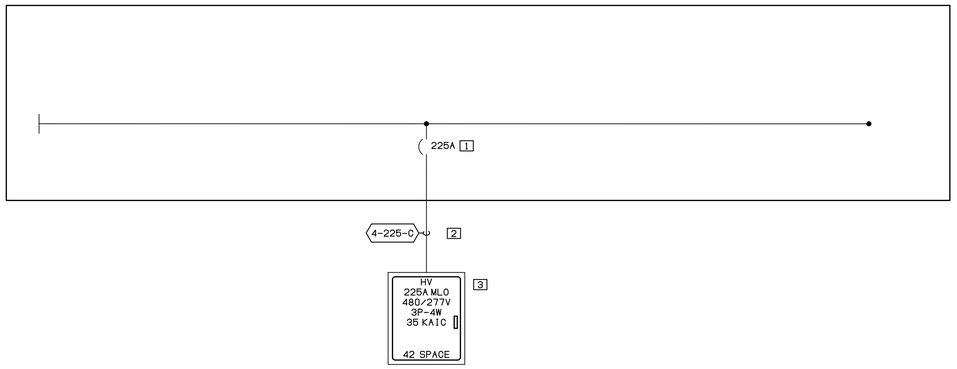
LEGEND & SCHEDULES - ELECTRICAL

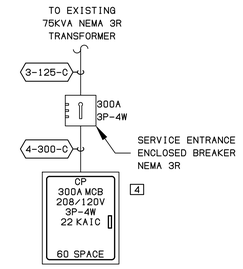
HNA ENGINEERING

6/17/2019 10:54:58 AM

EXISTING MSB, GE AV-LINE SWITCHBOARD
480/277V, 3PH, 4W, 2000A



1 ONE LINE DIAGRAM - BAND BUILDING



2 ONE LINE DIAGRAM - CONCESSION STAND

FEEDER SCHEDULE (NOTE: ALL CONDUCTORS THHN / THWN U.O.N.)

TAG #	NOMINAL AMPACITY	MINIMUM CONDUIT SIZE (IN)	NO. OF PARALLEL RUNS	MINIMUM CABLE SIZE (AWG)	MATERIAL (INCLUDES ALL CONDUCTORS)	NO. OF CONDUCTORS	EQUIP. GROUND. COND. (AWG)
3-PHASE, 4-WIRE SYSTEMS							
4-300-C	300A	3"	1	#300MCM	CU	4	#4
4-225-C	225A	2-1/2"	1	#4/0	CU	4	#4
3-PHASE, 3-WIRE SYSTEMS							
3-125-C	125A	1-1/4"	1	#1	CU	3	#6

3 FEEDER SCHEDULE

ONE LINE SYMBOL LEGEND

600A	MOLDED CASE CIRCUIT BREAKER. NUMBER INDICATED TRIP RATING	X-XXX-C	FEEDER CALLOUT. REFER TO FEEDER SCHEDULE
PANEL CP 208/120V 3P-4W	LIGHTING OR DISTRIBUTION PANELBOARD	XX, XXX KV	AVAILABLE SYMMETRICAL SHORT CIRCUIT CURRENT AT THE EQUIPMENT AS CALCULATED BY THE ENGINEER.
	CURRENT TRANSFORMER		GROUNDING CONNECTION OF SEPARATELY DERIVED SYSTEM
	POTENTIAL TRANSFORMER	45 KVA, 480V 3P, 208/120V, #6G-CU	DELTA/WYE DRY TYPE TRANSFORMER. TRANSFORMER SHALL BE CONSIDERED A SEPARATELY DERIVED SYSTEM AND SHALL BE GROUNDED PER NEC 250-30.
DPM	DIGITAL METERING PACKAGE (AMPS, VOLTS, KWD, KWH, PF)		
GF	GROUND FAULT RELAY		
SPD	SURGE PROTECTIVE DEVICE		

ELECTRICAL ONE-LINE NOTES

1. IN ACCORDANCE WITH NEC ARTICLE 110.16, ELECTRICAL EQUIPMENT LIKELY TO REQUIRE EXAMINATION WHILE ENERGIZED SHALL BE FIELD MARKED TO WARN PERSONNEL OF POTENTIAL ARC FLASH HAZARDS. THIS SHALL BE FURNISHED FROM THE FACTORY.
2. IN ACCORDANCE WITH NEC ARTICLE 110.24, THE SERVICE EQUIPMENT SHALL BE FIELD MARKED WITH THE MAXIMUM AVAILABLE FAULT CURRENT ALONG WITH THE DATE THE CALCULATION WAS PERFORMED.
3. ALL WORKING SPACE REQUIREMENTS AROUND ELECTRICAL EQUIPMENT IN ACCORDANCE WITH NEC ARTICLE 110.26 SHALL BE STRICTLY ADHERED TO BY ALL TRADES.
4. IN ACCORDANCE WITH NEC ARTICLE 230.8, RACEWAYS ENTERING A BUILDING FROM AN UNDERGROUND DISTRIBUTION SYSTEM SHALL BE SEALED IN ACCORDANCE WITH 300.5.G.
5. ALL PANELBOARDS SHALL HAVE COPPER BUSSING.
6. CONTRACTOR SHALL PROVIDE SPARE BREAKERS AS INDICATED ON PANEL SCHEDULES.
7. GROUNDING SHALL BE PER NEC 250.
8. ALL PANELBOARDS ARE TO EASY-TRIM TYPE.

SERVICE ENTRANCE NOTES

1. UNDERGROUND SERVICE LATERAL CONDUCTORS MUST BE PROTECTED FROM DAMAGE IN ACCORDANCE WITH ARTICLE 300.5. UNDERGROUND SERVICE CONDUCTORS THAT ARE NOT ENCASED IN CONCRETE AND THAT ARE BURIED 18" OR MORE BELOW GRADE SHALL HAVE THEIR LOCATION IDENTIFIED BY A WARNING RIBBON PLACED 12" ABOVE THE UNDERGROUND INSTALLATION.
2. UNLESS LOCAL CODE DICTATES OTHERWISE, PVC SERVICE ENTRANCE LATERAL RACEWAY MUST BE BURIED AT LEAST 18" TO THE TOP OF THE RACEWAY UNLESS BELOW A COVERING OF AT LEAST 2" OF CONCRETE. RACEWAY COVERED UNDER 2" OF CONCRETE MUST BE BURIED AT LEAST 12" TO THE TOP OF THE RACEWAY.
3. BACKFILL THAT CONTAINS LARGE ROCKS, PAVING MATERIALS, CORROSIVE MATERIAL OR ANYTHING ELSE THAT MAY CAUSE DAMAGE TO RACEWAYS OR CABLES SHALL NOT BE PLACED IN EXCAVATION.
4. CONDUITS OR RACEWAYS THROUGH WHICH MOISTURE MAY CONTACT LIVE PARTS SHALL BE SEALED OR PLUGGED AT ONE OR BOTH ENDS. SPARE OR UNUSED RACEWAYS SHALL ALSO BE SEALED. SEALANTS SHALL BE IDENTIFIED FOR USE WITH THE CABLE, INSULATION, SHIELD OR OTHER COMPONENTS.

KEYED NOTES

[#]

1. CONTRACTOR SHALL PROVIDE NEW 225A BREAKER IN EXISTING SWITCHBOARD.
2. CONTRACTOR SHALL FIELD COORDINATE EXACT ROUTING PRIOR TO BID (APPROXIMATELY 750'). CONTRACTOR SHALL MAKE ALL REPAIRS TO CEILINGS AND WALL AS REQUIRED. DURING CONSTRUCTION, THIS WORK SHALL BE PHASED TO MINIMIZE INTERRUPTIONS TO OWNER'S OPERATIONS.
3. CONTRACTOR SHALL PROVIDE APPROPRIATE LUG KIT FOR ENLARGED CONDUCTORS DUE TO VOLTAGE DROP.
4. PROVIDE SINGLE SECTION CONSTRUCTION.

SHEET REVISED 10-11-19 (1)

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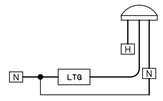
REVISIONS		
Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1

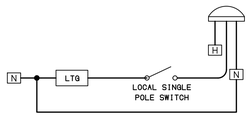
PROJECT NUMBER 150119
DATE OF ORIGINAL ISSUE September 2, 2019
SHEET NUMBER E0.2

