

# **APPENDIX H**

# **TECHNICAL SPECIFICATIONS**

## SECTION 012300 - ALTERNATES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

## 1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
  - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

## 1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other work of the Contract.
- C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

## 3.1 SCHEDULE OF ALTERNATES

## A. Alternate No. 1: Replace Stairs and Ramp.

1. Base Bid: None
2. Alternate: All work as required to renovate the exterior ramp and stairs as indicated on C-100, C-101, and C-501 and corresponding Specifications.

## B. Alternate No. 2: Renovate Kitchen.

1. Base Bid: Hot water supply lines from hot water tank to be installed to kitchen.
2. Alternate: All work as required to renovate the kitchen as indicated in AD-101, A-403, ED-101, E-102, M-101, PD-101, P-101, K-101 and corresponding Specifications

END OF SECTION 012300

## SECTION 028213 - ASBESTOS ABATEMENT

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. This Section specifies the procedures for removal of existing asbestos-containing materials (ACM) in a structure to be demolished and disposal of removed materials. The demolition of the structure will be by the General Construction Work Contract. The results of the testing for ACM are listed in Documents 003126.
  - 1. The report was compiled by an ELAP certified laboratory.
  - 2. In order to determine asbestos content, samples were analyzed by polarized light microscopy (PLM) and/or transmission electron microscopy (TEM).
  - 3. The report is intended for State Design and estimate purposes only, and is included to provide bidders with the same information available to the State.
  - 4. The report is available as Attachment A to this specification section.
  - 5. The Bulk Samples are representative of like materials in the Work area. All ACM may not have been sampled.
  
- B. Type of Asbestos Abatement Project:
  - 1. Large Asbestos Abatement Project: An asbestos project involving the removal, disturbance, repair or handling of more than 160 square feet or 260 linear feet of ACM.

#### 1.02 REFERENCES

- A. New York State Department of Environmental Conservation (DEC) 6NYCRR:
  - 1. Part 360 Solid Waste Management Facilities.
  - 2. Part 364 Waste Transporter Permits.
  - 3. Part 370 Hazardous Waste Management System-General.
  - 4. Part 371 Identification and Listing of Hazardous Wastes.
  - 5. Part 372 Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities.
  - 6. Part 373 Hazardous Waste Management Facilities.
  
- B. Occupational Safety and Health Administration (OSHA): Asbestos Regulations (29 CFR Part 1926.1101).
  
- C. U.S. Environmental Protection Agency (USEPA):
  - 1. National Emission Standards for Hazardous Air Pollutants; Asbestos NESHAP Revision; Final Rule.
  - 2. Asbestos Emergency Response Act (AHERA) (40 CFR Part 763, Subpart E).
  
- D. New York State Department of Labor (DOL): Industrial Code Rule 56.

#### 1.04 DEFINITIONS

- A. Authorized Personnel: Facility or the Director's Representative, and all other personnel who are authorized officials of any regulating agency, be it state, local, federal, or private entity who possess legal authority for enforcement or inspection of the work.
- B. Clearance Criteria: Shall be determined and established by a Certified Asbestos Project Monitor with an independent testing lab employed by the Director's Representative, conforming to all standards set forth by all authorities having jurisdiction, mentioned in the references, and issue the certification of cleaning.
- C. Site Specific Variance: Relief in accordance with section 30 of the Labor Law from specific sections of Industrial Code Rule 56 for a specific project.
- D. Phase I & II: Asbestos Project phases as defined and subcategorized in ICR 56-2.

#### 1.05 ABBREVIATIONS

- A. ASTM: American Society for Testing and Materials  
1916 Race Street  
Philadelphia, PA 19103
- B. CFR: Code of Federal Regulations  
Government Printing Office  
Washington, DC 20402
- C. DOL: New York State Department of Labor  
Harriman State Office Building Campus  
Albany, NY 12240
- D. NIOSH: National Institute for Occupational Safety and Health  
Building J.N.E. Room 3007  
Atlanta, GA 30333
- E. OSHA: Occupational Safety and Health Administration  
200 Constitution Avenue  
Washington, DC 20210
- F. USEPA: United States Environmental Protection Agency  
401 M Street SW  
Washington, DC 20460

#### 1.06 ASBESTOS SITE SPECIFIC VARIANCE

- A. If a site-specific variance is sought, the application must be submitted by the contractor's NYS DOL Certified Asbestos Project Designer with 14 days after the Contract Agreement is approved by the Comptroller. Forward the required forms to the Department of Labor for their action.

## 1.07 SUBMITTALS

- A. Product Data: Catalog sheets, specifications and installation instructions for each item specified.
- B. Asbestos Site Specific Variance Submittals; if a site specific variance is sought submit the following:
  - 1. One copy of the completed DOSH-751 and DOSH-465 forms.
  - 2. One copy of the New York State Department of Labor site-specific variance decision.
- C. Quality Control Submittals:
  - 1. Notification Compliance Data: Within 2 days after notification is sent to the regulatory agencies submit one copy of each notice sent to each regulatory agency (USEPA and DOL).
  - 2. Asbestos Removal Company Data: Name and address of proposed asbestos removal company and abatement contractor license issued by DOL.
  - 3. Asbestos Worker Certification Data: Name and address of proposed asbestos abatement workers and licenses issued by DOL.
  - 4. Work Plan: For information only, submit one copy of the work plan required under Quality Assurance Article.
  - 5. Waste Transporter Permit: One copy of transporter's current waste transporter permit from NYS DEC (NYS Part 364 Permit).
  - 6. Landfill: Landfill to be used for ACM disposal shall be licensed to receive asbestos waste by NYS DEC (NYS Part 360 Permit) and by USEPA. Out of state landfills shall provide licenses from local agencies having jurisdiction.
  - 7. Negative Air Pressure Equipment: Copy of manufacturer's and performance data of all units and HEPA filters used.
- D. Asbestos Work Closeout Submittals:
  - 1. Waste Shipment Records and Disposal Site Receipts: Copy of waste shipment record and disposal site receipt showing that the ACM has been properly disposed.
    - a. Waste shipment record and disposal site receipt must be received within 35 days of the ACM waste leaving the Site. If receipts are not received within the specified time period, the Director's Representative will notify USEPA in writing within 45 days of the ACM waste leaving the Site.
- E. Contract Closeout Submittals:
  - 1. Daily Log: Submit copy of Project Monitor's daily air sample log and a copy of Asbestos Abatement Contractor's Daily project log.
  - 2. Air Monitoring Data: Submit copy of air test results and chain of custody.

## 1.08 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the referenced standards.

- B. Pre-Work Conference: Before the Work of this Section is scheduled to commence, a conference will be held by the Director's Representative at the Site for the purpose of reviewing the Contract Documents, discussing requirements for the Work, and reviewing the Work procedures.
  - 1. The conference shall be attended by the Contractor, the asbestos removal subcontractor, and the testing laboratory employed by the Director.
- C. Work Plan: At the conclusion of the pre-work conference, before the physical abatement Work begins, prepare a detailed work plan.
  - 1. The work plan shall include, but not be limited to, work procedures, types of equipment, details of equipment used, decontamination unit locations, crew size, and emergency procedures for fire and medical emergencies and for failure of containment barriers.
  - 2. If a site-specific variance is sought, do not finalize the work plan until the Department of Labor decision is received.

#### 1.09 PROJECT CONDITIONS

- A. In addition to the postings required by law, post at the entrance to the abatement area the following documents:
  - 1. Copy of the printed Work plan.
  - 2. Copy of Industrial Code Rule 56.
- B. Shut-down of Air Handling System: Complete the Work of this Section within the time limitation allowed for shutdown of the air handling system serving the work area.
  - 1. The air handling system will not be restarted until approval of the air monitoring tests following the last cleaning.
  - 2. If total shut down of the system is not acceptable, follow all regulations for local isolation and provision for temporary HVAC as per DOL regulations.
- C. Maintain electric services to those portions of the building and remaining facility not a part of the asbestos abatement work area at all times. Follow all regulations for electric power shut down exemptions as per DOL regulations.
- D. Do not obstruct any aisle or passageway so as to reduce its required width as an exit.

#### 1.10 HEALTH AND SAFETY

- A. Where in the performance of the work, workers, supervisory personnel or subcontractors may encounter, disturb, or otherwise function in the immediate vicinity of contaminated items and materials, all personnel shall take appropriate continuous measures as necessary to protect all ancillary building occupants from the potential ACM exposure.
  - 1. Such measures shall include the procedures and methods described herein and shall be in compliance with all applicable regulations of federal, state and local agencies.

#### 1.11 FIRE PROTECTION, EMERGENCY EGRESS AND SECURITY

- A. Establish emergency and fire exits from the work area containment. Provide first aid kits and two full sets of protective clothing and respirators for use by qualified emergency personnel outside of the work area.
- B. Provide a logbook throughout the entire term of the project. All persons who enter the regulated abatement work area or enclosure shall sign the logbook. Document any intrusion or incident in the logbook.

#### 1.12 PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT

- A. Workers must wear personal protective equipment for all projects as per OSHA and DOL regulations. Provide respiratory protection in accordance with OSHA regulation 1910.134 and ANSI Z88.2.
- B. Workers must be trained as per OSHA and DOL requirements, have medical clearance and must have recently received pulmonary function test (PFT) and respirator fit tested by a trained professional.
  - 1. A personal air-sampling program shall be in place as required by OSHA.
  - 2. The use of respirators must also follow a complete respiratory protection program as specified by OSHA.

### PART 2 PRODUCTS

#### 2.01 DISPOSAL BAGS

- A. Type: Minimum 6 mil thick, black, and preprinted with a Caution Label.

#### 2.02 EQUIPMENT

- A. Temporary lighting, heating, hot water heating units, ground fault interrupters, and all other equipment on site shall be UL listed.
- B. All electrical equipment shall be in compliance with the National Electric Code, Article 305 - Temporary Wiring.

#### 2.03 FIREPROOFING

- A. Non-asbestos containing, compatible with the approved fireproofing system and classified as part of the Underwriters Laboratories (UL) listed system.

#### 2.04 GLOVE BAGS

- A. Type: Minimum 6 mil thick, clear, fire retardant polyethylene. Select glove bag sizes appropriate for the size and location of the project.



## 2.05 NEGATIVE AIR PRESSURE UNITS

- A. Type: Local exhaust system, capable of maintaining negative air pressure within the containment, and provides for HEPA filtration of efficiency not less than 99.97 percent with 0.3 micron particles. Equip the unit with filter alarms lights and operation time meter.

## 2.06 PLASTIC SHEETS

- A. Type: Minimum 6 mil thick, clear, fire retardant polyethylene.

## 2.07 RESPIRATORS

- A. Type: As approved by the Mine Safety and Health Administration (MSHA), Department of Labor, or the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

## 2.08 VACUUM CLEANERS

- A. Type: Vacuums equipped with HEPA filters.

## PART 3 EXECUTION

### 3.01 ASBESTOS-CONTAINING MATERIAL HANDLING AND REMOVAL PROCEDURES

- A. Comply with the standards referenced in Part 1 of this Section.

### 3.02 CLEAN UP PROCEDURES

- A. Comply with the standards referenced in Part 1 of this Section.

### 3.03 PROJECT AIR SAMPLING, MONITORING AND ANALYSIS

- A. Air Sampling and Analysis: The Director will employ the services of an independent testing laboratory to perform air sample monitoring. The laboratory shall use the methods described in standards referenced in Part 1 of this Section.
  1. The equipment, duration, flow rate, calibration of equipment, number and location of samples are as per ICR 56-4.
  2. Air sampling technician shall be on site to observe and maintain air-sampling equipment for the duration of the air sampling collection.
  3. Period of time permitted between completion of air sample collection and receipt of results on the project site shall be equal or less than 48 hours.
- B. If air samples collected outside the regulated work area indicate airborne fiber concentrations at or above 0.01 fibers per cubic centimeter, or the established background level, whichever is greater, work shall stop immediately for inspection of barriers and negative air ventilation systems. Clean up surfaces

outside the regulated work area using HEPA filter equipped vacuums and wet cleaning methods. Work methods shall be altered to reduce fiber concentrations to acceptable levels.

- C. Elevated air sample results, if any, along with background and all other air sample results collected during Phase IIA through Phase IIC shall be submitted to the Commissioner of appropriate Asbestos Control Bureau within the same business day of receipt of results.

### 3.04 FINAL CLEANING AND CLEARANCE PROCEDURES

- A. Negative Pressure Ventilation: Negative air pressure machines if used, shall remain in continuous operation during the entire length of the project.
- B. Cleaning and Visual Inspection: After first, second, third cleaning and required waiting/settling and drying periods, perform a final visual inspection.
  - 1. Final clearance air sampling shall commence after the waiting/settling and drying time as per ICR 56 has elapsed.
- C. Project Monitor Visual Inspection: The Director will employ the services of a DOL certified asbestos project monitor employed by an independent testing laboratory to perform visual inspection as required by ICR 56.
- D. Final Clearance Air Sampling: The Director will employ the services of an independent testing laboratory to perform final air sampling.
  - 1. The laboratory shall use the methods described in standards referenced in Part 1 of this Section.
  - 2. The equipment, duration, flow rate, calibration of equipment, number and location of samples are as per ICR 56-4.
  - 3. If initial Post-Abatement (Clearance Air) Monitoring results do not comply with the standards referenced in Part 1 of this Section the Contractor shall either re-clean or order a full set of TEM analysis.
    - a. Results of the TEM analysis will be conclusive, and if the results do not comply with the standards referenced in Part 1 of this Section, the Contractor shall re-clean and additional full set of air samples will be collected and analyzed until the standards are met.
    - b. All satisfactory PCM clearance air sample results along with background air sample results, if they are greater than or equal to 0.01 fibers per cubic centimeter, shall be submitted to the Commissioner of appropriate Asbestos Control Bureau within two business days of receipt of satisfactory clearance air results.
    - c. All satisfactory TEM results of previously unsatisfactory PCM clearance air sample results, along with the unsatisfactory PCM results shall be submitted to the Commissioner of appropriate Asbestos Control Bureau within two business days of receipt of satisfactory clearance air results.
  - 4. Prior to removal of isolation barriers the Director's Representative at the site will receive an affidavit from the air monitoring laboratory certifying the final air samples comply with the standards referenced in Part 1 of this Section.

- E. Dismantling of Regulated Abatement Work Area:
1. Remove all tools and equipment after proper decontamination as per Part 1 of this section.
  2. Dismantle and remove each tent enclosure and air lock and any barriers only after final clearance air monitoring has been performed and satisfactory results obtained.
  3. All remaining polyethylene, duct tape, expandable foam and other barrier materials shall be bagged, wrapped, containerized and labeled as asbestos waste.
  4. Remove all temporary hard walled barriers from site.
  5. Dismantle any remote decontamination units and plastic sheeting shall be disposed as asbestos waste.
  6. Remove all waste generated to the holding area, lockable trailer or dumpster.
  7. Contractor's Supervisor shall certify in writing to the Director that abatement work is complete and no debris/residue remains.

### 3.05 DISPOSAL OF ASBESTOS-CONTAINING MATERIAL AND RELATED DEBRIS

- A. Remove all waste generated as part of the asbestos project from the project site within ten calendar days from the site after completion of Phase IIC of the project or within one day of the waste disposal container/trailer becomes full, whichever occurs first.
- B. Transport and dispose of all the asbestos-containing waste, related debris, and wastewater to the approved disposal site.
- C. All generated waste removed from the site must be documented, accounted for and disposed of in compliance with the requirements of USEPA NESHAP.
- D. Comply also with the standards referenced in Part 1 of this Section.

### 3.06 RESTORATION

- A. Remove temporary decontamination facilities and restore area designated for these facilities to its original condition or better.
- B. Where existing work is damaged or contaminated, restore work to its original condition or better.

END OF SECTION 028231

Attachment A – Asbestos Survey Report

**REPORT FOR ENVIRONMENTAL INSPECTION SERVICES  
JAY COMMUNITY CENTER  
EMERGENCY SHELTER PROJECT  
11 SCHOOL LANE  
AU SABLE FORKS, NY 12912**



**Prepared For:**



**Bureau of Environmental Review and Assessment**  
Governor's Office of Storm Recovery  
25 Beaver Street, 5<sup>th</sup> Floor  
New York, NY 10004

**Prepared By:**



**Louis Berger**

96 Morton Street, 8 Floor  
New York, New York 10014

Report Submission  
Date: 6/4/2018

G.O.S.R. Task Order # 26  
Louis Berger U.S. Project # 2004232.026



**Louis Berger**

96 Morton Street, 8<sup>th</sup> Floor, New York, NY 10014  
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June 1, 2018

Ms. Amy Lentz  
Bureau of Environmental Review and Assessment  
Governor's Office of Storm Recovery  
25 Beaver Street, 5th Floor  
New York, NY 10004

Subject: **REPORT OF ENVIRONMENTAL INSPECTION SERVICES  
JAY COMMUNITY CENTER  
11 SCHOOL LANE  
AU SABLE FORKS, NY 12912  
GOSR Task Order # 26  
Louis Berger US Project # 2004232.026**

Dear Ms. Lentz,

Louis Berger U.S. Inc. (LB) has completed a limited material survey at Jay Community Center located at 11 School Lane, Au Sable Forks, NY based on the proposed scope of work as described by e-mail from the Governor's Office of Storm Recovery (GOSR) and on site by town supervisor Archie Depo. The survey included visual observation, material sampling, and laboratory sample analysis of suspect Asbestos Containing Materials (ACM) and Lead Based Paints (LBP).

The attached report presents descriptions and results of the material sampling procedures, and analysis. Relevant general project information is provided, followed by our findings, assessments and recommendations. Laboratory analysis data and certifications are provided in the Appendices.

If you have any questions concerning this report or if we may be of further assistance to you, please contact us.

Sincerely,

**LOUIS BERGER U.S., Inc.**

Prakash K. Saha  
Associate Vice President, Emergency Management & IH Services



# Report of Environmental Survey Services

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# Report of Environmental Survey Services

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## 1.0 EXECUTIVE SUMMARY

Louis Berger U.S. Inc., has performed an inspection for the presence or absence of Asbestos-Containing Materials (ACM) and Lead Based Paints (LBP) at the Jay Community Center located at 11 School Lane, Au Sable Forks, NY. The survey was conducted at the request of the Governor's Office of Storm Recovery (GOSR). The intent of this survey was to locate, identify and quantify asbestos-containing materials and lead-based paints that will be affected by the proposed scope of work as described by e-mail from the Governor's Office of Storm Recovery (GOSR) and on site by town supervisor Archie Depo.

Jeffrey Leed (NYS DOL #09-00446) (USEPA LBP-R-128763-1) conducted this survey on May 23, 2018.

### A. ASBESTOS-CONTAINING MATERIALS

Analytical results of bulk samples collected by LBUS indicate the following materials contain **asbestos** (greater than 1%):

- **Mastic to Bottom Layer Floor Tile – Black**
- **Mastic to Linoleum – Gray**
- **Linoleum – Brown**
- **Rope Gasket to Old Boiler – Gray**

Analytical results of bulk samples collected by LBUS indicated that the following materials did not contain asbestos (less than 1%):

- Wall Plaster – Brown Coat
- Wall Plaster – White Coat
- Ceiling Plaster – Brown Coat
- Ceiling Plaster – White Coat
- 2'X4' Ceiling Tile – Fissure – White
- Ceramic Floor Tile – Grout/Mortar – Gray
- Ceramic Wall Tile – Mortar – Gray
- Ceramic Wall Tile – Grout – White
- Joint Compound Assoc. with Sheetrock – White
- Tape Associated with Sheetrock – White
- Sheetrock – Gray
- Floor Tile – Bottom Layer – White
- 12"x12" Floor Tile – Top Layer - Beige
- Mastic to 4" Cove Base – Tan
- 4" Cove Base – Brown
- Fire Brick to Old Boiler – Red
- Hatch Sealant to Old Boiler – Red





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- Rope Gasket to New Boiler Ribs – White
- Interior Brick Mortar – Gray
- Pipe Elbow to Fiberglass Pipes - Gray
- Brick Mortar to Exterior Steps at Main Entry – Gray

Due to inaccessibility for sampling, the following materials were **assumed to contain asbestos**:

- No materials were assumed by LB's investigator during this limited survey.

## **B. LEAD-BASED PAINTS**

XRF shots collected indicate that the following testing combinations **are coated with lead-based paint** (greater than or equal to 1 mg/cm<sup>2</sup>);

- **White Tile Wall – Lower – Ladies Room**
- **White Tile Wall – Lower – Ladies Room**
- **White Tile Wall – Lower – Ladies Room**
- **White Tile Wall – Lower – Men's Room**
- **White Tile Wall – Lower – Men's Room**
- **White Tile Wall – Lower – Men's Room**
- **White Tile Wall – Lower – Men's Room**
- **White Tile Wall – Lower – Men's Room**
- **Gray Metal Door – Boiler Room**

XRF shots collected indicate that the following testing combinations are not coated with lead-based paint (less than 1 mg/cm<sup>2</sup>);

- White Plaster Wall – Kitchen
- White Plaster Wall – Kitchen
- White Plaster Wall – Kitchen
- White Plaster Wall – Kitchen
- Brown Wood Door – Kitchen
- White Wood Door Frame – Kitchen
- White Metal Window Sash – Kitchen
- Beige Wood Door Saddle – Kitchen
- Yellow Wood Cabinet – Kitchen
- Brown Wood Wall w/ Kitchen – Dining Room
- White Plaster Wall – Upper – Ladies Room
- White Plaster Wall – Upper – Ladies Room
- White Plaster Wall – Upper – Ladies Room
- White Metal Stall – Ladies Room
- White Metal Window – Ladies Room



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- White Wood Door – Ladies Room
- Beige Plaster Wall – Upper – Ladies Room
- White Plaster Wall – Upper – Men's Room
- White Plaster Wall – Upper – Men's Room
- White Plaster Wall – Upper – Men's Room
- White Plaster Wall – Upper – Men's Room
- White Metal Window – Men's Room
- Brown Wood Door – Men's Room
- Gray Metal Door Frame – Men's Room
- White Metal Stall – Men's Room
- White Concrete Wall – Boiler Room
- White Concrete Wall – Boiler Room
- White Concrete Wall – Boiler Room
- White Concrete Wall – Boiler Room
- Black Metal Ramp Handrail – Exterior

## 2.0 FIELD SURVEY PROCEDURES AND SAMPLE ANALYSIS METHODS

### **ASBESTOS CONTAINING MATERIALS**

Guidelines used for the inspection were established by the Environmental Protection Agency (EPA) in the Guidance for Controlling Asbestos Containing Materials in Buildings, Office of Pesticides and Toxic Substances, Doc 560/5-85-024, and 40 CFR Part 763, Asbestos Hazard Emergency Response Act (AHERA).

Field information was organized in accordance with the AHERA methodology of homogenous area (HA). During the survey, reasonable effort was made to identify all locations and types of ACM materials associated with the scope of work. Sampling has included multiple samples of the same materials chosen at random. However, due to inconsistencies of a manufacturer's processes and the contractor's installation methods, materials of similar construction may contain various amounts of asbestos. Furthermore, some materials that were not originally specified to contain asbestos may in fact contain this mineral. For example, cementitious pipe insulation and plaster were frequently mixed with asbestos at the construction site for ease of application. Locating all asbestos materials can only be definitively achieved by conducting exploratory demolition and sampling every section of pipe insulation, fitting or valve covering, fireproofing, and other suspect ACM.

Bulk samples of suspect ACM are analyzed using polarized light microscopy (PLM) coupled with dispersion staining, as described in 40 CFR Part 763 and the National Emissions Standard for Hazardous Air Pollutants (NESHAPS). NESHAPS is the standard industry protocol for the determination of asbestos in building materials. A suspect material is immersed in a solution of known refractive index and subjected to illumination by polarized light. The color displays that result are compared to a



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standardized atlas whereby the specific variety of asbestos is determined. It should also be recognized that PLM is primarily a qualitative identification method whereby asbestos percentage, if any, is estimated. While EPA and New York State regulations governing ACM consider materials containing greater than 1-percent as asbestos, accurately quantifying asbestos content below 5-percent has been shown to be unreliable.

The New York State Department of Health has recently revised the PLM Stratified Point Counting Method. The March 25, 2011 method, "Polarized Light Microscopy Methods for Identifying and Quantifying Asbestos in Bulk Samples" can be found as Item 198.1 in the Environmental Laboratory Approval program (ELAP) Certification manual. Whereas the procedure of analysis for bulk samples that falls into the category of "Non-friable Organically Bound" (NOB) can be found in the March 25, 2011 method "Polarized-Light Microscope Method for Identifying and Quantifying Asbestos in Non-Friable Organically Bound Bulk Samples", Item 198.6 in the ELAP Certification Manual. This category includes any sample in a flexible to rigid asphalt or vinyl matrix (floor tiles, mastic, roofing shingles, roofing felt, etc.). These samples must be "ashed" in a muffle furnace at 480-degrees Celsius (to remove organic matrix), treated with acid (to remove any mineral carbonate), and filtered through a 0.4-micron polycarbonate filter before being analyzed by PLM. The sample must be weighted between each of these steps to track the percent loss of organic matrix.