ONE LINE DIAGRAM - ELECTRICAL

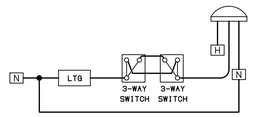
6/17/2019 10:54:58 AM



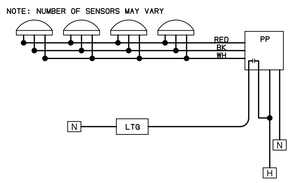
1 LINE VOLTAGE SENSOR



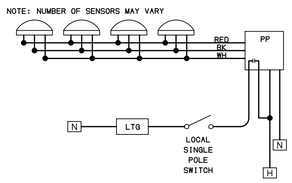
2 LINE VOLTAGE SENSOR W/ SINGLE SWITCHING



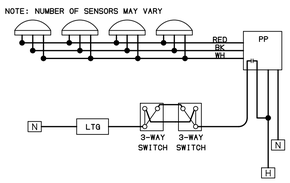
3 LINE VOLTAGE SENSOR W/ 3-WAY SWITCHING



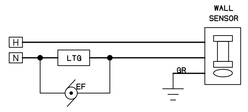
4 LOW VOLTAGE SENSORS



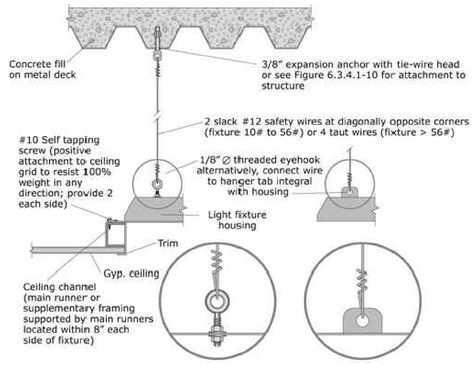
5 LOW VOLTAGE SENSORS W/ SINGLE SWITCHING



6 LOW VOLTAGE SENSORS W/ 3-WAY SWITCHING



7 WALL SWITCH SENSOR W/ EXHAUST FAN



8 SEISMIC MOUNT DETAIL

LUMINAIRE SCHEDULE

CALLOUT	LAMP NO.	LAMP WATTS	LAMP TYPE	DESCRIPTION	MOUNTING	MANUFACTURER	MODEL	INPUT WATTS (TOTAL)	VOLTS	NOTE #1	NOTE #2
A	-	-	LED	2'X4' ARCHITECTURAL TROFFER	RECESSED	LITHONIA	2BLT2-60L-ADSM-EZ1-LP840	53	277V-1P-2W		
AE	-	-	LED	2'X4' ARCHITECTURAL TROFFER	RECESSED	LITHONIA	SAME AS FIXTURE "A", ON GENERATOR BACKUP	53	277V-1P-2W	CONNECT TO UNSWITCHED "LIFE SAFETY" CIRCUIT	
B	-	-	LED	2'X4' WET LOCATION ARCHITECTURAL TROFFER	RECESSED	LITHONIA	2WRTL-G-L48-3000LM-MVOLT-EZ1-40K-80CRI	27	120V-1P-2W		
BE	-	-	LED	2'X4' WET LOCATION ARCHITECTURAL TROFFER	RECESSED	LITHONIA	SAME AS FIXTURE "B", ON BATTERY BACKUP	27	120V-1P-2W		PROVIDE LIGHTING MANUFACTURER RECOMMENDED EMERGENCY BATTERY BACKUP CAPABLE OF 90 MINUTE RUNTIME
D	-	-	LED	6" DOWNLIGHT	RECESSED	GOTHAM	EVO-40/20-6AR-MD-LD-MVOLT -EZ1-TRW	24	120V-1P-2W		
DE	-	-	LED	6" DOWNLIGHT	RECESSED	GOTHAM	SAME AS FIXTURE "D1", ON BATTERY BACKUP	24	120V-1P-2W		PROVIDE LIGHTING MANUFACTURER RECOMMENDED EMERGENCY BATTERY BACKUP CAPABLE OF 90 MINUTE RUNTIME
E	-	-	LED	EXIT SIGN	WALL/CEILING	LITHONIA	LQM-S-W-3-R-120/277-EL-N	2	277V-1P-2W	CONNECT TO UNSWITCHED "LIFE SAFETY CIRCUIT.	ON GENERATOR BACKUP
EX	-	-	LED	EXIT SIGN	WALL/CEILING	LITHONIA	LQM-S-W-3-R-120/277-EL-N	2	120V-1P-2W		PROVIDE LIGHTING MANUFACTURER RECOMMENDED EMERGENCY BATTERY BACKUP CAPABLE OF 90 MINUTE RUNTIME
EG	-	-	LED	LED EXTERIOR EM SCONCE, PHOTOCELL	WALL, @ 10' AFF	ISOLITE	ELED-EM-WH-CD	11	277V-1P-2W	CONNECT TO UNSWITCHED "LIFE SAFETY CIRCUIT.	ON GENERATOR BACKUP
EGX	-	-	LED	LED EXTERIOR EM SCONCE, PHOTOCELL	WALL, @ 10' AFF	ISOLITE	ELED-EM-WH-CD	11	120V-1P-2W		PROVIDE LIGHTING MANUFACTURER RECOMMENDED EMERGENCY BATTERY BACKUP CAPABLE OF 90 MINUTE RUNTIME
P	-	-	LED	EXTERIOR WALLPACK	WALL, MTD PER ARCHITECT ELEVATIONS	LITHONIA	WST-LED-P2-40K-VW-MVOLT-DDBXD	25	277V-1P-2W	COORDINATE FINISH WITH ARCHITECT	
W	-	-	LED	UPLIGHT/DOWNLIGHT CYLINDER	WALL, @ 7' AFF	LITHONIA	OLLWU-LED-P1-40K-MVOLT-??	14	120V-1P-2W	COORDINATE FINISH WITH ARCHITECT	
Z	-	-	LED	EXTERIOR WALLPACK	WALL, MTD PER ARCHITECT ELEVATIONS	LITHONIA	WST-LED-P2-40K-VW-MVOLT-DDBXD	25	120V-1P-2W	COORDINATE FINISH WITH ARCHITECT	

9 LUMINAIRE SCHEDULE

FIXTURE NOTES

1. THE ARCHITECT/ENGINEER RESERVES THE RIGHT TO REJECT ANY AND ALL FIXTURES NOT PRE-APPROVED BY ARCHITECT/ENGINEER 10 DAYS PRIOR TO BID.
2. ALL OCCUPANCY SENSORS SHALL BE SET WITH A 10 MINUTE TIME OUT, WITH THE EXCEPTION OF RESTROOM SENSORS, ALL RESTROOM SENSORS SHALL BE SET WITH A 20 MINUTE TIME OUT.
3. ALL EMERGENCY BALLAST OPTIONS SHALL BE AT LEAST 1400 LUMENS.
4. COORDINATE ALL FIXTURE MOUNTING HEIGHTS WITH ARCHITECT.
5. PROVIDE FACES AND DIRECTIONAL ARROWS AS REQUIRED FOR EXIT SIGNS. COORDINATE MOUNTING TYPE FOR EACH FIXTURE PER PLANS.

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REVISIONS		
Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1

PROJECT NUMBER 150119
DATE OF ORIGINAL ISSUE September 2, 2019
SHEET NUMBER E0.3

DETAILS - ELECTRICAL

HNA ENGINEERING

6/17/2019 10:54:58 AM

Branch Panel: CP

Location: CONCESSION STAND 129
Supply From:
Mounting: Flush
Enclosure: NEMA 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 22,000
Mains Type: MCB
Mains Rating: 300 A
MCB Rating: 300 A

Notes:

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	Receptacle (RESTROOM)	20 A	1	540 VA	3120...		2	50 A	Power (MSHP-1)	2
3	Receptacle (CONV)	20 A	1		180 VA	3120...	--	--	--	4
5	Receptacle (SANDWICH/SALAD PREP FRIDGE)	20 A	1			300 VA	2038...	2	30 A	Power (MSHP-2)	6
7	Receptacle (HOTDOG GRILL)	20 A	1	900 VA	2038...		--	--	--	8
9	Receptacle (COFFEE MAKER)	20 A	1		1660...	500 VA	1	20 A	Power (AC-1)	10
11	Receptacle (BOTTLE COOLER)	20 A	1			228 VA	500 VA	1	20 A	Power (AC-2)	12
13	Receptacle (MICROWAVE)	20 A	1	1550...	180 VA		1	20 A	Receptacle (POS)	14
15	Power (ICE MAKER)	20 A	1		2136...	1344...	1	20 A	Receptacle (FREEZER)	16
17	Receptacle (REFRIGERATOR)	20 A	1			588 VA	900 VA	1	20 A	Receptacle (PATIO)	18
19	Power (DF-1)	20 A	1	1392...	542 VA		1	20 A	Lighting (CONCESSION)	20
21	Lighting (PATIO)	20 A	1		140 VA	1500...	3	20 A	Power (WH-1)	22
23	Lighting (EXTERIOR)	20 A	1			25 VA	1500...	--	--	--	24
25	Receptacle (HEATED DISPLAY)	20 A	2	1220...	1500...		--	--	--	26
27	--	--	--		1220...	1061...	2	20 A	Power (DISPOSER)	28
29	Receptacle (HOT FOOD WELL)	20 A	1			1200...	1061...	--	--	--	30
31	Spare	20 A	1	0 VA	0 VA		1	20 A	Spare	32
33	Spare	20 A	1		0 VA	0 VA	1	20 A	Spare	34
35	Spare	20 A	1			0 VA	0 VA	1	20 A	Spare	36
37	Spare	20 A	1	0 VA	0 VA		1	20 A	Spare	38
39	Spare	20 A	1		0 VA	0 VA	1	20 A	Spare	40
41	Spare	20 A	1			0 VA	0 VA	1	20 A	Spare	42
43	Spare	20 A	1	0 VA	0 VA		1	20 A	Spare	44
45	Spare	20 A	1		0 VA	0 VA	1	20 A	Spare	46
47	Spare	20 A	1			0 VA	0 VA	1	20 A	Spare	48
49	Spare	20 A	1	0 VA	0 VA		1	20 A	Spare	50
51	Spare	20 A	1		0 VA	0 VA	1	20 A	Spare	52
53	Spare	20 A	1			0 VA	0 VA	1	20 A	Spare	54
55	Spare	20 A	1	0 VA	0 VA		1	20 A	Spare	56
57	Spare	20 A	1		0 VA	0 VA	1	20 A	Spare	58
59	Spare	20 A	1			0 VA	0 VA	1	20 A	Spare	60
		Total Load:		12969 VA		12722 VA	8340 VA			
		Total Amps:		114 A		112 A	70 A			

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting	612 VA	100.00%	612 VA		
Motor	2440 VA	100.00%	2440 VA	**Total Conn. Load:**	34031 VA
Power	21466 VA	100.00%	21466 VA	**Total Est. Demand:**	34031 VA
Receptacle	9570 VA	100.00%	9570 VA	**Total Conn. Current:**	94 A
				Total Est. Demand Current:	94 A

Notes:

Branch Panel: HV

Location:
Supply From:
Mounting: Surface
Enclosure: Type 1

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 35,000
Mains Type: MLO
Mains Rating: 225 A
MCB Rating:

Notes:

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1	Power (RTU-1)	40 A	3	8591...	8591...		3	40 A	Power (RTU-2)	2
3	--	--	--		8591...	8591...	--	--	--	4
5	--	--	--			8591...	8591...	--	--	6
7	Power (RTU-3)	20 A	3	5127...	742 VA		1	20 A	Lighting (CORRIDOR)	8
9	--	--	--		5127...	325 VA	1	20 A	Lighting (EXTERIOR)	10
11	--	--	--			5127...	1537...	1	20 A	Lighting (INTERIOR)	12
13	Spare	20 A	1	0 VA	0 VA		1	20 A	Spare	14
15	Spare	20 A	1		0 VA	0 VA	1	20 A	Spare	16
17	Spare	20 A	1			0 VA	0 VA	1	20 A	Spare	18
19	Spare	20 A	1	0 VA	0 VA		1	20 A	Spare	20
21	Spare	20 A	1		0 VA	0 VA	1	20 A	Spare	22
23	Spare	20 A	1			0 VA	0 VA	1	20 A	Spare	24
25	Spare	20 A	1	0 VA	0 VA		1	20 A	Spare	26
27	Spare	20 A	1		0 VA	0 VA	1	20 A	Spare	28
29	Spare	20 A	1			0 VA	0 VA	1	20 A	Spare	30
		Total Load:		23014 VA		22633 VA	23773 VA			
		Total Amps:		83 A		82 A	86 A			

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting	2590 VA	100.00%	2590 VA		
Power	66924 VA	100.00%	66924 VA	**Total Conn. Load:**	69418 VA
				Total Est. Demand:	69418 VA
				Total Conn. Current:	83 A
				Total Est. Demand Current:	83 A

Notes:

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PANEL SCHEDULES - ELECTRICAL

REVISIONS

Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1

PROJECT NUMBER
150119

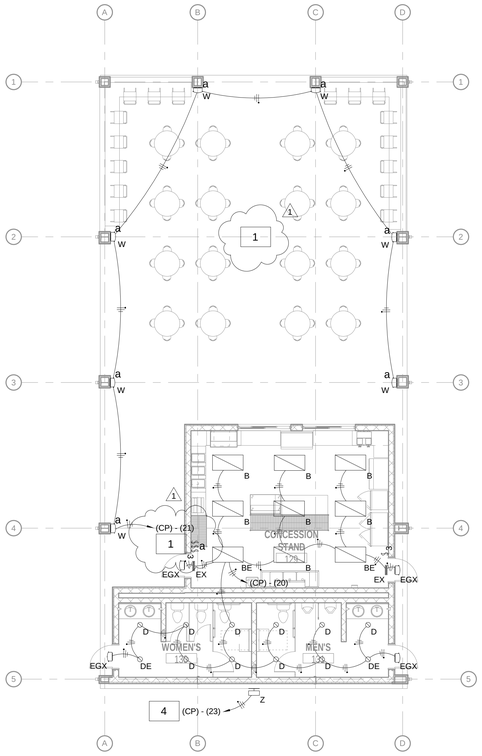
DATE OF ORIGINAL ISSUE
September 2, 2019

SHEET NUMBER
E0.5

HNA ENGINEERING

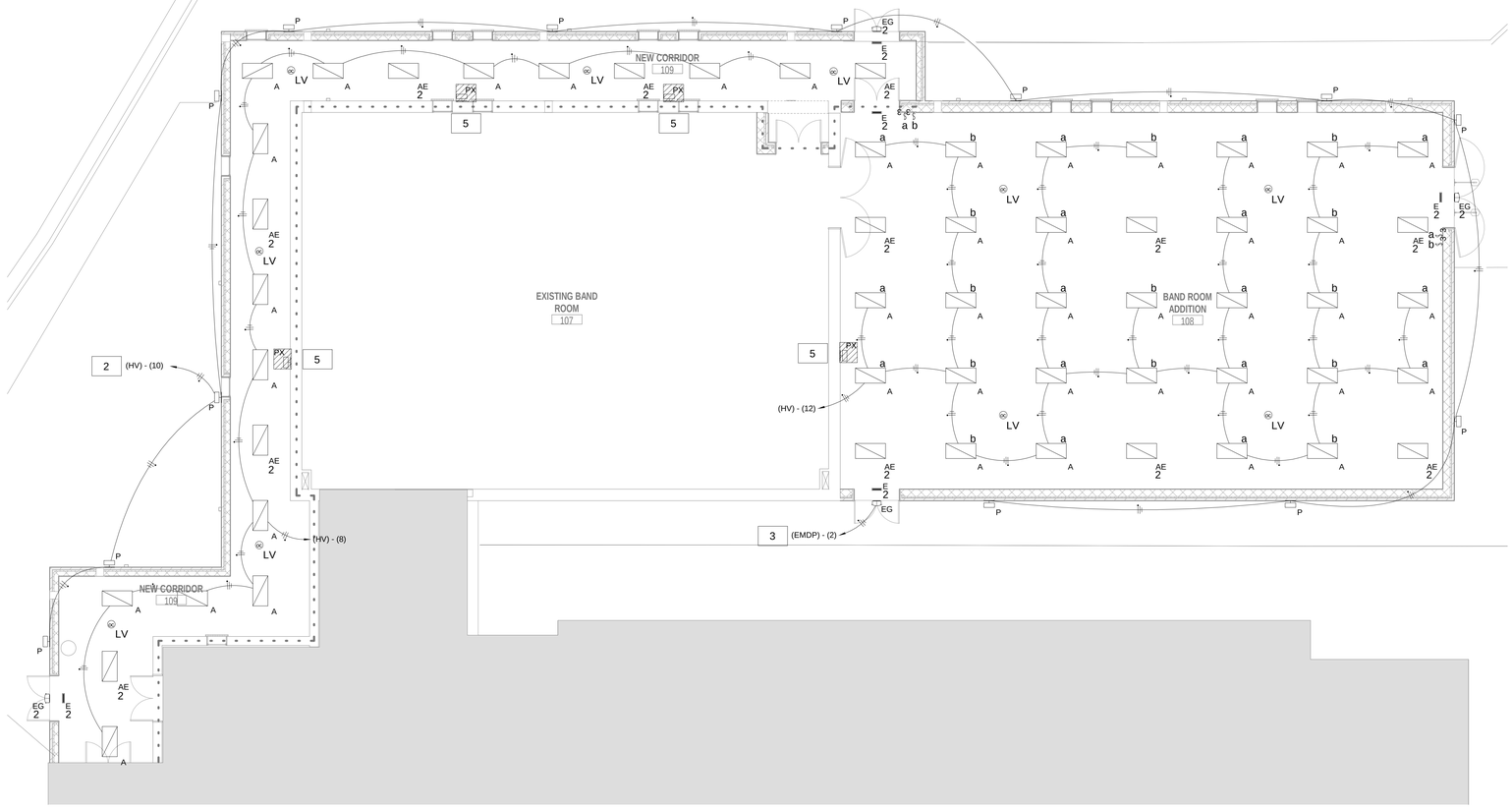
10/13/2019 5:33:24 PM

NOTE: CONCESSION STAND IS NOT A SPACE WHERE STUDENTS EARN CREDIT HOURS.



2 CONCESSION STAND FLOOR PLAN - ELECTRICAL - LIGHTING

1/8" = 1'-0"



1 BAND ROOM FLOOR PLAN - ELECTRICAL - LIGHTING

1/8" = 1'-0"

WALL RATING LEGEND

- SMOKE TIGHT PARTITION
- ONE HOUR RATED FIRE BARRIER
- TWO HOUR RATED FIRE BARRIER

WALL RATING LEGEND

NOT TO SCALE

LIGHTING NOTES

1. ALL HOMERUNS, WHERE WIRE SIZE IS NOT SPECIFIED, ARE #12 AWG.
2. ALL EMERGENCY FIXTURES SERVED FROM "EMDP" SHALL SERVE AS A NIGHT-LIGHT AND SHALL REMAIN UNSWITCHED.

KEYED NOTES

#

1. PROVIDE SWITCH FOR CEILING FAN. SEE FAN LOCATION ON SHEET E3.1.
2. INDICATED CIRCUIT SHALL BE CONNECTED TO NEW LIGHTING CONTROL PANEL "LCP".
3. INDICATED CIRCUIT SHALL BE CONNECTED TO EXISTING PANEL "EMDP" FED FROM CAMPUS GENERATOR FOR EMERGENCY LIGHTING.
4. EXTERIOR FIXTURE "Z" TO BE CONTROLLED VIA PHOTOCELL.
5. EXISTING WALL PACK TO BE DEMOLISHED. REMOVE WIRE BACK TO NEAREST JUNCTION BOX.

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HNA ENGINEERING

FLOOR PLAN - ELECTRICAL - LIGHTING

REVISIONS

Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1

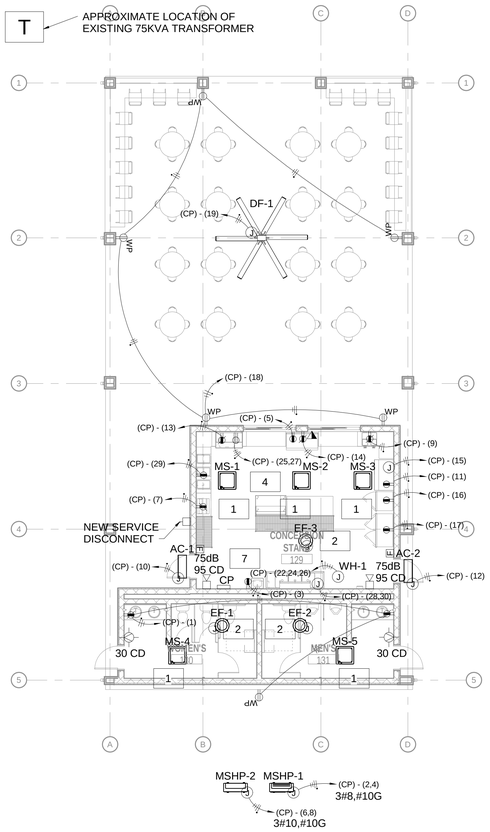
PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
September 2, 2019