ELAP has determined that analysis of NOB materials is not reliably performed by PLM. Therefore, if PLM analysis yields results of 1-percent asbestos or less, the result must be confirmed by TEM. For bulk samples that undergo TEM analysis, the March 25th, 2011 method "Transmission Electron Microscope Method for Identifying and Quantitating Asbestos in Non-Friable organically Bound Bulk Samples" must be used and can be found as Item 198.4 in the ELAP Certification Manual. ELAP certified laboratories must include the following statement with their PLM analysis results for each "negative" (1-percent or less asbestos) NOB sample: "Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Before this material can be considered or treated as non-ACM, confirmation must be made by quantitative transmission electron microscopy".

All samples are initially analyzed by Polarized Light Microscopy in accordance with Item 198.1 and 198.6 of the ELAP Certification Manual. Samples which yielded a negative PLM result and which are classified as a "non-friable" material are then re-analyzed utilizing TEM methodology in accordance with Item 198.4 of the ELAP Certification Manual.

Laboratory analysis was performed by AmeriSci New York, located at 117 East 30th Street, New York, New York. AmeriSci National Voluntary Laboratory Accreditation Program (NVLAP) accreditation number is 200546-0 and their New York State Environmental Laboratory Approval Program (ELAP) number is 11480.



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## **LEAD BASED PAINT**

All accessible spaces and surfaces within the proposed work area were inspected. Painted surfaces within the space equivalents were identified and grouped together by component type, substrate and visible color. In similar fashion, the inspection continued in each space equivalent with the identification of unique combinations of component, substrate and visible color. A random representative area of each unique combination was sampled and tested in each room equivalent. For each of these designated components, an area on the component was chosen which represents the paint on that building component. During the inspection, components that are accessible surfaces, friction surfaces, impact surfaces, or have deteriorated paint was identified.

The readings of paint surfaces were taken using an RMD LPA-1 XRF Lead Paint Spectrum Analyzer. The LPA-1 method of measurement is based on the spectrometric analysis of lead K-shell X-ray fluorescence within a controlled depth of interrogation. The LPA-1 Analyzer uses a Co-57 radioactive source and an advanced, solid-state, room temperature, radiation detector to generate and detect the x-ray fluorescence spectrum of a painted surface. The spectrum is then analyzed by a microprocessor to eliminate the effects of substrate and other factors such as scattering to allow an accurate determination of the amount of lead on a surface. The LPA-1 automatically analyzes spectrometric data in real time and differentiates the lead signal from the spectrum. The x-ray fluorescence properties are determined through calibration process and are used for automatic substrate correction and calculation of the lead content of a painted surface.



# Report of Environmental Survey Services

## 3.0 INSPECTION RESULTS

### A. ASBESTOS-CONTAINING MATERIAL ASSESSMENT

The asbestos inspection involved a thorough visual examination of the Jay Community Center based on the proposed scope of work as described by e-mail from the Governor's Office of Storm Recovery (GOSR) and on site by town supervisor Archie Depo. The following table presents inspection results:

Homogenous Area No.	Location	Material	Results	Quantity
A	Interior Throughout	Wall Plaster – Brown Coat	Non-ACM	---
B	Interior Throughout	Wall Plaster – White Coat	Non-ACM	---
C	Interior Throughout	Ceiling Plaster – Brown Coat	Non-ACM	---
D	Interior Throughout	Ceiling Plaster – White Coat	Non-ACM	---
E	Interior Throughout	2'X4' Ceiling Tile – Fissure – White	Non-ACM	---
F	Bathrooms Throughout	Ceramic Floor Tile – Grout/Mortar – Gray	Non-ACM	---
G	Bathrooms Throughout	Ceramic Wall Tile – Mortar – Gray	Non-ACM	---
H	Bathrooms Throughout	Ceramic Wall Tile – Grout – White	Non-ACM	---
I	Kitchen	Joint Compound Assoc. with Sheetrock – White	Non-ACM	---
J	Kitchen	Tape Associated with Sheetrock – White	Non-ACM	---
K	Kitchen	Sheetrock – Gray	Non-ACM	---
L	<b>Kitchen</b>	<b>Mastic to Bottom Layer Floor Tile – Black</b>	<b>ACM</b>	<b>240 SF</b>
M	<b>Kitchen</b>	<b>Floor Tile – Bottom Layer – White</b>	<b>ACM Contaminated</b>	
N	<b>Kitchen</b>	<b>12"x12" Floor Tile – Top Layer - Beige</b>	<b>ACM Contaminated</b>	
O	<b>Kitchen</b>	<b>Mastic to Linoleum – Gray</b>	<b>ACM</b>	
P	<b>Kitchen</b>	<b>Linoleum – Brown</b>	<b>ACM</b>	
Q	Kitchen	Mastic to 4" Cove Base – Tan	Non-ACM	---



# Report of Environmental Survey Services

Homogenous Area No.	Location	Material	Results	Quantity
R	Kitchen	4" Cove Base – Brown	Non-ACM	---
<b>S</b>	<b>Boiler Room</b>	<b>Rope Gasket to Old Boiler – Gray</b>	<b>ACM</b>	<b>5 LF</b>
T	Boiler Room	Fire Brick to Old Boiler – Red	Non-ACM	---
U	Boiler Room	Hatch Sealant to Old Boiler – Red	Non-ACM	---
V	Boiler Room	Rope Gasket to New Boiler Ribs – White	Non-ACM	---
W	Boiler Room	Interior Brick Mortar – Gray	Non-ACM	---
X	Basement Throughout	Pipe Elbow to Fiberglass Pipes - Gray	Non-ACM	---
Y	Exterior Front Steps	Brick Mortar to Exterior Steps at Main Entry – Gray	Non-ACM	---

Laboratory analysis results, in tabular form, are included in Appendix A.

## **B. LEAD-BASED PAINT**

The lead inspection involved a thorough visual examination of all accessible areas impacted by the upcoming alteration project. The following suspect surfaces were tested for lead content:

SAMPLE LOCATION	BUILDING COMPONENT	COLOR	SUBSTRATE	CONDITION	LEAD RESULT
Calibration Check @ 1.0 mg/cm <sup>2</sup>					0.8
					0.7
					0.8
Calibration Check @ 0.0 mg/cm <sup>2</sup>					-0.3
					-0.1
					-0.1
Kitchen	Wall	White	Plaster	Fair	-0.1
Kitchen	Wall	White	Plaster	Fair	-0.1
Kitchen	Wall	White	Plaster	Fair	0.0
Kitchen	Wall	White	Plaster	Fair	-0.0
Kitchen	Door	Brown	Wood	Fair	-0.1
Kitchen	Door Frame	White	Wood	Fair	0.0
Kitchen	Window Sash	White	Metal	Fair	-0.2
Kitchen	Door Saddle	Beige	Wood	Fair	-0.1
Kitchen	Cabinet	Yellow	Wood	Fair	-0.2
Dining Room	Wall w/ Kitchen	Brown	Wood	Fair	-0.2
<b>Ladies Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Tile</b>	<b>Fair</b>	<b>2.7</b>



# Report of Environmental Survey Services

SAMPLE LOCATION	BUILDING COMPONENT	COLOR	SUBSTRATE	CONDITION	LEAD RESULT
Ladies Room	Wall – Upper	White	Plaster	Fair	-0.1
<b>Ladies Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Tile</b>	<b>Fair</b>	<b>2.5</b>
Ladies Room	Wall – Upper	White	Plaster	Fair	-0.1
<b>Ladies Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Tile</b>	<b>Fair</b>	<b>3.7</b>
Ladies Room	Wall – Upper	White	Plaster	Fair	-0.0
Ladies Room	Stall	White	Metal	Fair	-0.0
Ladies Room	Window	White	Metal	Fair	-0.3
Ladies Room	Door	White	Wood	Fair	-0.1
Ladies Room	Wall – Upper	Beige	Plaster	Fair	0.1
<b>Men’s Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Tile</b>	<b>Fair</b>	<b>2.9</b>
Men’s Room	Wall – Upper	White	Plaster	Fair	0.5
<b>Men’s Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Tile</b>	<b>Fair</b>	<b>3.8</b>
Men’s Room	Wall – Upper	White	Plaster	Fair	0.3
<b>Men’s Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Tile</b>	<b>Fair</b>	<b>3.4</b>
Men’s Room	Wall – Upper	White	Plaster	Fair	-0.1
<b>Men’s Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Tile</b>	<b>Fair</b>	<b>2.9</b>
Men’s Room	Wall – Upper	White	Plaster	Fair	0.1
Men’s Room	Window	White	Metal	Fair	-0.1
Men’s Room	Door	Brown	Wood	Fair	-0.1
Men’s Room	Door Frame	Gray	Metal	Fair	0.1
Men’s Room	Stall	White	Metal	Fair	-0.0
Boiler Room	Wall	White	Concrete	Fair	-0.3
Boiler Room	Wall	White	Concrete	Fair	-0.3
Boiler Room	Wall	White	Concrete	Fair	-0.2
Boiler Room	Wall	White	Concrete	Fair	-0.3
<b>Boiler Room</b>	<b>Door</b>	<b>Gray</b>	<b>Metal</b>	<b>Fair</b>	<b>2.9</b>
Exterior	Ramp Handrail	Black	Metal	Fair	-0.0
Calibration Check @ 1.0 mg/cm <sup>2</sup>					1.0
					0.9
					1.0

Bold = Positive for LEAD

## 4.0 AREAS NOT ACCESSIBLE

During the survey the following areas were not accessible:

- All areas were accessible to LB’s investigator during this limited survey.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on analytical results and our observations, materials affected by the scope of work were determined to be ACM and LBP.

LB inspected and only sampled suspect building materials, which were observable and accessible to the survey team. All suspect asbestos-containing materials and lead-based paints encountered during the course of any future renovation work which have not been tested must be approached with caution and assumed ACM, until tested otherwise.



# Report of Environmental Survey Services

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In the event any suspect Asbestos-Containing Materials identified during future renovations are found to be positive for ACM, proper asbestos abatement procedures shall be implemented prior to the commencement of such work. All asbestos abatement removal and repair work shall be performed in accordance with all applicable Federal, State and Local Rules, Regulations and Specifications. The abatement project shall be filed with all agencies having jurisdiction over this project, such as USEPA and NYS DOL.

## 6.0 REPORT CERTIFICATIONS

This report, and the supporting data, findings, conclusions, opinions, and recommendations contain the results of LB's environmental survey work at the Jay Community Center located at 11 School Lane, Au Sable Forks, NY, based on the proposed scope of work as described by e-mail from the Governor's Office of Storm Recovery (GOSR) and on site by town supervisor Archie Depo).

Opinions and recommendations presented in this report apply to site conditions and features as they existed at the time of LB's site visits, and those reasonably foreseeable. They cannot necessarily apply to conditions and features of which LB is unaware and has not had the opportunity to evaluate.

The conclusions presented in this report are professional opinions solely upon LB's visual observations of accessible areas, laboratory test data, and current regulatory requirements. These conclusions are intended exclusively for the purpose stated herein, at the site indicated, and based upon the scope of work indicated by the GOSR.

Prepared by:

Reviewed by:

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Jeffrey Leed  
NYS DOL Inspector

---

Michael Gelfand  
Project Manager





# **Report of Environmental Survey Services**

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## **APPENDIX A:**

### **SAMPLE ANALYSIS RESULTS IN TABULAR FORM**



# Report of **Envi.** Survey Services

**APPENDIX A**  
**JAY COMMUNITY CENTER**  
**11 SCHOOL LANE**  
**AU SABLE FORKS, NY 12941**  
**GOSR Task Order # 26**  
**Louis Berger US Project # 2004232.026**

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
A	01	Women's Bathroom	Wall Plaster – Brown Coat	NAD	---
	02	Women's Bathroom		NAD	---
	03	Kitchen		NAD	---
	04	Men's Bathroom		NAD	---
	05	Men's Bathroom		NAD	---
B	06	Women's Bathroom	Wall Plaster – White Coat	NAD	---
	07	Women's Bathroom		NAD	---
	08	Kitchen		NAD	---
	09	Men's Bathroom		NAD	---
	10	Men's Bathroom		NAD	---
C	11	Women's Bathroom	Ceiling Plaster – Brown Coat	NAD	---
	12	Women's Bathroom		NAD	---
	13	Kitchen		NAD	---
	14	Men's Bathroom		NAD	---
	15	Men's Bathroom		NAD	---
D	16	Women's Bathroom	Ceiling Plaster – White Coat	NAD	---
	17	Women's Bathroom		NAD	---
	18	Kitchen		NAD	---
	19	Men's Bathroom		NAD	---
	20	Men's Bathroom		NAD	---
E	21	Women's Bathroom	2'X4' Ceiling Tile – Fissure – White	NAD	NAD
	22	Men's Bathroom		NAD	NAD
F	23	Women's Bathroom	Ceramic Floor Tile – Grout/Mortar – Gray	NAD	---
	24	Men's Bathroom		NAD	---
G	25	Women's Bathroom	Ceramic Wall Tile – Mortar – Gray	NAD	---
	26	Men's Bathroom		NAD	---
H	27	Women's Bathroom	Ceramic Wall Tile – Grout – White	NAD	---
	28	Men's Bathroom		NAD	---



# Report of **Envi.** Survey Services

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
I	29	Kitchen – Outside Wall	Joint Compound Assoc. with Sheetrock – White	NAD	---
	30	Kitchen – Outside Wall		NAD	---
J	31	Kitchen – Outside Wall	Tape Associated with Sheetrock – White	NAD	NAD
	32	Kitchen – Outside Wall		NAD	NAD
K	33	Kitchen – Outside Wall	Sheetrock – Gray	NAD	---
	34	Kitchen – Outside Wall		NAD	---
L	35	Kitchen – Under Sink	Mastic to Bottom Layer Floor Tile – Black	5.4% Chrysotile	NA/PS
	36	Kitchen – Under Sink		NA/PS	NA/PS
M	37	Kitchen – Under Sink	Floor Tile – Bottom Layer – White	NAD	---
	38	Kitchen – Under Sink		NAD	---
N	39	Kitchen – Under Sink	12”x12” Floor Tile – Top Layer - Beige	NAD	---
	40	Kitchen – Under Sink		NAD	---
O	41	Kitchen – Left	Mastic to Linoleum – Gray	33.7% Chrysotile	NA/PS
	42	Kitchen – Right		NA/PS	NA/PS
P	43	Kitchen – Left	Linoleum – Brown	8.3% Chrysotile	NA/PS
	44	Kitchen – Right		NA/PS	NA/PS
Q	45	Kitchen – Left	Mastic to 4” Cove Base – Tan	NAD	---
	46	Kitchen – Right		NAD	---
R	47	Kitchen – Left	4” Cove Base – Brown	NAD	---
	48	Kitchen – Right		NAD	---
S	49	Boiler Room	Rope Gasket to Old Boiler – Gray	26.7% Chrysotile	---
	50	Boiler Room		NA/PS	---
T	51	Boiler Room	Fire Brick to Old Boiler – Red	NAD	---
	52	Boiler Room		NAD	---
U	53	Boiler Room	Hatch Sealant to Old Boiler – Red	NAD	NAD
	54	Boiler Room		NAD	NAD
V	55	Boiler Room	Rope Gasket to New Boiler Ribs – White	NAD	---
	56	Boiler Room		NAD	---
W	57	Boiler Room	Interior Brick Mortar – Gray	NAD	---
	58	Boiler Room		NAD	---
X	59	Room Beneath Men’s Bathroom	Pipe Elbow to Fiberglass Pipes - Gray	NAD	---
	60	Room Beneath Men’s Bathroom		NAD	---
	61	Room Beneath Men’s Bathroom		NAD	---
Y	62	Exterior – Main Entry	Brick Mortar to Exterior Steps at Main Entry - Gray	NAD	---



# Report of **Envi.** Survey Services

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
Y	63	Exterior – Main Entry	Brick Mortar to Exterior Steps at Main Entry - Gray	NAD	---

Notes:

NAD = No Asbestos Detected

NA/PS = NOT ANALYZED/POSITIVE STOP



# **Report of Environmental Survey Services**

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## **APPENDIX B:**

### **BULK SAMPLE LABORATORY RESULTS & CHAIN OF CUSTODY**



Please Reply To:

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NEW YORK, NY 10016

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**FACSIMILE TELECOPY TRANSMISSION**

**To:** Mike Gelfand  
Louis Berger & Assoc., P.C.

**From:** Ella Babayeva  
**AmeriSci Job #:** 218054364

**Fax #:**

**Subject:** ELAP-PLM/TEM 48 hour Results  
**Client Project:** 2004232.026.01.01; GOSR; Jay  
Community Center - Au Sable  
Forks, NY, Kitchen, B

**Email:** mgelfand@louisberger.com,ssantana@louisberger.co  
m,jawang@louisberger.com,LabResults@louisberger  
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## PLM Bulk Asbestos Report

Louis Berger & Assoc., P.C.  
Attn: Mike Gelfand  
48 Wall Street  
16th Floor  
New York, NY 10005

**Date Received** 05/25/18    **AmeriSci Job #** 218054364  
**Date Examined** 05/26/18    **P.O. #**  
**ELAP #** 11480    **Page** 1 of 11  
**RE:** 2004232.026.01.01; GOSR; Jay Community Center - Au  
Sable Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen,  
Bathroom, And Boiler Room Renovations

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
01 A	218054364-01 Location: Women's Bathroom - Wall Plaster, Brown Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Animal hair Trace, Non-fibrous 100 %			
02 A	218054364-02 Location: Women's Bathroom - Wall Plaster, Brown Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Animal hair Trace, Non-fibrous 100 %			
03 A	218054364-03 Location: Kitchen - Wall Plaster, Brown Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Cellulose Trace, Non-fibrous 100 %			
04 A	218054364-04 Location: Men's Bathroom - Wall Plaster, Brown Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Cellulose Trace, Non-fibrous 100 %			
05 A	218054364-05 Location: Men's Bathroom - Wall Plaster, Brown Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Cellulose Trace, Non-fibrous 100 %			

# PLM Bulk Asbestos Report

2004232.026.01.01; GOSR; Jay Community Center - Au Sable  
 Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen,  
 Bathroom, And Boiler Room Renovations

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
06 B	218054364-06 Location: Women's Bathroom - Wall Plaster, White Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 100 %			
07 B	218054364-07 Location: Women's Bathroom - Wall Plaster, White Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 100 %			
08 B	218054364-08 Location: Kitchen - Wall Plaster, White Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 100 %			
09 B	218054364-09 Location: Men's Bathroom - Wall Plaster, White Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 100 %			
10 B	218054364-10 Location: Men's Bathroom - Wall Plaster, White Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 100 %			
11 C	218054364-11 Location: Women's Bathroom - Ceiling Plaster, Brown Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Cementitious, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Animal hair Trace, Non-fibrous 100 %			



# PLM Bulk Asbestos Report

2004232.026.01.01; GOSR; Jay Community Center - Au Sable  
Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen,  
Bathroom, And Boiler Room Renovations

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
12 C	218054364-12 <b>Location:</b> Women's Bathroom - Ceiling Plaster, Brown Coat	<b>No</b>	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Animal hair Trace, Non-fibrous 100 %			
13 C	218054364-13 <b>Location:</b> Kitchen - Ceiling Plaster, Brown Coat	<b>No</b>	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
14 C	218054364-14 <b>Location:</b> Men's Bathroom - Ceiling Plaster, Brown Coat	<b>No</b>	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
15 C	218054364-15 <b>Location:</b> Men's Bathroom - Ceiling Plaster, Brown Coat	<b>No</b>	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
16 D	218054364-16 <b>Location:</b> Women's Bathroom - Ceiling Plaster, White Coat	<b>No</b>	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
17 D	218054364-17 <b>Location:</b> Women's Bathroom - Ceiling Plaster, White Coat	<b>No</b>	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			

Client Name: Louis Berger &amp; Assoc., P.C.

**PLM Bulk Asbestos Report**

2004232.026.01.01; GOSR; Jay Community Center - Au Sable  
Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen,  
Bathroom, And Boiler Room Renovations

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
18 D	218054364-18 Location: Kitchen - Ceiling Plaster, White Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 100 %			
19 D	218054364-19 Location: Men's Bathroom - Ceiling Plaster, White Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 100 %			
20 D	218054364-20 Location: Men's Bathroom - Ceiling Plaster, White Coat	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 100 %			
21 E	218054364-21 Location: Women's Bathroom - 2' X 4' Ceiling Tile, Fissure, White	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 50.4 %			
22 E	218054364-22 Location: Men's Bathroom - 2' X 4' Ceiling Tile, Fissure, White	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 45.6 %			
23 F	218054364-23 Location: Women's Bathroom - Ceramic Floor Tile, Grout/Mortar, Gray	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey, Homogeneous, Non-Fibrous, Cementitious, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 100 %			

Client Name: Louis Berger &amp; Assoc., P.C.

**PLM Bulk Asbestos Report**

2004232.026.01.01; GOSR; Jay Community Center - Au Sable  
Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen,  
Bathroom, And Boiler Room Renovations

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
24 F	218054364-24 Location: Men's Bathroom - Ceramic Floor Tile, Grout/Mortar, Gray	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
25 G	218054364-25 Location: Women's Bathroom - Ceramic Wall Tile, Mortar, Gray	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey, Heterogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
26 G	218054364-26 Location: Men's Bathroom - Ceramic Wall Tile, Mortar, Gray	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
27 H	218054364-27 Location: Women's Bathroom - Ceramic Wall Tile, Grout, White	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
28 H	218054364-28 Location: Men's Bathroom - Ceramic Wall Tile, Grout, White	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
29 I	218054364-29 Location: Kitchen, Outside Wall - Joint Compound Assoc. With Sheetrock, White	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			

Client Name: Louis Berger &amp; Assoc., P.C.

## PLM Bulk Asbestos Report

2004232.026.01.01; GOSR; Jay Community Center - Au Sable  
Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen,  
Bathroom, And Boiler Room Renovations

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
30 I	218054364-30	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Location:</b> Kitchen, Outside Wall - Joint Compound Assoc. With Sheetrock, White			
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
31 J	218054364-31	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Location:</b> Kitchen, Outside Wall - Tape Associated With Sheetrock, White "Material Submitted Is Paint"			
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 23.9 %			
32 J	218054364-32	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Location:</b> Kitchen, Outside Wall - Tape Associated With Sheetrock, White "Material Submitted Is Paint"			
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 25 %			
33 K	218054364-33	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Location:</b> Kitchen, Outside Wall - Sheetrock, Gray			
<b>Analyst Description:</b> Grey, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Cellulose Trace, Non-fibrous 100 %			
34 K	218054364-34	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Location:</b> Kitchen, Outside Wall - Sheetrock, Gray			
<b>Analyst Description:</b> Grey, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Cellulose Trace, Non-fibrous 100 %			
35 L	218054364-35	Yes	5.4 % (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Location:</b> Kitchen, Under Sink - Mastic To Bottom Layer Floor Tile, Black			
<b>Analyst Description:</b> Black, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b> Chrysotile 5.4 %			
<b>Other Material:</b> Non-fibrous 30.8 %			
<b>Comment:</b> Material Submitted Is Floor Tile			

# PLM Bulk Asbestos Report

2004232.026.01.01; GOSR; Jay Community Center - Au Sable Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen, Bathroom, And Boiler Room Renovations

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
36 L	218054364-36 <b>Location:</b> Kitchen, Under Sink - Mastic To Bottom Layer Floor Tile, Black		NA/PS
<b>Analyst Description:</b> Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b>			
37 M	218054364-37 <b>Location:</b> Kitchen, Under Sink - Floor Tile, Bottom Layer, White	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 14.2 %			
38 M	218054364-38 <b>Location:</b> Kitchen, Under Sink - Floor Tile, Bottom Layer, White	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 10.8 %			
39 N	218054364-39 <b>Location:</b> Kitchen, Under Sink - 12" X 12" Floor Tile, Top Layer, Beige	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Beige, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 13.3 %			
40 N	218054364-40 <b>Location:</b> Kitchen, Under Sink - 12" X 12" Floor Tile, Top Layer, Beige	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Beige, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 12.2 %			
41 O	218054364-41 <b>Location:</b> Kitchen, Left - Mastic To Linoleum, Gray "Mastic Is Inseparable From Flooring Material, Composite Analysis Result"	Yes	33.7 % (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey/White, Heterogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> Chrysotile 33.7 % <b>Other Material:</b> Non-fibrous 33.7 %			

# PLM Bulk Asbestos Report

2004232.026.01.01; GOSR; Jay Community Center - Au Sable  
 Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen,  
 Bathroom, And Boiler Room Renovations

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
42 O	218054364-42 Location: Kitchen, Right - Mastic To Linoleum, Gray		NA/PS
<b>Analyst Description:</b> Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b>			
43 P	218054364-43 Location: Kitchen, Left - Linoleum, Brown	Yes	8.3 % (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> Chrysotile 8.3 % <b>Other Material:</b> Non-fibrous 20.8 %			
44 P	218054364-44 Location: Kitchen, Right - Linoleum, Brown		NA/PS
<b>Analyst Description:</b> Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b>			
45 Q	218054364-45 Location: Kitchen, Left - Mastic To 4" Cove Base, Tan	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Tan, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 32.8 %			
46 Q	218054364-46 Location: Kitchen, Right - Mastic To 4" Cove Base, Tan	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Tan, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 36.9 %			
47 R	218054364-47 Location: Kitchen, Left - 4" Cove Base, Brown	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 1.9 %			

Client Name: Louis Berger &amp; Assoc., P.C.