SHEET NUMBER
E2.1

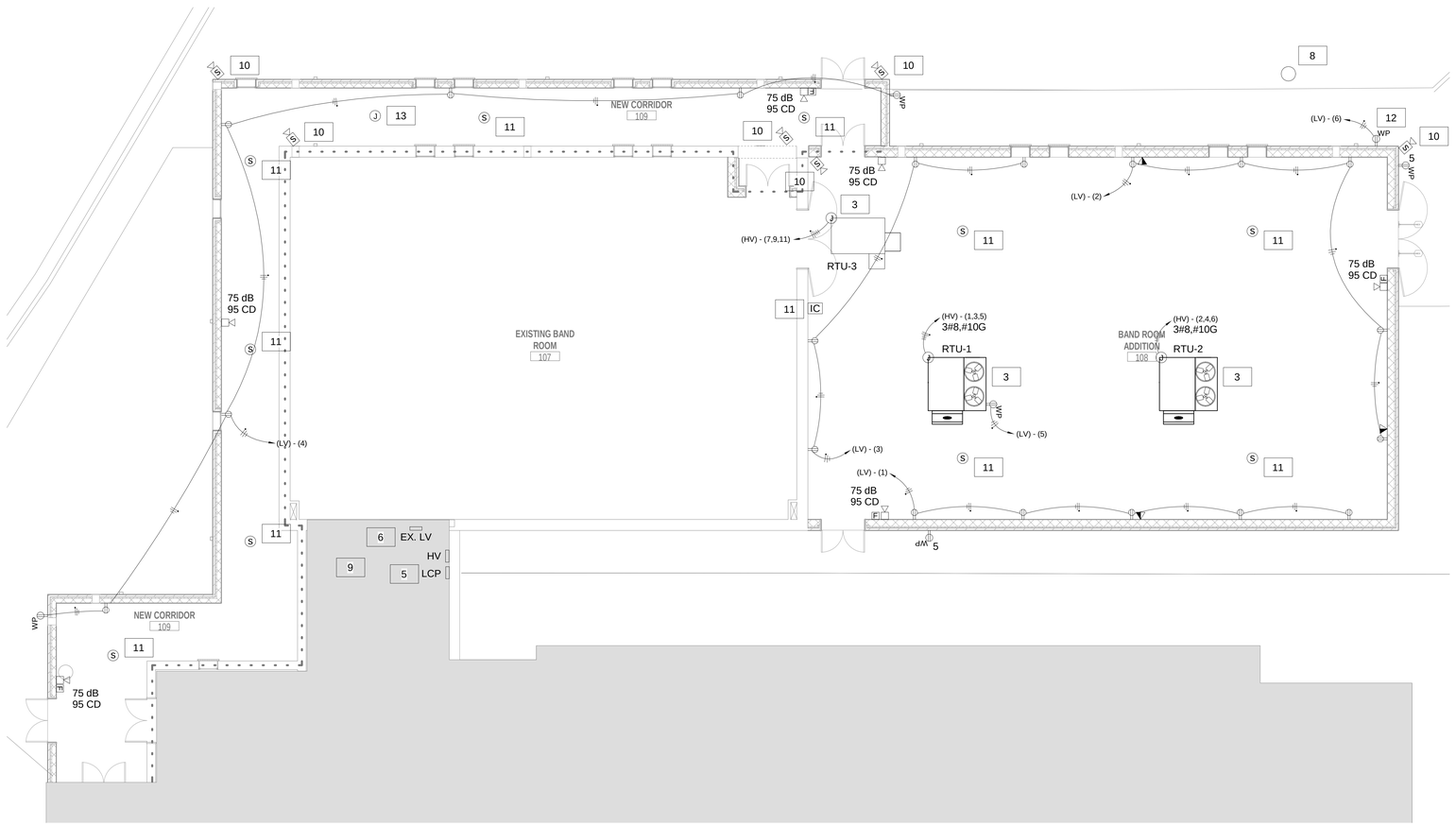
10/13/2019 5:34:11 PM

NOTE: CONCESSION STAND IS NOT A SPACE WHERE STUDENTS EARN CREDIT HOURS.



2 CONCESSION STAND FLOOR PLAN - ELECTRICAL - POWER

1/8" = 1'-0"



1 BAND ROOM FLOOR PLAN - ELECTRICAL - POWER

1/8" = 1'-0"

WALL RATING LEGEND

- SMOKE TIGHT PARTITION
- ONE HOUR RATED FIRE BARRIER
- TWO HOUR RATED FIRE BARRIER

WALL RATING LEGEND
NOT TO SCALE

FIRE ALARM NOTES

1. ALL REQUIRED DOCUMENTATION REGARDING THE DESIGN OF FIRE DETECTION, ALARM, AND COMMUNICATIONS SYSTEMS AND THE PROCEDURES OF MAINTENANCE, INSPECTION, AND TESTING OF FIRE DETECTION, ALARM, AND COMMUNICATIONS SYSTEMS SHALL BE MAINTAINED AT AN APPROVED, SECURE LOCATION FOR THE LIFE OF THE SYSTEM.
2. THE FIRE ALARM CONTROL PANEL CIRCUIT BREAKER SHALL BE MARKED WITH RED PAINT, AND SHALL BE ACCESSIBLE ONLY TO AUTHORIZED PERSONNEL, AND SHALL BE IDENTIFIED AS "FIRE ALARM CIRCUIT." THE LOCATION OF THE CIRCUIT BREAKER SHALL BE PERMANENTLY IDENTIFIED AT THE FIRE ALARM CONTROL PANEL.
3. MORE THAN TWO VISIBLE NOTIFICATION APPLIANCES IN THE SAME ROOM OR ADJACENT SPACE WITHIN THE FIELD OF VIEW MUST FLASH IN SYNCHRONIZATION.
4. CONTRACTOR SHALL PROVIDE FIRE ALARM SYSTEMS SECONDARY POWER SOURCE LOAD CALCULATIONS PER NFPA 72 4.4.1.5.3.
5. CONTRACTOR SHALL PROVIDE A STORAGE BATTERY DEDICATED TO THE FIRE ALARM SYSTEM PER NFPA 72 4.4.1.5.
6. FIRE ALARM CONTRACTOR TO PROVIDE & WIRE ALL REQUIRED DUCT SMOKE DETECTORS. MECHANICAL TO MOUNT DETECTOR.
7. COORDINATE LOCATION OF FIRE ALARM ANNUNCIATOR PANEL WITH FIRE MARSHAL.
8. PROVIDE TAMPER & FLOW SWITCHES AS REQUIRED. COORDINATE WITH FIRE PROTECTION DRAWINGS & CONTRACTOR FOR EXACT QUANTITY & LOCATIONS.
9. ALL FIRE ALARM DEVICES TO CONNECT TO EXISTING SIMPLEX CAMPUS SYSTEM. PROVIDE NAC EXTENDED AND EXPANSION/PROGRAMMING AS REQUIRED.

POWER NOTES

1. ALL HOMERUNS, WHERE WIRE SIZE IS NOT SPECIFIED, ARE #12 AWG.

KEYED NOTES

#	
1.	INDOOR UNIT TO RECEIVE POWER FROM OUTDOOR UNIT THROUGH FIELD-SUPPLIED INTERCONNECTED WIRING PROVIDED AND INSTALLED BY CONTRACTOR.
2.	EXHAUST FAN SHALL BE CIRCUITED AND SWITCHED WITH LOCAL LIGHTING.
3.	CONTRACTOR SHALL PROVIDE SUPPLY & RETURN DUCT SMOKE DETECTOR IN MECHANICAL UNIT AS INDICATED.
4.	CONTRACTOR SHALL FIELD COORDINATE EXACT LOCATION OF ALL POWER FOR EQUIPMENT LOCATED IN CONCESSION STAND. SEE PANEL SCHEDULE FOR DESIGNATED CIRCUITS.
5.	LIGHTING CONTROL PANEL "LCP" SHALL BE ACUITY #ARP-INTENC08-NLT-8SPR-MVOLT-HLK-SM. PROVIDE WITH NLIGHT ECLYPSE #nECY-MVOLT-BAC-ENCGFXK
6.	PANEL "LV" IS EXISTING. PROVIDE NEW BREAKERS IN EXISTING PANEL AS REQUIRED.
7.	PANEL SHALL RECESS IN WALL. COORDINATE WITH ARCHITECT. PROVIDE (5)-1"C FROM PANEL CAN TO ABOVE CEILING FOR FUTURE CIRCUITS.
8.	PROVIDE (4)-1"C STUBBED AND CAPPED BELOW GRADE APPROXIMATELY 10' FROM PAVEMENT FOR FUTURE USAGE.
9.	COORDINATE EXACT LOCATION OF ALL NEW PANELS WITH OWNER PRIOR TO ROUGH-IN.
10.	CONTRACTOR SHALL RELOCATE EXISTING SECURITY CAMERA. PROVIDE BOX IN EXT. WALL AND 1"C TO ACCESSIBLE CEILING SPACE. FIELD COORDINATE EXACT LOCATION WITH OWNER.
11.	CONTRACTOR SHALL PROVIDE INTERCOM PUSH TO CALL BUTTON AND RECESSED CEILING SPEAKERS TO MATCH OWNER'S EXISTING TELECOR SYSTEM. PROVIDE ALL WIRING, PROGRAMMING, AND EXPANSION AS REQUIRED.
12.	PROVIDE RECEPTACLE FOR IRRIGATION CONTROLLER. FIELD COORDINATE EXACT LOCATION.
13.	CONTRACTOR SHALL RELOCATE EXISTING PARKING LOT LIGHTING PULLBOX 10' BEYOND NEW BUILDING PAD. EXTEND ALL CONDUCTORS AS REQUIRED.

HNA ENGINEERING

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HOUSTON HIGH SCHOOL
BAND ROOM ADDITION AND CONCESSION STAND
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Germantown, TN 38139
150119

JOSHUA D. HOLTGREWE
REGISTERED ENGINEER
No. 113280
STATE OF TENNESSEE

REVISIONS		
Revision Date	Rev. #	Revision Description
10-11-19	1	Addendum 1

PROJECT NUMBER
150119

DATE OF ORIGINAL ISSUE
September 2, 2019

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FLOOR PLAN - ELECTRICAL - POWER

10/13/2019 5:33:25 PM

PLEASE INDICATE WHICH PRODUCTS AND/OR SERVICES YOUR COMPANY CAN SUPPLY.