**PLM Bulk Asbestos Report**

2004232.026.01.01; GOSR; Jay Community Center - Au Sable  
Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen,  
Bathroom, And Boiler Room Renovations

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
48 R	218054364-48 Location: Kitchen, Right - 4" Cove Base, Brown	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Brown, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 2.2 %			
49 S	218054364-49 Location: Boiler Room - Rope Gasket To Old Boiler, Gray	Yes	26.7 % (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey/Red, Heterogeneous, Fibrous, Bulk Material			
<b>Asbestos Types:</b> Chrysotile 26.7 %			
<b>Other Material:</b> Non-fibrous 73.3 %			
50 S	218054364-50 Location: Boiler Room - Rope Gasket To Old Boiler, Gray		NA/PS
<b>Analyst Description:</b> Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b>			
51 T	218054364-51 Location: Boiler Room - Fire Brick To Old Boiler, Red	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Red/Tan, Heterogeneous, Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Fibrous glass 60 %, Non-fibrous 40 %			
52 T	218054364-52 Location: Boiler Room - Fire Brick To Old Boiler, Red	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Red/Tan, Heterogeneous, Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Fibrous glass 65 %, Non-fibrous 35 %			
53 U	218054364-53 Location: Boiler Room - Hatch Sealant To Old Boiler, Red	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Red, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 17.3 %			

Client Name: Louis Berger &amp; Assoc., P.C.

**PLM Bulk Asbestos Report**

2004232.026.01.01; GOSR; Jay Community Center - Au Sable  
Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen,  
Bathroom, And Boiler Room Renovations

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
54 U	218054364-54 Location: Boiler Room - Hatch Sealant To Old Boiler, Red	No	NAD (by NYS ELAP 198.6) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Red, Homogeneous, Non-Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 18 %			
55 V	218054364-55 Location: Boiler Room - Rope Gasket To New Boiler Ribs, White	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Fibrous glass 100 %, Non-fibrous Trace			
56 V	218054364-56 Location: Boiler Room - Rope Gasket To New Boiler Ribs, White	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> White, Homogeneous, Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Fibrous glass 100 %, Non-fibrous Trace			
57 W	218054364-57 Location: Boiler Room - Interior Brick Mortar, Gray	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
58 W	218054364-58 Location: Boiler Room - Interior Brick Mortar, Gray	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Non-fibrous 100 %			
59 X	218054364-59 Location: Room Beneath Men's Bathroom - Pipe Elbow To Fiberglass Pipes, Gray	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey, Homogeneous, Fibrous, Bulk Material			
<b>Asbestos Types:</b>			
<b>Other Material:</b> Fibrous glass 45 %, Non-fibrous 55 %			



# PLM Bulk Asbestos Report

2004232.026.01.01; GOSR; Jay Community Center - Au Sable  
 Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen,  
 Bathroom, And Boiler Room Renovations

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
60 X	218054364-60 Location: Room Beneath Men's Bathroom - Pipe Elbow To Fiberglass Pipes, Gray	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey, Homogeneous, Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Fibrous glass 35 %, Non-fibrous 65 %			
61 X	218054364-61 Location: Room Beneath Men's Bathroom - Pipe Elbow To Fiberglass Pipes, Gray	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey, Homogeneous, Fibrous, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Fibrous glass 40 %, Non-fibrous 60 %			
62 Y	218054364-62 Location: Exterior, Main Entry - Brick Mortar To Exterior Steps At Main Entry, Gray	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey, Homogeneous, Non-Fibrous, Cementitious, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 100 %			
63 Y	218054364-63 Location: Exterior, Main Entry - Brick Mortar To Exterior Steps At Main Entry, Gray	No	NAD (by NYS ELAP 198.1) by Ella Babayeva on 05/26/18
<b>Analyst Description:</b> Grey, Homogeneous, Non-Fibrous, Cementitious, Bulk Material <b>Asbestos Types:</b> <b>Other Material:</b> Non-fibrous 100 %			

**Reporting Notes:**

Analyzed by: Ella Babayeva 

\*NAD/NSD =no asbestos detected; NA =not analyzed; NAPS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis by EPA 600/M4-82-020 per 40 CFR 763 (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite or 198.6 for NOB samples or EPA 400 pt ct by EPA 600/M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. AIHA-LAP, LLC Lab ID 102843, RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054.

Client Name: Louis Berger & Assoc., P.C.

**Table I**  
**Summary of Bulk Asbestos Analysis Results**

2004232.026.01.01; GOSR; Jay Community Center - Au Sable Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen, Bathroom, And Boiler Room Renovations

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	01	A	---	---	---	---	NAD	NA
Location: Women's Bathroom - Wall Plaster, Brown Coat								
02	02	A	---	---	---	---	NAD	NA
Location: Women's Bathroom - Wall Plaster, Brown Coat								
03	03	A	---	---	---	---	NAD	NA
Location: Kitchen - Wall Plaster, Brown Coat								
04	04	A	---	---	---	---	NAD	NA
Location: Men's Bathroom - Wall Plaster, Brown Coat								
05	05	A	---	---	---	---	NAD	NA
Location: Men's Bathroom - Wall Plaster, Brown Coat								
06	06	B	---	---	---	---	NAD	NA
Location: Women's Bathroom - Wall Plaster, White Coat								
07	07	B	---	---	---	---	NAD	NA
Location: Women's Bathroom - Wall Plaster, White Coat								
08	08	B	---	---	---	---	NAD	NA
Location: Kitchen - Wall Plaster, White Coat								
09	09	B	---	---	---	---	NAD	NA
Location: Men's Bathroom - Wall Plaster, White Coat								
10	10	B	---	---	---	---	NAD	NA
Location: Men's Bathroom - Wall Plaster, White Coat								
11	11	C	---	---	---	---	NAD	NA
Location: Women's Bathroom - Ceiling Plaster, Brown Coat								
12	12	C	---	---	---	---	NAD	NA
Location: Women's Bathroom - Ceiling Plaster, Brown Coat								
13	13	C	---	---	---	---	NAD	NA
Location: Kitchen - Ceiling Plaster, Brown Coat								
14	14	C	---	---	---	---	NAD	NA
Location: Men's Bathroom - Ceiling Plaster, Brown Coat								
15	15	C	---	---	---	---	NAD	NA
Location: Men's Bathroom - Ceiling Plaster, Brown Coat								
16	16	D	---	---	---	---	NAD	NA
Location: Women's Bathroom - Ceiling Plaster, White Coat								

See Reporting notes on last page

**Table I**  
**Summary of Bulk Asbestos Analysis Results**

2004232.026.01.01; GOSR; Jay Community Center - Au Sable Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen, Bathroom, And Boiler Room Renovations

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
17	17	D	---	---	---	---	NAD	NA
Location: Women's Bathroom - Ceiling Plaster, White Coat								
18	18	D	---	---	---	---	NAD	NA
Location: Kitchen - Ceiling Plaster, White Coat								
19	19	D	---	---	---	---	NAD	NA
Location: Men's Bathroom - Ceiling Plaster, White Coat								
20	20	D	---	---	---	---	NAD	NA
Location: Men's Bathroom - Ceiling Plaster, White Coat								
21	21	E	0.127	22.8	26.8	50.4	NAD	NAD
Location: Women's Bathroom - 2' X 4' Ceiling Tile, Fissure, White								
22	22	E	0.158	18.4	36.1	45.6	NAD	NAD
Location: Men's Bathroom - 2' X 4' Ceiling Tile, Fissure, White								
23	23	F	---	---	---	---	NAD	NA
Location: Women's Bathroom - Ceramic Floor Tile, Grout/Mortar, Gray								
24	24	F	---	---	---	---	NAD	NA
Location: Men's Bathroom - Ceramic Floor Tile, Grout/Mortar, Gray								
25	25	G	---	---	---	---	NAD	NA
Location: Women's Bathroom - Ceramic Wall Tile, Mortar, Gray								
26	26	G	---	---	---	---	NAD	NA
Location: Men's Bathroom - Ceramic Wall Tile, Mortar, Gray								
27	27	H	---	---	---	---	NAD	NA
Location: Women's Bathroom - Ceramic Wall Tile, Grout, White								
28	28	H	---	---	---	---	NAD	NA
Location: Men's Bathroom - Ceramic Wall Tile, Grout, White								
29	29	I	---	---	---	---	NAD	NA
Location: Kitchen, Outside Wall - Joint Compound Assoc. With Sheetrock, White								
30	30	I	---	---	---	---	NAD	NA
Location: Kitchen, Outside Wall - Joint Compound Assoc. With Sheetrock, White								
31	31	J	0.071	59.2	16.9	23.9	NAD	NAD
Location: Kitchen, Outside Wall - Tape Associated With Sheetrock, White "Material Submitted Is Paint"								
32	32	J	0.056	55.4	19.6	25.0	NAD	NAD
Location: Kitchen, Outside Wall - Tape Associated With Sheetrock, White "Material Submitted Is Paint"								

See Reporting notes on last page

**Table I**  
**Summary of Bulk Asbestos Analysis Results**

2004232.026.01.01; GOSR; Jay Community Center - Au Sable Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen, Bathroom, And Boiler Room Renovations

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
33	33	K					NAD	NA
Location: Kitchen, Outside Wall - Sheetrock, Gray								
34	34	K					NAD	NA
Location: Kitchen, Outside Wall - Sheetrock, Gray								
35	35	L	0.105	34.3	29.5	30.8	Chrysotile 5.4	NA
Location: Kitchen, Under Sink - Mastic To Bottom Layer Floor Tile, Black								
36	36	L	0.091	37.4	28.6	34.1	NA/PS	NA
Location: Kitchen, Under Sink - Mastic To Bottom Layer Floor Tile, Black								
37	37	M	0.212	20.3	65.6	14.2	NAD	NAD
Location: Kitchen, Under Sink - Floor Tile, Bottom Layer, White								
38	38	M	0.240	19.6	69.6	10.8	NAD	NAD
Location: Kitchen, Under Sink - Floor Tile, Bottom Layer, White								
39	39	N	0.196	20.4	66.3	13.3	NAD	NAD
Location: Kitchen, Under Sink - 12" X 12" Floor Tile, Top Layer, Beige								
40	40	N	0.246	22.0	65.9	12.2	NAD	NAD
Location: Kitchen, Under Sink - 12" X 12" Floor Tile, Top Layer, Beige								
41	41	O	0.089	24.7	7.9	33.7	Chrysotile 33.7	NA
Location: Kitchen, Left - Mastic To Linoleum, Gray "Mastic Is Inseparable From Flooring Material, Composite Analysis Result"								
42	42	O	0.050	34.0	14.0	52.0	NA/PS	NA
Location: Kitchen, Right - Mastic To Linoleum, Gray								
43	43	P	0.117	53.8	17.1	20.8	Chrysotile 8.3	NA
Location: Kitchen, Left - Linoleum, Brown								
44	44	P	0.118	79.7	16.1	4.2	NA/PS	NA
Location: Kitchen, Right - Linoleum, Brown								
45	45	Q	0.180	49.4	17.8	32.8	NAD	NAD
Location: Kitchen, Left - Mastic To 4" Cove Base, Tan								
46	46	Q	0.157	51.6	11.5	36.9	NAD	NAD
Location: Kitchen, Right - Mastic To 4" Cove Base, Tan								
47	47	R	0.214	31.3	66.8	1.9	NAD	NAD
Location: Kitchen, Left - 4" Cove Base, Brown								
48	48	R	0.225	35.6	62.2	2.2	NAD	NAD
Location: Kitchen, Right - 4" Cove Base, Brown								

See Reporting notes on last page

**Table I**  
**Summary of Bulk Asbestos Analysis Results**

2004232.026.01.01; GOSR; Jay Community Center - Au Sable Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen, Bathroom, And Boiler Room Renovations

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
49	49	S	---	---	---	---	Chrysotile 26.7	NA
Location: Boiler Room - Rope Gasket To Old Boiler, Gray								
50	50	S	---	---	---	---	NA/PS	NA
Location: Boiler Room - Rope Gasket To Old Boiler, Gray								
51	51	T	---	---	---	---	NAD	NA
Location: Boiler Room - Fire Brick To Old Boiler, Red								
52	52	T	---	---	---	---	NAD	NA
Location: Boiler Room - Fire Brick To Old Boiler, Red								
53	53	U	0.249	72.7	10.0	17.3	NAD	NAD
Location: Boiler Room - Hatch Sealant To Old Boiler, Red								
54	54	U	0.111	73.0	9.0	18.0	NAD	NAD
Location: Boiler Room - Hatch Sealant To Old Boiler, Red								
55	55	V	---	---	---	---	NAD	NA
Location: Boiler Room - Rope Gasket To New Boiler Ribs, White								
56	56	V	---	---	---	---	NAD	NA
Location: Boiler Room - Rope Gasket To New Boiler Ribs, White								
57	57	W	---	---	---	---	NAD	NA
Location: Boiler Room - Interior Brick Mortar, Gray								
58	58	W	---	---	---	---	NAD	NA
Location: Boiler Room - Interior Brick Mortar, Gray								
59	59	X	---	---	---	---	NAD	NA
Location: Room Beneath Men's Bathroom - Pipe Elbow To Fiberglass Pipes, Gray								
60	60	X	---	---	---	---	NAD	NA
Location: Room Beneath Men's Bathroom - Pipe Elbow To Fiberglass Pipes, Gray								
61	61	X	---	---	---	---	NAD	NA
Location: Room Beneath Men's Bathroom - Pipe Elbow To Fiberglass Pipes, Gray								
62	62	Y	---	---	---	---	NAD	NA
Location: Exterior, Main Entry - Brick Mortar To Exterior Steps At Main Entry, Gray								
63	63	Y	---	---	---	---	NAD	NA
Location: Exterior, Main Entry - Brick Mortar To Exterior Steps At Main Entry, Gray								

See Reporting notes on last page

Client Name: Louis Berger & Assoc., P.C.