- [ ] CLASS: 005-00 - ABRASIVES
- [ ] CLASS: 010-00 - ACOUSTICAL TILE, INSULATING MATERIALS, AND SUPPLIES
- [ ] CLASS: 015-00 - ADDRESSING, COPYING, MIMEOGRAPH, AND SPIRIT DUPLICATING MACHINE SUPPLIES: CHEMICALS, INKS, PAPER, ETC.
- [ ] CLASS: 025-00 - AIR COMPRESSORS AND ACCESSORIES
- [ ] CLASS: 031-00 - AIR CONDITIONING, HEATING AND VENTILATING EQUIPMENT: PARTS AND ACCESSORIES (SEE CLASS 740)
- [ ] CLASS: 045-00 - APPLIANCES AND EQUIPMENT, HOUSEHOLD TYPE
- [ ] CLASS: 050-00 - ART EQUIPMENT AND SUPPLIES
- [ ] CLASS: 055-00 - AUTOMOTIVE ACCESSORIES FOR AUTOMOBILES, BUSES, TRUCKS, ETC.
- [ ] CLASS: 060-00 - AUTOMOTIVE AND TRAILER EQUIPMENT AND PARTS
- [ ] CLASS: 065-00 - AUTOMOTIVE BODIES, ACCESSORIES, AND PARTS
- [ ] CLASS: 070-00 - AUTOMOTIVE AND RELATED TRANSPORTATION EQUIPMENT
- [ ] CLASS: 071-00 - AUTOMOBILES, SCHOOL BUSES, SUVS, AND VANS
- [ ] CLASS: 072-00 - TRUCKS
- [ ] CLASS: 073-00 - TRAILERS
- [ ] CLASS: 075-00 - AUTOMOTIVE SHOP EQUIPMENT AND SUPPLIES
- [ ] CLASS: 080-00 - BADGES, EMBLEMS, NAME TAGS AND PLATES, JEWELRY, ETC.
- [ ] CLASS: 085-00 - BAGS, BAGGING, TIES, AND EROSION CONTROL EQUIPMENT
- [ ] CLASS: 090-00 - BAKERY EQUIPMENT, COMMERCIAL
- [ ] CLASS: 095-00 - BARBER AND BEAUTY SHOP EQUIPMENT AND SUPPLIES
- [ ] CLASS: 100-00 - BARRELS, DRUMS, KEGS, AND CONTAINERS
- [ ] CLASS: 105-00 - BEARINGS
- [ ] CLASS: 110-00 - BELTS AND BELTING: AUTOMOTIVE AND INDUSTRIAL
- [ ] CLASS: 125-00 - BOOKBINDING SUPPLIES
- [ ] CLASS: 150-00 - BUILDER'S SUPPLIES
- [ ] CLASS: 155-00 - BUILDINGS AND STRUCTURES: FABRICATED AND PREFABRICATED
- [ ] CLASS: 165-00 - CAFETERIA AND KITCHEN EQUIPMENT, COMMERCIAL
- [ ] CLASS: 175-00 - CHEMICAL LABORATORY EQUIPMENT AND SUPPLIES
- [ ] CLASS: 190-00 - CHEMICALS AND SOLVENTS, COMMERCIAL (IN BULK)
- [ ] CLASS: 192-00 - CLEANING COMPOSITIONS, DETERGENTS, SOLVENTS, AND STRIPPERS-PREPACKAGED
- [ ] CLASS: 193-00 - CLINICAL LABORATORY REAGENTS AND TESTS
- [ ] CLASS: 195-00 - CLOCKS, TIMERS, WATCHES, AND JEWELERS' AND WATCHMAKERS TOOLS AND EQUIPMENT
- [ ] CLASS: 200-00 - CLOTHING, ATHLETIC, CASUAL, DRESS, UNIFORM, WEATHER RELATED, WORK
- [ ] CLASS: 201-00 - CLOTHING ACCESSORIES (SEE CLASS 800 FOR SHOES AND BOOTS)
- [ ] CLASS: 204-00 - COMPUTER HARDWARE AND PERIPHERALS AND MICROCOMPUTERS
- [ ] CLASS: 206-00 - COMPUTER HARDWARE AND PERIPHERALS FOR MINI AND MAIN FRAME COMPUTERS
- [ ] CLASS: 207-00 - COMPUTER ACCESSORIES AND SUPPLIES
- [ ] CLASS: 208-00 - COMPUTER SOFTWARE AND MICROCOMPUTERS (PREPROGRAMMED)
- [ ] CLASS: 209-00 - COMPUTER SOFTWARE FOR MINI AND MAINFRAME COMPUTERS (PREPROGRAMMED)
- [ ] CLASS: 220-00 - CONTROLLING, INDICATING, MEASURING, MONITORING, & RECORDING

- [ ] CLASS: 225-00 - COOLERS, DRINKING WATER, (WATER FOUNTAINS)
- [ ] CLASS: 232-00 - CRAFTS, GENERAL
- [ ] CLASS: 233-00 - CRAFTS, SPECIALIZED
- [ ] CLASS: 240-00 - CUTLERY, COOKWARE, DISHES, GLASSWARE, SILVERWARE, UTENSILS, SUPPLIES
- [ ] CLASS: 250-00 - DATA PROCESSING CARDS AND PAPER
- [ ] CLASS: 255-00 - DECALS AND STAMPS
- [ ] CLASS: 265-00 - DRAPERIES, CURTAINS, AND UPHOLSTERY MATERIAL (INCLUDING AUTO)
- [ ] CLASS: 280-00 - ELECTRICAL CABLES AND WIRES (NOT ELECTRONIC)
- [ ] CLASS: 285-00 - ELECTRICAL EQUIPMENT AND SUPPLIES (EXCEPT CABLE AND WIRE)
- [ ] CLASS: 287-00 - ELECTRONIC COMPONENTS, REPLACEMENT PARTS, AND ACCESSORIES
- [ ] CLASS: 310-00 - ENVELOPES, PLAIN
- [ ] CLASS: 315-00 - EPOXY BASED FORMULATIONS FOR ADHESIVES, COATINGS, AND RELATED AGENTS
- [ ] CLASS: 318-00 - FARE COLLECTION EQUIPMENT AND SUPPLIES
- [ ] CLASS: 330-00 - FENCING
- [ ] CLASS: 335-00 - FERTILIZERS AND SOIL CONDITIONERS
- [ ] CLASS: 340-00 - FIRE PROTECTION EQUIPMENT AND SUPPLIES
- [ ] CLASS: 345-00 - FIRST AID AND SAFETY EQUIPMENT AND SUPPLIES
- [ ] CLASS: 350-00 - FLAGS, FLAG POLES, BANNERS, AND ACCESSORIES
- [ ] CLASS: 360-00 - FLOOR COVERING, FLOOR COVERING INSTALLATION AND REMOVAL EQUIPMENT AND SUPPLIES
- [ ] CLASS: 365-00 - FLOOR MAINTENANCE MACHINES, PARTS, AND ACCESSORIES
- [ ] CLASS: 375-00 - FOODS: BAKERY PRODUCTS (FRESH)
- [ ] CLASS: 380-00 - FOODS: DAIRY PRODUCTS (FRESH)
- [ ] CLASS: 385-00 - FOODS, FROZEN
- [ ] CLASS: 390-00 - FOODS: PERISHABLE
- [ ] CLASS: 393-00 - FOODS: STAPLE GROCERY AND GROCER'S MISCELLANEOUS ITEMS
- [ ] CLASS: 395-00 - FORMS, CONTINUOUS, COMPUTER PAPER, FORM LABELS, SNAP-OUT FORMS, AND FOLDERS AND FORMS
- [ ] CLASS: 405-00 - FUEL, OIL, GREASE AND LUBRICANTS
- [ ] CLASS: 410-00 - FURNITURE: HEALTH CARE AND HOSPITAL FACILITY
- [ ] CLASS: 415-00 - FURNITURE: LABORATORY
- [ ] CLASS: 420-00 - FURNITURE: CAFETERIA, CHAPEL, DORMITORY, HOUSEHOLD, LIBRARY, LOUNGE, SCHOOL
- [ ] CLASS: 425-00 - FURNITURE: OFFICE
- [ ] CLASS: 440-00 - GLASS AND GLAZING SUPPLIES
- [ ] CLASS: 445-00 - HAND TOOLS (POWERED AND NON-POWERED), ACCESSORIES & SUPPLIES
- [ ] CLASS: 450-00 - HARDWARE AND RELATED ITEMS
- [ ] CLASS: 460-00 - HOSE, ACCESSORIES, AND SUPPLIES: INDUSTRIAL, COMMERCIAL, AND GARDEN
- [ ] CLASS: 470-00 - HOSPITAL AND RELATED SPECIALIZED EQUIPMENT AND SUPPLIES: MOBILITY, SPEECH IMPAIRED, AND RESTRAINT ITEMS
- [ ] CLASS: 475-00 - HOSPITAL, SURGICAL, AND RELATED MEDICAL ACCESSORIES AND SUNDRY ITEMS
- [ ] CLASS: 485-00 - JANITORIAL SUPPLIES, GENERAL LINE
- [ ] CLASS: 490-00 - LABORATORY EQUIPMENT AND ACCESSORIES

☐ CLASS: 493-00 - LABORATORY EQUIPMENT AND ACCESSORIES: BIOCHEMISTRY, CHEMISTRY, ENVIRONMENTAL SCIENCE, ETC

☐ CLASS: 495-00 - LABORATORY AND FIELD EQUIPMENT AND SUPPLIES: BIOLOGY, BOTANY, GEOLOGY, MICROBIOLOGY, ZOOLOGY, ETC

☐ CLASS: 500-00 - LAUNDRY AND DRY CLEANING EQUIPMENT, ACCESSORIES, PARTS, AND SUPPLIES-COMMERCIAL

☐ CLASS: 515-00 - LAWN MAINTENANCE EQUIPMENT, ACCESSORIES

☐ CLASS: 525-00 - LIBRARY AND ARCHIVAL EQUIPMENT, MACHINES, AND SUPPLIES

☐ CLASS: 530-00 - LUGGAGE, BRIEF CASES, PURSES AND RELATED ITEMS

☐ CLASS: 545-00 - MACHINERY AND HARDWARE, INDUSTRIAL

☐ CLASS: 550-00 - MARKERS, PLAQUES AND TRAFFIC DEVICES

☐ CLASS: 555-00 - MARKING AND STENCILING DEVICES

☐ CLASS: 556-00 - MASS TRANSPORTATION-TRANSIT BUS

☐ CLASS: 557-00 - MASS TRANSPORTATION-TRANSIT BUS ACCESSORIES AND PARTS

☐ CLASS: 560-00 - MATERIAL HANDLING AND STORAGE EQUIPMENT AND ALLIED ITEMS

☐ CLASS: 575-00 - MICROFICHE AND MICROFILM EQUIPMENT, ACCESSORIES, AND SUPPLIES

☐ CLASS: 580-00 - MUSICAL INSTRUMENTS, ACCESSORIES, AND SUPPLIES

☐ CLASS: 590-00 - NOTIONS AND RELATED SEWING ACCESSORIES AND SUPPLIES

☐ CLASS: 595-00 - NURSERY STOCK, EQUIPMENT, AND SUPPLIES

☐ CLASS: 600-00 - OFFICE MACHINES, EQUIPMENT, AND ACCESSORIES

☐ CLASS: 605-00 - OFFICE MECHANICAL AIDS, SMALL MACHINES, AND APPARATUSES

☐ CLASS: 610-00 - OFFICE SUPPLIES: CARBON PAPER AND RIBBONS, ALL TYPES

☐ CLASS: 615-00 - OFFICE SUPPLIES, GENERAL

☐ CLASS: 620-00 - OFFICE SUPPLIES: ERASERS, INKS, LEADS, PENS, PENCILS, ETC

☐ CLASS: 630-00 - PAINT, PROTECTIVE COATINGS, VARNISH, WALLPAPER, AND RELATED PRODUCTS

☐ CLASS: 635-00 - PAINTING EQUIPMENT AND ACCESSORIES

☐ CLASS: 640-00 - PAPER AND PLASTIC PRODUCTS, DISPOSABLE

☐ CLASS: 645-00 - PAPER, FOR OFFICE AND PRINT SHOP USE

☐ CLASS: 650-00 - PARK, PLAYGROUND, RECREATION AREA AND SWIMMING POOL EQUIP

☐ CLASS: 652-00 - PERSONAL HYGIENE AND GROOMING EQUIPMENT AND SUPPLIES

☐ CLASS: 655-00 - PHOTOGRAPHIC EQUIPMENT AND SUPPLIES (NOT INCLUDING GRAPHIC ARTS, AND MICROFILM, AND X-RAY)

☐ CLASS: 658-00 - PIPE, TUBING, AND ACCESSORIES

☐ CLASS: 659-00 - PIPE AND TUBING FITTINGS

☐ CLASS: 665-00 - PLASTICS, RESINS, FIBERGLASS: CONSTRUCTION, FORMING, LAMINATING AND MOLDING EQUIPMENT

☐ CLASS: 670-00 - PLUMBING EQUIPMENT, FIXTURES, AND SUPPLIES

☐ CLASS: 680-00 - POLICE EQUIPMENT AND SUPPLIES

☐ CLASS: 690-00 - POWER GENERATION EQUIPMENT, ACCESSORIES, AND SUPPLIES

☐ CLASS: 691-00 - POWER TRANSMISSION EQUIPMENT (ELECTRICAL, MECHANICAL, AIR AND HYDRAULIC)

☐ CLASS: 700-00 - PRINTING PLANT EQUIPMENT AND SUPPLIES (EXCEPT PAPER)

☐ CLASS: 710-00 - PROSTHETIC DEVICES, HEARING AIDS, AUDITORY TESTING EQUIPMENT, ELECTRONIC READING DEVICES, ETC

☐ CLASS: 715-00 - PUBLICATIONS, AUDIOVISUAL MATERIALS, BOOKS, TEXTBOOKS

☐ CLASS: 720-00 - PUMPING EQUIPMENT AND ACCESSORIES

☐ CLASS: 725-00 - RADIO COMMUNICATION, TELEPHONE, AND TELECOMMUNICATION EQUIPMENT, ACCESSORIES, AND SUPPLIES

☐ CLASS: 730-00 - RADIO COMMUNICATION AND TELECOMMUNICATION TESTING, MEASURING, AND ANALYZING EQUIPMENT, ACCESSORIES AND SUPPLIES

☐ CLASS: 740-00 - REFRIGERATION EQUIPMENT AND ACCESSORIES

☐ CLASS: 745-00 - ROAD AND HIGHWAY BUILDING MATERIALS

☐ CLASS: 770-00 - ROOFING

☐ CLASS: 780-00 - SCALES AND WEIGHING APPARATUS

☐ CLASS: 785-00 - SCHOOL EQUIPMENT AND SUPPLIES

☐ CLASS: 795-00 - SEWING AND TEXTILE MACHINERY, AND ACCESSORIES

☐ CLASS: 801-00 - SIGNS, SIGN MATERIALS, SIGN MAKING EQUIPMENT, AND RELATED SUPPLIES

☐ CLASS: 803-00 - SOUND SYSTEMS, COMPONENTS, AND ACCESSORIES: GROUP INTERCOM, MUSIC, PUBLIC ADDRESS, ETC

☐ CLASS: 805-00 - SPORTING GOODS, ATHLETIC EQUIPMENT AND ATHLETIC FACILITY EQUIPMENT

☐ CLASS: 810-00 - SPRAYING EQUIPMENT

☐ CLASS: 815-00 - STEAM AND HOT WATER FITTINGS, ACCESSORIES, AND SUPPLIES

☐ CLASS: 820-00 - STEAM AND HOT WATER BOILERS AND STEAM HEATING EQUIPMENT

☐ CLASS: 830-00 - TANKS (METAL, WOOD, AND SYNTHETIC MATERIALS)

☐ CLASS: 832-00 - TAPE

☐ CLASS: 838-00 - TELECOMMUNICATIONS EQUIPMENT, ACCESSORIES, AND SUPPLIES

☐ CLASS: 839-00 - TELEPHONE EQUIPMENT, ACCESSORIES, AND SUPPLIES

☐ CLASS: 840-00 - TELEVISION EQUIPMENT AND ACCESSORIES

☐ CLASS: 845-00 - TESTING APPARATUS AND INSTRUMENTS

☐ CLASS: 855-00 - THEATRICAL EQUIPMENT AND SUPPLIES

☐ CLASS: 863-00 - TIRES AND TUBES

☐ CLASS: 870-00 - VENETIAN BLINDS, AWNINGS, AND SHADES

☐ CLASS: 880-00 - VISUAL EDUCATION EQUIPMENT AND SUPPLIES

☐ CLASS: 883-00 - VOICE RESPONSE SYSTEMS

☐ CLASS: 895-00 - WELDING EQUIPMENT AND SUPPLIES

☐ CLASS: 906-00 - ARCHITECTURAL SERVICES, PROFESSIONAL

☐ CLASS: 907-00 - ARCHITECTURAL AND ENGINEERING SERVICES, NON-PROFESSIONAL

☐ CLASS: 908-00 - REBINDING AND REPAIRING SERVICES

☐ CLASS: 909-00 - BUILDING CONTSTRUCTION SERVICES, NEW

☐ CLASS 910-00 - BUILDING MAINTENANCE, INSTALLATION, AND REPAIR SERVICES

☐ CLASS: 912-00 - CONSTRUCTION SERVICES, GENERAL

☐ CLASS: 913-00 - CONSTRUCTION SERVICES, HEAVY

☐ CLASS: 914-00 - CONSTRUCTION SERVICES, TRADE

☐ CLASS: 915-00 - COMMUNICATIONS AND MEDIA RELATED SERVICES

☐ CLASS: 918-00 - CONSULTING SERVICES

☐ CLASS: 920-00 - DATA PROCESSING, COMPUTER, AND SOFTWARE SERVICES

☐ CLASS: 924-00 - EDUCATIONAL SERVICES

☐ CLASS: 925-00 - ENGINEERING SERVICES, PROFESSIONAL

☐ CLASS: 926-00 - ENVIRONMENTAL AND ECOLOGICAL SERVICES

☐ CLASS: 928-00 - EQUIP. MAINT., AND REPAIR SERVICES FOR AUTOMOBILES, TRUCKS, TRAILERS, TRANSIT BUS AND OTHER

	CLASS: 931-00 - EQUIP. MAINT., AND REPAIR SERVICES-APPLIANCE, ATHLETIC, CAFETERIA, FURNITURE, MUSICAL INSTRUMENTS, & SEWING EQUIP.
	CLASS: 936-00 - EQUIP. MAINT., AND REPAIR SERVICES-GENERAL
	CLASS: 939-00 - EQUIP. MAINT., AND REPAIR SERVICES-COMPUTERS, OFFICE, PHOTOGRAPHIC, RADIO/TELEVISION EQUIPMENT
	CLASS: 941-00 - EQUIP. MAINT., REPAIR, AND RELATED SERVICES-POWER GENERATION
	CLASS: 946-00 - FINANCIAL SERVICES
	CLASS: 948-00 - HEALTH RELATED SERVICES
	CLASS: 952-00 - HUMAN SERVICES
	CLASS: 953-00 - INSURANCE, AND INSURANCE SERVICES ALL TYPES
	CLASS: 956-00 - LIBRARY AND SUBSCRIPTION SERVICES
	CLASS: 958-00 - MANAGEMENT SERVICES
	CLASS: 962-00 - MISCELLANEOUS SERVICES, NO. 2
	CLASS: 965-00 - PRINTING PREPARATIONS
	CLASS: 966-00 - PRINTING
	CLASS: 971-00 - REAL PROPERTY RENTAL OR LEASE
	CLASS: 975-00 - RENTAL OR LEASE SERVICES
	CLASS: 977-00 - RENTAL OR LEASE SERVICES OF APPLIANCES
	CLASS: 981-00 - RENTAL OR LEASE OF EQUIPMENT-GENERAL EQUIPMENT
	CLASS: 984-00 - RENTAL OR LEASE OF SERVICES OF COMPUTERS, DATA PROCESSING, AND WORD PROCESSING EQUIPMENT
	CLASS: 985-00 - RENTAL OR LEASE SERVICES OF EQUIPMENT-OFFICE
	CLASS: 988-00 - ROADSIDE, GROUNDS, RECREATIONAL AND PARK AREA SERVICES
	CLASS: 990-00 - SECURITY, FIRE, SAFETY, AND EMERGENCY SERVICES
	CLASS: 992-00 - TESTING AND CALIBRATION SERVICES
	CLASS: 998-00 - SALE OF SURPLUS & OBSOLETE ITEMS

Germantown Municipal School District

6685 Poplar Avenue, Suite 202

Germantown TN 38138

901-752-7900

Jacqueline Saunders, Purchasing Analyst

Jacqueline.Saunders@gmsdk12.org

FAX (901)757-6479

GMSD Vendor/Contractor Application and Information Packet

This packet should be submitted via mail, fax or email. Unless otherwise noted, each section should be completed. If a section is to be omitted, it will be designated with the signature on page 7 (or at the end of the document) of a GMSD District Office employee.