**Table I**  
**Summary of Bulk Asbestos Analysis Results**

2004232.026.01.01; GOSR; Jay Community Center - Au Sable Forks, NY, Kitchen, Bathrooms, Boiler Room, Kitchen, Bathroom, And Boiler Room Renovations

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
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Analyzed by: Marik Peysakhov; Date Analyzed 5/27/2018

\*\*Quantitative Analysis (Semi/Full); Bulk Asbestos Analysis - PLM by EPA 600/M4-82-020 per 40 CFR or ELAP 198.1 for New York friable samples or ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (not covered by NVLAP Bulk accreditation) or ELAP 198.4; for New York samples; NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = <1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses); NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, AIHA-LAP, LLC (PLM) Lab ID 102843.

Warning Note: PLM limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris for which PLM evaluation is recommended (i.e. soils and other heterogeneous materials).

Reviewed By: \_\_\_\_\_

PROJECT NO.: 2004232.026.01.01 LOCATION(S) SURVEYED: Kitchen, Bathrooms, Boiler Room  
 CLIENT: GOSR PROPOSED PROJECT: Kitchen, Bathroom, and Boiler Room Renovations  
 PROJECT SITE: Jay Community Center - Au Sable Forks, NY DATE(S) OF INSPECTION: 5/23/2018  
 Project Manager: M. Gelfand Inspector(s): Jeff Leed

LOUIS BERGER  
 TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341  
 ADDRESS: 96 Morton St, 8th Floor, New York, NY 10014

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LFSF)	FIELD NOTES
A	01	Wall Plaster - Brown Coat	Women's Bathroom		
A	02	Wall Plaster - Brown Coat	Women's Bathroom		
A	03	Wall Plaster - Brown Coat	Kitchen		
A	04	Wall Plaster - Brown Coat	Men's Bathroom		
A	05	Wall Plaster - Brown Coat	Men's Bathroom		
B	06	Wall Plaster - White Coat	Women's Bathroom		
B	07	Wall Plaster - White Coat	Women's Bathroom		
B	08	Wall Plaster - White Coat	Kitchen		
B	09	Wall Plaster - White Coat	Men's Bathroom		
B	10	Wall Plaster - White Coat	Men's Bathroom		
C	11	Ceiling Plaster - Brown Coat	Women's Bathroom		
C	12	Ceiling Plaster - Brown Coat	Women's Bathroom		

RESULTS TO:  
 TURNAROUND TIME:  4 HR.  12 HR.  
 24 HR.  48 HR.  72 HR.  96 HR.

#218054364

**CHAIN OF CUSTODY**

Relinquished by: <u>Jeff Leed</u> (Sign)	(Date) <u>5/25/18</u>	(Time) <u>1717</u>	Relinquished by: _____ (Sign)	(Date) _____	(Time) _____
Received by: <u>Stefan</u> (Sign)	(Date) <u>5-25-18</u>	(Time) <u>1720</u>	Received by: _____ (Sign)	(Date) _____	(Time) _____

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1<sup>st</sup> positive in any homogeneous group.

Louis Berger

# ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PROJECT NO.: 2004232.026.01.01

CLIENT: GOSR

PROJECT SITE: Jay Community Center - Au Sable Forks, NY

Project Manager: M. Gelfand

LOCATION(S) SURVEYED: Kitchen, Bathrooms, Boiler Room

PROPOSED PROJECT: Kitchen, Bathroom, and Boiler Room Renovations

DATE(S) OF INSPECTION: 5/23/2018

Inspector(s): Jeff Leed

LOUIS BERGER

TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341

ADDRESS: 96 Morton St, 8th Floor, New York, NY 10014

RESULTS TO:

TURNAROUND TIME:  4 HR.  12 HR.

24 HR.  48 HR.  72 HR.  96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
C	13	Ceiling Plaster - Brown Coat	Kitchen		
C	14	Ceiling Plaster - Brown Coat	Men's Bathroom		
C	15	Ceiling Plaster - Brown Coat	Men's Bathroom		
D	16	Ceiling Plaster - White Coat	Women's Bathroom		
D	17	Ceiling Plaster - White Coat	Women's Bathroom		
D	18	Ceiling Plaster - White Coat	Kitchen		
D	19	Ceiling Plaster - White Coat	Men's Bathroom		
D	20	Ceiling Plaster - White Coat	Men's Bathroom		
E	21	2'X4' Ceiling Tile - Fissure - White	Women's Bathroom		
E	22	2'X4' Ceiling Tile - Fissure - White	Men's Bathroom		
F	23	Ceramic Floor Tile - Grout/Mortar - Gray	Women's Bathroom		
F	24	Ceramic Floor Tile - Grout/Mortar - Gray	Men's Bathroom		

#218054364

### CHAIN OF CUSTODY

Relinquished by: <i>Leed</i>	(Sign)	<i>5/23/18</i>	(Date)	<i>17:17</i>	(Time)	Relinquished by:	(Sign)		(Date)	(Time)
Received by: <i>Stegman</i>	(Sign)	<i>5/25/18</i>	(Date)	<i>17:20</i>	(Time)	Received by:	(Sign)		(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.





**Louis Berger**

# ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PROJECT NO.: 2004232.026.01.01

CLIENT: GOSR

PROJECT SITE: Jay Community Center - Au Sable Forks, NY

Project Manager: M. Gelfand

LOCATION(S) SURVEYED: Kitchen, Bathrooms, Boiler Room

PROPOSED PROJECT: Kitchen, Bathroom, and Boiler Room Renovations

DATE(S) OF INSPECTION: 5/23/2018

Inspector(s): Jeff Leed

LOUIS BERGER  
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341  
ADDRESS: 96 Morton St, 8th Floor, New York, NY 10014

RESULTS TO:

TURNAROUND TIME:  4 HR.  12 HR.  
 24 HR.  48 HR.  72 HR.  96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
G	25	Ceramic Wall Tile - Mortar - Gray	Women's Bathroom		
G	26	Ceramic Wall Tile - Mortar - Gray	Men's Bathroom		
H	27	Ceramic Wall Tile - Grout - White	Women's Bathroom		
H	28	Ceramic Wall Tile - Grout - White	Men's Bathroom		
I	29	Joint Compound Assoc. with Sheetrock - White	Kitchen - Outside Wall		
I	30	Joint Compound Assoc. with Sheetrock - White	Kitchen - Outside Wall		
J	31	Tape Associated with Sheetrock - White	Kitchen - Outside Wall		#218054364
J	32	Tape Associated with Sheetrock - White	Kitchen - Outside Wall		
K	33	Sheetrock - Gray	Kitchen - Outside Wall		
K	34	Sheetrock - Gray	Kitchen - Outside Wall		
L	35	Mastic to Bottom Layer Floor Tile - Black	Kitchen - Under Sink		
L	36	Mastic to Bottom Layer Floor Tile - Black	Kitchen - Under Sink		

### CHAIN OF CUSTODY

Relinquished by: <i>Jeff Leed</i>	(Sign)	(Date) 5/25/18	(Time) 1717	Relinquished by:	(Sign)	(Date)	(Time)
Received by: <i>Stefan</i>	(Sign)	(Date) 5-25-18	(Time) 1720	Received by:	(Sign)	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

PROJECT NO.: 2004232.026.01.01

CLIENT: GOSR

PROJECT SITE: Jay Community Center - Au Sable Forks, NY

Project Manager: M. Gelfand

LOCATION(S) SURVEYED: Kitchen, Bathrooms, Boiler Room

PROPOSED PROJECT: Kitchen, Bathroom, and Boiler Room Renovations

DATE(S) OF INSPECTION: 5/23/2018

Inspector(s): Jeff Leed

LOUIS BERGER  
 TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341  
 ADDRESS: 96 Morton St, 8th Floor, New York, NY 10014

RESULTS TO:

TURNAROUND TIME:  4 HR.  12 HR.  
 24 HR.  48 HR.  72 HR.  96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
M	37	Floor Tile - Bottom Layer - White	Kitchen - Under Sink		
M	38	Floor Tile - Bottom Layer - White	Kitchen - Under Sink		
N	39	12"x12" Floor Tile - Top Layer - Beige	Kitchen - Under Sink		
N	40	12"x12" Floor Tile - Top Layer - Beige	Kitchen - Under Sink		
O	41	Mastic to Linoleum - Gray	Kitchen - Left		
O	42	Mastic to Linoleum - Gray	Kitchen - Right		
P	43	Linoleum - Brown	Kitchen - Left		
P	44	Linoleum - Brown	Kitchen - Right		
Q	45	Mastic to 4" Cove Base - Tan	Kitchen - Left		
Q	46	Mastic to 4" Cove Base - Tan	Kitchen - Right		
R	47	4" Cove Base - Brown	Kitchen - Left		
R	48	4" Cove Base - Brown	Kitchen - Right		

#218054364

**CHAIN OF CUSTODY**

Relinquished by: <i>J Leed</i>	(Sign)	(Date) 5/25/18	(Time) 1717	Relinquished by:	(Sign)	(Date)	(Time)
Received by: <i>M Gelfand</i>	(Sign)	(Date) 5/25/18	(Time) 1720	Received by:	(Sign)	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1<sup>st</sup> positive in any homogeneous group.

PROJECT NO.: 2004232.026.01.01

CLIENT: GOSR

PROJECT SITE: Jay Community Center - Au Sable Forks, NY

Project Manager: M. Gelfand

LOCATION(S) SURVEYED: Kitchen, Bathrooms, Boiler Room

PROPOSED PROJECT: Kitchen, Bathroom, and Boiler Room Renovations

DATE(S) OF INSPECTION: 5/23/2018

Inspector(s): Jeff Leed

LOUIS BERGER  
 TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341  
 ADDRESS: 96 Morton St, 8th Floor, New York, NY 10014

TURNAROUND TIME:  4 HR.  12 HR.  
 24 HR.  48 HR.  72 HR.  96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
S	49	Rope Gasket to Old Boiler - Gray	Boiler Room		
S	50	Rope Gasket to Old Boiler - Gray	Boiler Room		
T	51	Fire Brick to Old Boiler - Red	Boiler Room		
T	52	Fire Brick to Old Boiler - Red	Boiler Room		
U	53	Hatch Sealant to Old Boiler - Red	Boiler Room		
U	54	Hatch Sealant to Old Boiler - Red	Boiler Room		
V	55	Rope Gasket to New Boiler Ribs - White	Boiler Room		
V	56	Rope Gasket to New Boiler Ribs - White	Boiler Room		
W	57	Interior Brick Mortar - Gray	Boiler Room		
W	58	Interior Brick Mortar - Gray	Boiler Room		
X	59	Pipe Elbow to Fiberglass Pipes - Gray	Room Beneath Men's Bathroom		
X	60	Pipe Elbow to Fiberglass Pipes - Gray	Room Beneath Men's Bathroom		

#218054364

**CHAIN OF CUSTODY**

Relinquished by: <i>Jeff Leed</i>	(Date) 5/23/18	(Time) 1:17	Relinquished by:	(Date)	(Time)
Received by: <i>M. Gelfand</i>	(Date) 5/23/18	(Time) 1:20	Received by:	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1<sup>st</sup> positive in any homogeneous group.

PROJECT NO.: 2004232.026.01.01  
 CLIENT: GOSR  
 PROJECT SITE: Jay Community Center - Au Sable Forks, NY  
 Project Manager: M. Gelfand

LOCATION(S) SURVEYED: Kitchen, Bathrooms, Boiler Room  
 PROPOSED PROJECT: Kitchen, Bathroom, and Boiler Room Renovations  
 DATE(S) OF INSPECTION: 5/23/2018  
 Inspector(s): Jeff Leed

LOUIS BERGER  
 TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341  
 ADDRESS: 96 Morton St, 8<sup>th</sup> Floor, New York, NY 10014

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
X	61	Pipe Elbow to Fiberglass Pipes - Gray	Room Beneath Men's Bathroom		
Y	62	Brick Mortar to Exterior Steps at Main Entry - Gray	Exterior - Main Entry		
Y	63	Brick Mortar to Exterior Steps at Main Entry - Gray	Exterior - Main Entry		

**CHAIN OF CUSTODY**

Relinquished by: <u>J. Leed</u>	(Sign)	5/23/18	(Date)	17:17	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Received by: <u>S. Fasen</u>	(Sign)	5/23/18	(Date)	17:20	(Time)	Received by:	(Sign)	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1<sup>st</sup> positive in any homogeneous group.



# **Report of Environmental Survey Services**

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## **APPENDIX C:**

### **LEAD FIELD DATA SHEETS WITH XRF RESULTS**

# XRF Testing Data Report

Project Number	2004232.026.01.01.01
Testing Location	Jay Community Center, 11 School Road, Au Sable Forks, NY
Inspector	J. Leed
Date	May 23, 2018
XRF Model	RMD LPA-1
XRF Serial Number	3675

Test Number	Room	Component Name	Color	Condition	Substrate	Location (Wall/Side)	[Pb] (mg/cm <sup>2</sup> )	Result
1	-	CALIBRATION @ 1.0	5/23/2018 10:00	-	-	-	0.8	NEG
2	-	CALIBRATION @ 1.0		-	-	-	0.7	NEG
3	-	CALIBRATION @ 1.0		-	-	-	0.8	NEG
4	-	CALIBRATION @ 0.0		-	-	-	-0.3	NEG
5	-	CALIBRATION @ 0.0		-	-	-	-0.1	NEG
6	-	CALIBRATION @ 0.0		-	-	-	-0.1	NEG
7	Kitchen	Wall	White	Fair	Plaster	A	-0.1	NEG
8	Kitchen	Wall	White	Fair	Plaster	B	-0.1	NEG
9	Kitchen	Wall	White	Fair	Plaster	C	0	NEG
10	Kitchen	Wall	White	Fair	Plaster	D	0	NEG
11	Kitchen	Door	Brown	Fair	Wood	A	-0.1	NEG
12	Kitchen	Door Frame	White	Fair	Wood	A	0	NEG
13	Kitchen	Window Sash	White	Fair	Metal	B	-0.2	NEG
14	Kitchen	Door Saddle	Beige	Fair	Wood	A	-0.1	NEG
15	Kitchen	Cabinet	Yellow	Fair	Wood	C	-0.2	NEG
16	Dining Room	Wall w/ Kitchen	Brown	Fair	Wood	D	-0.2	NEG
<b>14</b>	<b>Ladies Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Fair</b>	<b>Tile</b>	<b>A</b>	<b>2.7</b>	<b>POS</b>
18	Ladies Room	Wall – Upper	White	Fair	Plaster	A	-0.1	NEG
<b>19</b>	<b>Ladies Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Fair</b>	<b>Tile</b>	<b>B</b>	<b>2.5</b>	<b>POS</b>
20	Ladies Room	Wall – Upper	White	Fair	Plaster	B	-0.1	NEG
<b>21</b>	<b>Ladies Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Fair</b>	<b>Tile</b>	<b>D</b>	<b>3.7</b>	<b>POS</b>

Test Number	Room	Component Name	Color	Condition	Substrate	Location (Wall/Side)	[Pb] (mg/cm <sup>2</sup> )	Result
22	Ladies Room	Wall – Upper	White	Fair	Plaster	D	0	NEG
23	Ladies Room	Stall	White	Fair	Metal	B	0	NEG
24	Ladies Room	Window	White	Fair	Metal	C	-0.3	NEG
25	Ladies Room	Door	White	Fair	Wood	A	-0.1	NEG
26	Ladies Room	Wall – Upper	Beige	Fair	Plaster	C	0.1	NEG
<b>27</b>	<b>Men's Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Fair</b>	<b>Tile</b>	<b>A</b>	<b>2.9</b>	<b>POS</b>
28	Men's Room	Wall – Upper	White	Fair	Plaster	A	0.5	NEG
<b>29</b>	<b>Men's Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Fair</b>	<b>Tile</b>	<b>B</b>	<b>3.8</b>	<b>POS</b>
30	Men's Room	Wall – Upper	White	Fair	Plaster	B	0.3	NEG
<b>31</b>	<b>Men's Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Fair</b>	<b>Tile</b>	<b>C</b>	<b>3.4</b>	<b>POS</b>
32	Men's Room	Wall – Upper	White	Fair	Plaster	C	-0.1	NEG
<b>33</b>	<b>Men's Room</b>	<b>Wall – Lower</b>	<b>White</b>	<b>Fair</b>	<b>Tile</b>	<b>D</b>	<b>2.9</b>	<b>POS</b>
34	Men's Room	Wall – Upper	White	Fair	Plaster	D	0.1	NEG
35	Men's Room	Window	White	Fair	Metal	C	-0.1	NEG
36	Men's Room	Door	Brown	Fair	Wood	A	-0.1	NEG
37	Men's Room	Door Frame	Gray	Fair	Metal	A	0.1	NEG
38	Men's Room	Stall	White	Fair	Metal	-	0	NEG
39	Boiler Room	Wall	White	Fair	Concrete	A	-0.3	NEG
40	Boiler Room	Wall	White	Fair	Concrete	B	-0.3	NEG
41	Boiler Room	Wall	White	Fair	Concrete	C	-0.2	NEG
42	Boiler Room	Wall	White	Fair	Concrete	D	-0.3	NEG
<b>43</b>	<b>Boiler Room</b>	<b>Door</b>	<b>Gray</b>	<b>Fair</b>	<b>Metal</b>	<b>A</b>	<b>2.9</b>	<b>POS</b>
44	Exterior	Ramp Handrail	Black	Fair	Metal	-	0	NEG
<b>45</b>	-	<b>CALIBRATE @ 1.0</b>	<b>5/23/2018 13:15</b>	-	-	-	1	<b>POS</b>
46	-	CALIBRATE @ 1.0		-	-	-	0.9	NEG
<b>47</b>	-	<b>CALIBRATE @ 1.0</b>		-	-	-	1	<b>POS</b>



Louis Berger

96 Morton St, 8th Fl  
New York, NY

XRF LEAD-BASED PAINT  
TESTING DATA SHEET

PAGE 1 OF 2

PROJECT NO.:  
CLIENT: GOSR  
INSPECTOR(S): Jeff Leed  
PROJ. MANAGER:

PROJECT NAME:  
PROJECT LOCATION: Jay Coon Center  
INSPECTION DATE: 5/23/18

NOTES:

XRF TEST #	LOCATION	SUBSTRATE	COLOR	COMPONENT	WALL LOCATION	CONDITION (I/F/P)	XRF READING [mg/cm <sup>2</sup> ]	INITIAL RESULT
1	Pos. Cal @ 1.0						0.8	P N
2							0.7	P N
3							0.8	P N
4	Neg. Cal @ 0.0						-0.5	P N
5							-0.1	P N
6							-0.1	P N
7	Kitchen	Plaster	White	Wall	A		-0.1	P N
8					B		-0.1	P N
9					C		0.0	P N
10					D		-0.0	P N
11		Wood	Brown	Door	A		-0.1	P N
12			White	Frame	A		0.0	P N
13		Metal		Window Sash	B		-0.2	P N
14		Wall	Beige	Door Saddle	A		-0.1	P N
15			Yellow	Cabinet	C		0.2	P N
16	Vining Run	Wood	Brown	Wall w/Kitchen	D		-0.2	P N
17	Ladies Room	Tile	White	Wall - Lower	A		2.7	(P) N
18		P		Upper	A		-0.1	P N
19		T		-L	B		2.5	(P) N
20		P		U	B		-0.1	P N
21		T		L	D		3.2	(P) N
22		P		U	D		-0.0	P N
23		M		Stall	B		-0.0	P N
24		M		Window	C		-0.3	P N
25		W		Door	A		-0.1	P N
26		P	Beige	Wall - Upper	C		0.1	P N
27	Men's Room	T	Wd	Wall - L	A		2.9	(P) N
28		P		U	A		0.5	P N
29		T		L	B		3.8	(P) N
30		P		U	B		0.3	P N

Substrate: M: Metal; PL: Plaster; S: Sheetrock; C: Concrete; CB: Cinderblock; CR: Ceramic (Sinks, Toilets, etc.); CT: Ceramic Tile; PG: Porcelain-glazed Block; B: Brick; W: Wood; V: Vinyl; FG: Fiberglass; G: Glass; Condition: I = Intact; F = Fair; P = Poor Initial Result: P = Positive; N = Negative

Instrument RMD-LPA-1 Serial # 3675

Inspector Signature *[Signature]*





Louis Berger

96 Morton St, 8th Fl  
New York, NY

XRF LEAD-BASED PAINT  
TESTING DATA SHEET

PROJECT NO.:  
CLIENT: GOSP  
INSPECTOR(S): Jeff Lead  
PROJ. MANAGER:

PROJECT NAME:  
PROJECT LOCATION: Jay Conn Center  
INSPECTION DATE: 5/23/18

NOTES:

XRF TEST #	LOCATION	SUBSTRATE	COLOR	COMPONENT	WALL LOCATION	CONDITION (I/F/P)	XRF READING [mg/cm <sup>2</sup> ]	INITIAL RESULT	
31	Mens Room	P	W	Wall-L	C		3.4	(P) N	
32	↓	P		U	C		-0.1	P N	
33				L	V		2.9	(P) N	
34				OV	D		0.1	P N	
35			M		Window	C		-0.1	P N
36			W	Br	Door	A		-0.1	P N
37			M	Gray	↓ Frame	A		0.1	P N
38			M	W	Stall			-0.0	P N
39		Boiler Rm	C	W	Wall	A		-0.3	P N
40	↓				B		-0.3	P N	
41					C		-0.2	P N	
42			W			V		-0.3	P N
43	↓	M	Green	Door	A		2.9	(P) N	
44		Ext.	↓	Black	Ramp Handrail			-0.0	P N
45	Pos. Cal @ 1.0						1.0	P N	
46	↓						0.9	P N	
47							1.0	P N	
									P N
								P N	
								P N	
								P N	
								P N	
								P N	
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								P N	

Substrate: M: Metal; PL: Plaster; S: Sheetrock; C: Concrete; CB: Cinderblock; CR: Ceramic (Sinks, Toilets, etc.); CT: Ceramic Tile; PG: Porcelain-glazed Block; B: Brick; W: Wood; V: Vinyl; FG: Fiberglass; G: Glass; Condition: I = Intact; F = Fair; P = Poor Initial Result: P = Positive; N = Negative

Instrument RMD-LPA-1 Serial # 3675  
Inspector Signature



# **Report of Environmental Survey Services**

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## **APPENDIX D:**

### **LABORATORY ACCREDITATIONS & PERSONNEL CERTIFICATIONS**

**New York State – Department of Labor**

Division of Safety and Health  
License and Certificate Unit  
State Campus, Building 12  
Albany, NY 12240

**ASBESTOS HANDLING LICENSE**

Louis Berger & Assoc., P.C.  
16th Floor  
48 Wall Street  
  
New York, NY 10005

FILE NUMBER: 09-46778  
LICENSE NUMBER: 46778  
LICENSE CLASS: RESTRICTED  
DATE OF ISSUE: 07/13/2017  
EXPIRATION DATE: 07/31/2018

Duly Authorized Representative – Prakash Saha:

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.