VENDOR/CONTRACTOR INFORMATION

Date of Application:_____ **Business Location(County & State):**_____

Business Name (as listed on W-9):_____

Federal Employer ID Number (as listed on W-9):_____

Mailing Address (as listed on W-9):

_____

_____

_____

Telephone:_____

Fax:_____

Email:_____

Type of Business (Check One) Manufacturer___ Construction___ Distributor___ Agent/Rep___ Other___ (*please specify*_____)

Organization (Check One) Individual___ Partnership___ Corporation___ Non-Profit Org.___

Business Certification Yes___ No___

Uniform Certification Agency Number:_____

(***Please Select Only Those Categories That Apply***)

SMALL BUSINESS ENTERPRISE_____
WOMEN-OWNED BUSINESS_____
MINORITY BUSINESS ENTERPRISE:

Asian/Pacific Female___
Asian/Pacific Male_____
Asian/Indian Female___
Asian/Indian Male_____

Black-Non Hispanic Female___
Black-Non Hispanic Male_____
Black _____
Hispanic Female _____
Hispanic Male _____

Native American Indian/Alaskan Female___
Native American Indian/Alaskan Male_____
White American Female _____
White American Male _____

How Long in Present Business _____
Average Number of Employees_____
Average Annual Sales $_____

LIST OTHER TN CUSTOMERS YOU HAVE SOLD / SERVICED TO:
_____Phone #_____
_____Phone #_____
_____Phone #_____
Approximate Inventory Normally Stocked $_____ (if applicable)

Location of Warehouse Facility:_____ and/or Location of Service Facility:_____

NAMES OF OFFICERS, MEMBERS OR OWNERS, PARTNERSHIP, ETC.:
PRESIDENT:_____
VICE-PRESIDENT:_____
SECRETARY:_____
TREASURER:_____

PERSONS AUTHORIZED TO SIGN BIDS & CONTRACTS:
NAME:_____
OFFICIAL CAPACITY:_____

Note: Each manufacturer, supplier and vendor is responsible for notifying GMSD Purchasing of any change to any/all information listed above.

By requesting to be placed on GMSD's Vendor/Contractor/Bidder's List, each manufacturer, supplier and vendor is agreeing to do business with GMSD. Each manufacturer, supplier, vendor also agrees to extend credit to GMSD without requiring a credit application and to fulfill any Purchase Orders and/or contractual obligation that may occur. If a credit application is required, a submitted bid may be rejected.

DRUG AND ALCOHOL TESTING

Due to the safety-sensitive nature of education, GMSD employees, without limitation, are subject to reasonable suspicion and post-accident drug and alcohol testing. All COMPANIES attest that such COMPANY operates a drug-free workplace program or other drug and alcohol testing program with requirements at least as stringent as that of GMSD. **The COMPANY will attach a copy of their drug and alcohol testing policy.**

BACKGROUND CHECK

By agreeing to provide services to any school within GMSD, the COMPANY attests that it is aware of its obligations under T.C.A. 49-5-413(D) to ensure that all of its employees who have direct contact with students of GMSD or students in GMSD's child care program or who have access to the grounds of GMSD when children are present have completed the following:

(1) Supplied a fingerprint sample and submitted to a criminal history records check conducted by the Tennessee Bureau of Investigation and the Federal Bureau of Investigation prior to having any contact with GMSD's children or entering the grounds of GMSD. T.C.A. 49-5-413(d)(2)(A)

(2) Successfully passed the aforementioned criminal history records check. An employer or employee may not come in direct contact with GMSD's children or children in GMSD's child care program and may not enter the grounds of GMSD when children are present if the criminal history records check indicates that the employee has ever been convicted of any of the following offenses, or the same or similar offense in any jurisdiction, including convictions for the solicitation of, attempt to commit, conspiracy, or acting as an accessory to:

(i) A sexual offense or a violent sexual offense as defined in § 40-39-202;
(ii) Any offense in title 39, chapter 13;
(iii) §§ 39-14-301 and 39-14-302;
(iv) §§ 39-14-401 -- 39-14-404;
(v) §§ 39-15-401 and 39-15-402;
(vi) § 39-17-417;
(vii) § 39-17-1320; or
(viii) Any other offense in title 39, chapter 17, part 13.

In addition, the COMPANY also agrees that if one of its employees commits such an offense after it has conducted its initial criminal history check on such employee, said employee will notify the COMPANY of the offense within seven (7) days from the date of conviction and the COMPANY will subsequently not permit that employee to have contact with students of GMSD or to children in GMSD's child care program or to enter the grounds of GMSD.

The COMPANY shall ensure that subcontractors comply with the statutory requirements described in this background check policy. The COMPANY will attach a copy of their background check policy, including what COMPANY they utilize for background checks.

CODE OF ETHICS

All employees representing the COMPANY are expected to abide by a Code of Ethics for COMPANIES established by GMSD:

1. Any employee representing the COMPANY shall not be in physical, verbal or any other type of contact or communication with any students on GMSD property except as required by the scope of contracted services.

2. The use of tobacco products, drugs or alcohol by any employee representing the COMPANY on GMSD property or during GMSD meetings or events is strictly forbidden.

3. All employees representing the COMPANY shall treat all representatives of GMSD with the utmost respect. Employees will not engage in any conduct that could reasonably be construed as exploitative, physically intimidating, discriminatory, harassing on the basis of gender, race, ethnicity, religion, national origin, sexual orientation, age, or any other protected category. No profanity of any kind will be tolerated on GMSD property.

   The Germantown Municipal School District ("GMSD") conducts its programs, services and activities consistent with applicable federal, state and local laws and regulations. GMSD provides equal employment and educational opportunities to all qualified persons without discrimination on the basis of race, color, national origin (including ancestry, or any other subcategory of national origin recognized by applicable law), religion, sex (including any subcategory of sex recognized by applicable law), age, disability, veteran status, genetic information, or any other basis protected by applicable law in employment and in any program or activity offered or sponsored by GMSD or GMSD schools. Sex discrimination includes sexual harassment and is strictly prohibited.

   The Contractor agrees to conduct its business and to provide services to GMSD in accordance with GMSD policy and all applicable federal, state and local laws and regulations governing discrimination and harassment. The Contractor certifies that it does not discriminate against its employees or applicants on grounds of race, color, religion, national origin, sex, disability, veteran's status, or age with regard to persons forty (40) years of age and older.

4. All employees representing the COMPANY shall abide by all guidelines set at the school level, including, but not limited to parking, checking in and out at the front office, any time an employee of the COMPANY is on campus, and working within the framework of the school and administration of the school to provide services that are least disruptive to the education environment of the school.

5. All employees representing the COMPANY are forbidden from using any technology available at the schools unless they have express written permission from the school administration.

6. In the event that an employee representing the COMPANY is required to take a cell phone call for personal or business reasons, the employee must do so in a manner and setting that causes the least disruption to the educational environment.

7. All employees representing the COMPANY are forbidden from taking photographs, video or footage of any kind on GMSD property without written consent of a School Administrator or the District Office.

8. All employees representing the COMPANY understand that unauthorized removal of any kind will not be tolerated on GMSD property and will be grounds for a request by the District to remove that employee from the property.

9. All employees representing the COMPANY shall represent GMSD in a positive ethical, legal and moral manner.

CONFLICTS OF INTEREST

The employees of the COMPANY shall avoid any conflict of interest that could interfere with the duties and responsibilities designated by the Germantown Municipal School Board or could reflect in a manner detrimental to the system. The following is prohibited:

- Any pecuniary transaction, indirectly or directly, by a professional employee or school board member concerned with supplying books, maps, school furniture, and/or other apparatus to the school system of employment or to act as agent for anyone is expressly forbidden by statute (T.C.A. 49-6-2003).
- Selling items or soliciting money for personal gain or profit during school hours or at an off-campus event attended by students and staff.
- Soliciting, referring, or encouraging students into programs, schools, or universities for personal compensatory gain.

Transactions with parties with whom a conflicting interest exists may be undertaken only if all of the following are observed:

1. The conflicting interest is fully disclosed;
2. The person with the conflict of interest is excluded from the discussion and approval of such transaction;
3. A competitive bid or comparable valuation exists; and
4. The [board or a duly constituted committee thereof] has determined that the transaction is in the best interest of the organization.

Disclosure in the organization should be made to the Superintendent (or if he/she is the one with the conflict, then to the GMSD Board of Education Chair), who shall bring the matter to the attention of the Board or Ethics Committee established in accordance with Policy 1.106 . Disclosure involving Board Members should be made to the GMSD Board of Education Chair, (or if he/she is the one who shall bring these matters to the Board or Ethics Committee. The Board or Ethics Committee shall determine whether a conflict exists and in the case of an existing conflict, whether the contemplated transaction may be authorized. The decision of the Board or Ethics Committee on these matters will rest in their sole discretion, and their concern must be the welfare of Germantown Municipal School District and the advancement of its purpose.

Germantown Municipal School District Policy References

1. Professional Employment HR 5.102
2. Drug-Free Schools SP 6.307
3. Drug and Alcohol Testing for Employees
4. Drug-Free Workplace SBO 1.804
5. Code of Ethics SBO 1.106
6. Tobacco Free Schools SBO 1.803
7. Conflict of Interest HR 5.601

Tennessee State Code Policy References

1. TCA 49-5-413(d)
2. TCA 40-39-202

CONFIDENTIALITY AND NON-DISCLOSURE

All records, documents, files, data and/or information maintained by GMSD shall, at all times remain the sole and exclusive property of GMSD.

The COMPANY agrees that its employees, agents, successors, assigns, legal representatives or subcontractors will not access, use, divulge or disclose, either directly or indirectly, any records, documents, files, data and/or information maintained by GMSD, specifically including but not limited to, student records and information about employees made confidential by law (the "Non-Public Information"), unless and except as required by the COMPANY's scope of services for GMSD or as otherwise required by law. The COMPANY further agrees to take all necessary steps to safeguard private information from accidental or intentional disclosure.

The COMPANY agrees to return to GMSD all records, documents, files, data and/or information; and, all copies thereof in any format in which they may exist, that are in the possession of the COMPANY when the contract terminates and/or the scope of services is complete. Where return is not possible or practical, the PARTIES may agree that such records, documents, files, data and/or information will be destroyed if permitted by law.

The COMPANY shall not assign or transfer any of its contract rights or obligations unless expressly provided by the contract or agreed by prior written consent of Germantown Municipal School District.

HOLD HARMLESS

As a condition precedent to Contractor being awarded contract with GMSD, Contractor hereby agrees to indemnify and hold harmless the Germantown Municipal School District, its board members, administrators, employees, and agents (individually an "Indemnitees") from and against any and all claims, demands, actions, suits, losses, costs, charges, expenses, damages and liabilities whatsoever, whether under federal or state law, which the Indemnitee(s) may pay, sustain, suffer, or incur by reason of or in connection with the services, equipment or products provided by Contractor pursuant to the contract, including, without limiting the generality of the foregoing, all costs and expenses (including legal expenses) incurred in connection with any such loss or damage.

INSURANCE REQUIREMENTS
WITH
GERMANTOWN MUNICIPAL SCHOOL DISTRICT

The COMPANY shall purchase and maintain the insurance outlined below to provide protection from the COMPANY's negligent acts. The COMPANY shall provide this insurance as required by the Contract documents. All Certificates should be issued with an Insurance Company (or Companies) maintaining an AM Best Rating of A- or better and a Financial Size of IX or greater. All Insurance Companies shall be authorized to conduct business in the State of Tennessee. The negligence by any subcontractor, by anyone directly or indirectly employed by any of them, shall be considered a negligent act of the COMPANY.

- Commercial General Liability Insurance in the amount of $1,000,000 per occurrence. This must include Products/Completed Operations, Explosion/Collapse/Underground Coverage and Contractual Liability. The Germantown Municipal School District must be named Additional Insured using a CG 2010 (11/85) endorsement (or equivalent) and this must be noted on the Certificate of Insurance. The Insurance Company agrees to waive their Right of Subrogation against the Germantown Municipal School District and this must be noted on the Certificate of Insurance.
- Auto Liability Insurance in the amount of $1,000,000 Combined Single Limit. The Germantown Municipal School District must be named Additional Insured and the Insurance Company agrees to waive their Right of Subrogation against the Germantown Municipal School District and this must be noted on the Certificate of Insurance.
- Statutory Workers Compensation with Employers Liability- the Insurance Company agrees to waive their Right of Subrogation against the Germantown Municipal School District and this must be noted on the Certificate of Insurance.
- Umbrella Liability in the amount of $2,000,000 per occurrence- the terms and conditions of the Umbrella must conform to the primary insurance.

The Cancellation Clause on the Certificate of Insurance is amended to read: Should any of the described policies on the attached Certificate of Insurance be cancelled, non-renewed or reduced in coverage- the issuing Insurance Company will mail 30 days written notice by registered mail, return receipt requested, or email to:

Germantown Municipal School District
ATTN: Jacqueline Saunders
6685 Poplar Avenue
Suite 202
Germantown TN 38138

The Company agrees that it shall maintain the above insurance through both final acceptance and any Warranty Period defined by the contract documents.

I have read the aforementioned terms set forth by GMSD and attest I have reviewed the TCA statutes and Board policies referenced in this document. My signature below indicates my company and its representatives agree to abide by all the terms set forth in this agreement.

If any provision of this Agreement shall be held by a court of competent jurisdiction to be unenforceable, the remaining provisions shall remain in full force and effect.

I understand that for this application to be complete, my company must also submit:

_____ *Completed W-9*
_____ *Certificate of Insurance (listing GMSD—6685 Poplar Avenue, Suite 202, Germantown TN 38138-- as Additional Insured)*
_____ *Copy of Drug and Alcohol Policy*
_____ *Copy of Background Check Policy and Company Utilizing*

_____
Signature

_____
Name (Please Print)

_____
Title

District Office Signature: _____

Raptor may be used in lieu of Background Check Requirements _____
No COI required for this submission _____

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

▶ **Go to *www.irs.gov/FormW9* for instructions and the latest information.**

Give Form to the requester. Do not send to the IRS.

Print or type. See **Specific Instructions** on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only **one** of the following seven boxes.

☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN,* later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number

			–		–				

or

Employer identification number

		–							

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here **Signature of U.S. person** ▶ **Date** ▶

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9.*

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, *later.*

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),

2. Certify that you are not subject to backup withholding, or

3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and

4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting,* later, for further information.

Note: If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States.

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Pub. 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items.

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.

2. The treaty article addressing the income.

3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.

4. The type and amount of income that qualifies for the exemption from tax.

5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 24% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,

2. You do not certify your TIN when required (see the instructions for Part II for details),

3. The IRS tells the requester that you furnished an incorrect TIN,

4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or

5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code,* later, and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships,* earlier.

What is FATCA Reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code,* later, and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of $50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a $500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account (other than an account maintained by a foreign financial institution (FFI)), list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9. If you are providing Form W-9 to an FFI to document a joint account, each holder of the account that is a U.S. person must provide a Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note: ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C corporation, or S corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box on line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box on line 3.

IF the entity/person on line 1 is a(n) . . .	THEN check the box for . . .
• Corporation	Corporation
• Individual • Sole proprietorship, or • Single-member limited liability company (LLC) owned by an individual and disregarded for U.S. federal tax purposes.	Individual/sole proprietor or single-member LLC
• LLC treated as a partnership for U.S. federal tax purposes, • LLC that has filed Form 8832 or 2553 to be taxed as a corporation, or • LLC that is disregarded as an entity separate from its owner but the owner is another LLC that is not disregarded for U.S. federal tax purposes.	Limited liability company and enter the appropriate tax classification. (P= Partnership; C= C corporation; or S= S corporation)
• Partnership	Partnership
• Trust/estate	Trust/estate

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space on line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)

2—The United States or any of its agencies or instrumentalities

3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

4—A foreign government or any of its political subdivisions, agencies, or instrumentalities

5—A corporation

6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession

7—A futures commission merchant registered with the Commodity Futures Trading Commission

8—A real estate investment trust

9—An entity registered at all times during the tax year under the Investment Company Act of 1940

10—A common trust fund operated by a bank under section 584(a)

11—A financial institution

12—A middleman known in the investment community as a nominee or custodian

13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over $600 required to be reported and direct sales over $5,000[1]	Generally, exempt payees 1 through 5[2]
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

[1] See Form 1099-MISC, Miscellaneous Income, and its instructions.

[2] However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note: You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns. If this address differs from the one the requester already has on file, write NEW at the top. If a new address is provided, there is still a chance the old address will be used until the payor changes your address in their records.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN.

If you are a single-member LLC that is disregarded as an entity separate from its owner, enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note: See *What Name and Number To Give the Requester,* later, for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at *www.SSA.gov*. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at *www.irs.gov/Businesses* and clicking on Employer Identification Number (EIN) under Starting a Business. Go to *www.irs.gov/Forms* to view, download, or print Form W-7 and/or Form SS-4. Or, you can go to *www.irs.gov/OrderForms* to place an order and have Form W-7 and/or SS-4 mailed to you within 10 business days.

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note: Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if item 1, 4, or 5 below indicates otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code,* earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), ABLE accounts (under section 529A), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account) other than an account maintained by an FFI	The actual owner of the account or, if combined funds, the first individual on the account[1]
3. Two or more U.S. persons (joint account maintained by an FFI)	Each holder of the account
4. Custodial account of a minor (Uniform Gift to Minors Act)	The minor[2]
5. a. The usual revocable savings trust (grantor is also trustee) b. So-called trust account that is not a legal or valid trust under state law	The grantor-trustee[1] The actual owner[1]
6. Sole proprietorship or disregarded entity owned by an individual	The owner[3]
7. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	**Give name and EIN of:**
8. Disregarded entity not owned by an individual	The owner
9. A valid trust, estate, or pension trust	Legal entity[4]
10. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
11. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
12. Partnership or multi-member LLC	The partnership
13. A broker or registered nominee	The broker or nominee
14. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
15. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

[1] List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

[2] Circle the minor's name and furnish the minor's SSN.

[3] You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

[4] List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships,* earlier.

***Note:** The grantor also must provide a Form W-9 to trustee of trust.

Note: If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records From Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Pub. 5027, Identity Theft Information for Taxpayers.

Victims of identity theft who are experiencing economic harm or a systemic problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes. Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to *phishing@irs.gov.* You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at *spam@uce.gov* or report them at *www.ftc.gov/complaint.* You can contact the FTC at *www.ftc.gov/idtheft* or 877-IDTHEFT (877-438-4338). If you have been the victim of identity theft, see *www.IdentityTheft.gov* and Pub. 5027.

Visit *www.irs.gov/IdentityTheft* to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.