Eileen M. Franko, Director  
For the Commissioner of Labor

# United States Environmental Protection Agency

This is to certify that



Jeffrey A Leed

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226 as:

Risk Assessor

## In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires November 18, 2019

LBP-R-128763-1

Certification #

November 17, 2016

Issued On



John Gorman, Chief

Pesticides & Toxic Substances Branch





01213 004426021 48



Department of Labor

JEFFREY A LEED

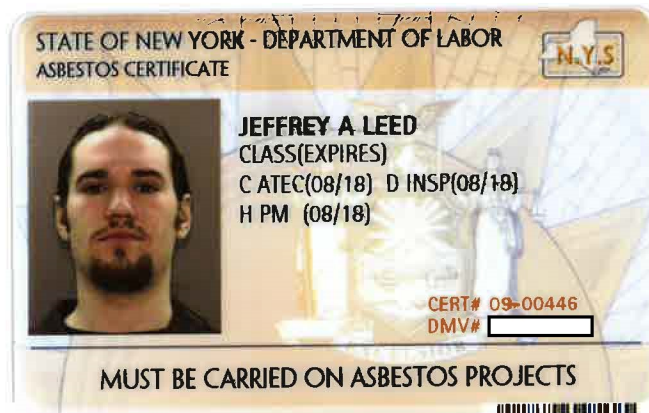
C/O LOUIS BERGER 48 WALL ST - 16TH FL  
NEW YORK NY 10005

Enclosed is your new card.

## NYS Department of Labor

The Department of Labor is happy to provide this improved card. We welcome your comments:  
nysdol@labor.ny.gov or call (518) 457-2735

YOUR NEW CARD



STATE OF NEW YORK - DEPARTMENT OF LABOR  
ASBESTOS CERTIFICATE



**MICHAEL GELFAND**  
CLASS(EXPIRES)  
D INSP(02/19) E MGPL(02/19)  
I PD (02/19)

CERT# 98-17113  
DMV# [REDACTED]

MUST BE CARRIED ON ASBESTOS PROJECTS





## Department of Health

ANDREW M. CUOMO  
Governor

HOWARD A. ZUCKER, M.D., J.D.  
Commissioner

SALLY DRESLIN, M.S., R.N.  
Executive Deputy Commissioner

LAB ID: 11480

April 01, 2018

MR. PAUL J. MUCHA  
AMERICA SCIENCE TEAM NEW YORK, INC  
117 EAST 30TH ST  
NEW YORK, NY 10016

Certificate Expiration Date:  
April 01, 2019

Dear Mr. Mucha,

Enclosed are certificate(s) of approval issued to your environmental laboratory for the current permit year. The certificate(s) supersede(s) any previously issued one(s) and is(are) in effect through the expiration date listed. Please carefully examine the certificate(s) to insure that the categories, subcategories, analytes, and methods for which your laboratory is approved are correct. In addition, verify that your laboratory's name, address, lead technical director, and identification number are accurate.

Pursuant to NYCRR Subpart 55-2.2, original certificates must be posted conspicuously in the laboratory and copies shall be made available to any client of the laboratory upon request.

Pursuant to NYCRR Subpart 55-2.6, any misrepresentation of the fields of accreditation (category - method - analyte) for which your laboratory is approved may result in denial, suspension, or revocation of your certification. Any use of the Environmental Laboratory Approval Program (ELAP) or National Environmental Laboratory Accreditation Program (NELAP) name, reference to the laboratory's approval status, and/or using the NELAP logo in any catalogs, advertising, business solicitations, proposals, quotations, laboratory analytical reports, or other materials must include the laboratory's ELAP identification number and distinguish between testing for which the laboratory is approved and testing for which the laboratory is not approved.

If you have any questions, please contact ELAP at the New York State Department of Health (NYS DOH), Wadsworth Center, PO Box 509, Albany NY, 12201-0509; by phone at (518) 485-5570; by facsimile at (518) 485-5568; and by email at [elap@health.ny.gov](mailto:elap@health.ny.gov).

Sincerely,

Victoria Pretti  
Director and QA Officer  
Environmental Laboratory Approval Program

NEW YORK STATE DEPARTMENT OF HEALTH  
WADSWORTH CENTER



Expires 12:01 AM April 01, 2019  
Issued April 01, 2018

**CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE**

*Issued in accordance with and pursuant to section 502 Public Health Law of New York State*

MR. PAUL J. MUCHA  
AMERICA SCIENCE TEAM NEW YORK, INC  
117 EAST 30TH ST  
NEW YORK, NY 10016

NY Lab Id No: 11480

*is hereby APPROVED as an Environmental Laboratory for the category  
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE  
All approved subcategories and/or analytes are listed below:*

**Miscellaneous**

Asbestos in Friable Material	Item 198.1 of Manual EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual

Serial No.: 57809

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.





**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005**

**AmeriSci New York**  
DBA: AmeriSci New York  
117 E. 30th Street  
New York, NY 10016  
Mr. Paul Mucha  
Phone: 212-679-8600 Fax: 212-679-2711  
Email: pmucha@amerisci.com  
<http://www.amerisci.com>

**ASBESTOS FIBER ANALYSIS**

**NVLAP LAB CODE 200546-0**

**Bulk Asbestos Analysis**

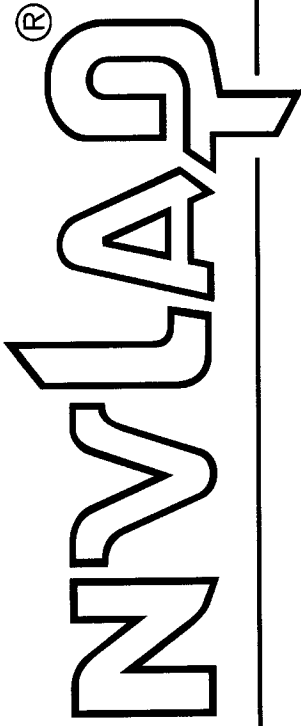
<u>Code</u>	<u>Description</u>
18/A01	EPA -- Appendix E to Subpart E of Part 763 -- Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

**Airborne Asbestos Analysis**

<u>Code</u>	<u>Description</u>
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.

For the National Voluntary Laboratory Accreditation Program

United States Department of Commerce  
National Institute of Standards and Technology



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# Certificate of Accreditation to ISO/IEC 17025:2005

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NVLAP LAB CODE: 200546-0

**AmeriSci New York**  
New York, NY

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:

## **Asbestos Fiber Analysis**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2017-07-01 through 2018-06-30

Effective Dates

---

A handwritten signature in black ink, appearing to read "Peter S. Homan".

---

For the National Voluntary Laboratory Accreditation Program

# United States Environmental Protection Agency

This is to certify that

Louis Berger & Assoc., P.C.

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226

In the Jurisdiction of:

New York

This certification is valid from the date of issuance and expires July 27, 2018

NY-126444-2

Certification #

May 28, 2015

Issued On



Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

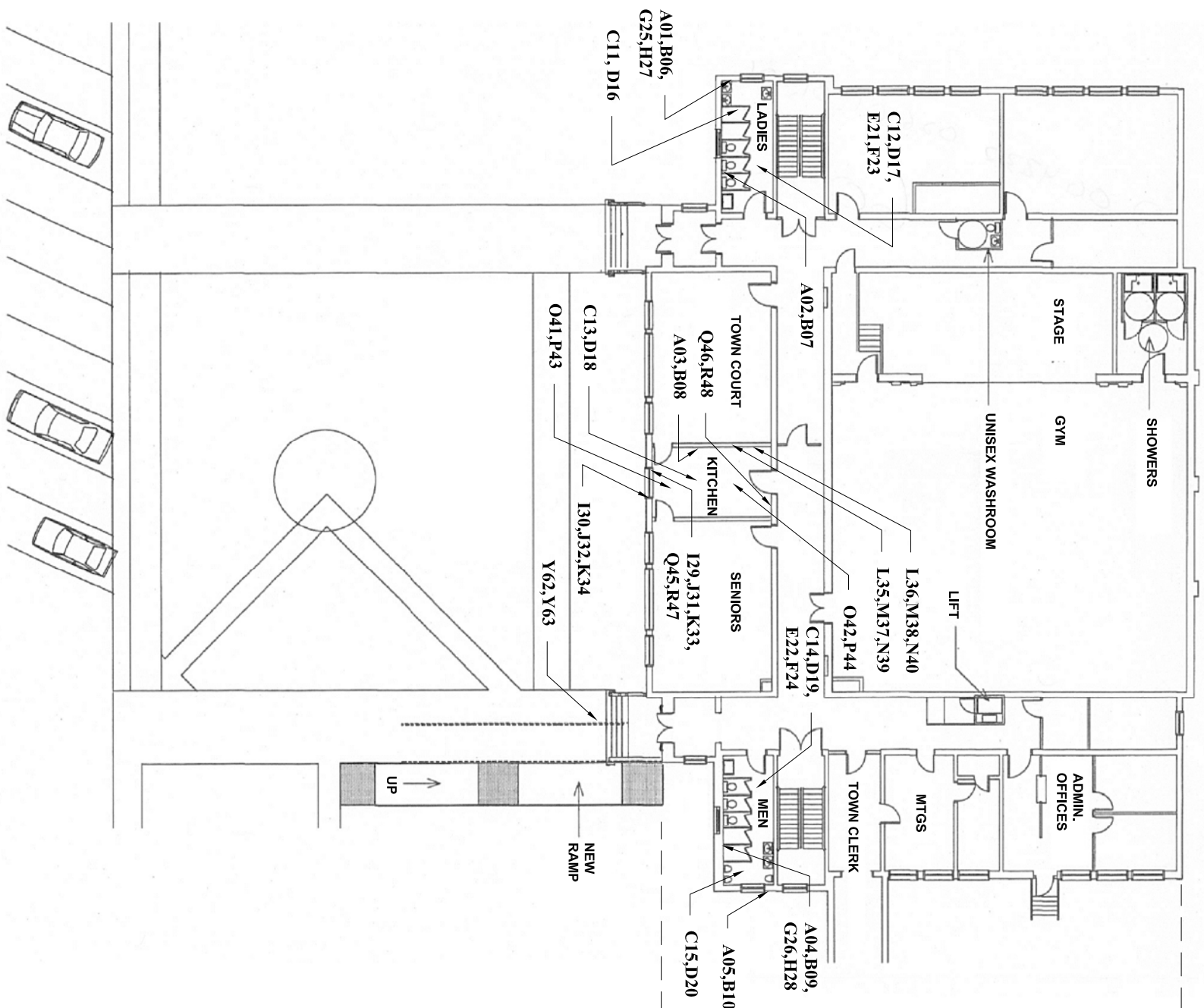


# **Report of Environmental Survey Services**

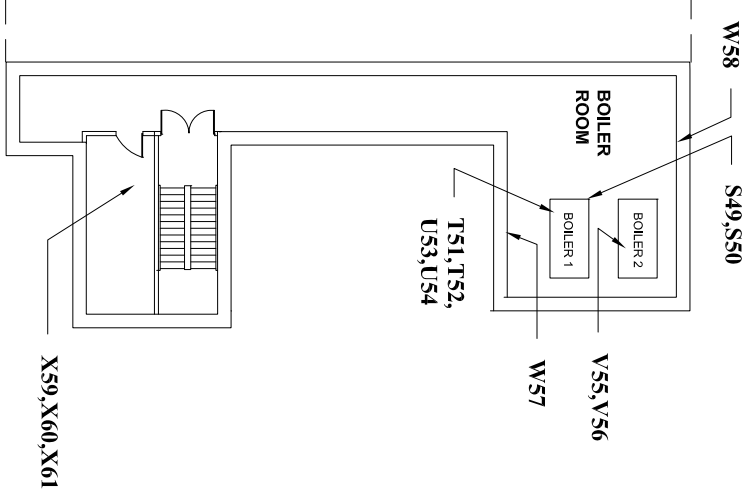
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## **APPENDIX E:**

### **BULK SAMPLE LOCATION DRAWINGS**



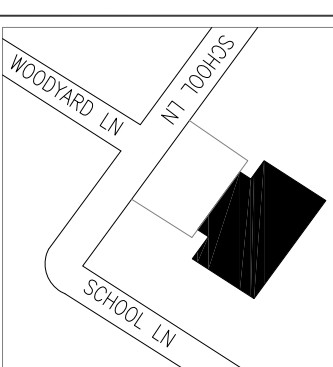
1 FIRST FLOOR PLAN  
SCALE: NOT TO SCALE



2 PARTIAL BASEMENT FLOOR PLAN  
SCALE: NOT TO SCALE



KEY PLAN



**Louis Berger**

96 Madison Street, 8th Floor, New York, New York 10014  
TEL 212.612.7900 FAX 212.363.4341 WWW.LOUISBERGER.COM

REVISIONS:	NUMBER	DESCRIPTION	DATE
	1		
	2		
	3		
	4		

**GOSR JAY COMMUNITY CENTER  
EMERGENCY SHELTER UPGRADE  
11 SCHOOL LN  
AU SABLE FORKS, NY 12912**

DRAWING TITLE:  
**ASBESTOS BULK SAMPLE LOCATIONS  
FIRST FLOOR AND PARTIAL BASEMENT  
FLOOR PLAN**

DRAWN BY: J. PEREZ SCALE: NOT TO SCALE

INSP./INV.: J. LEED DATE: 06/01/2018

CERTIFICATE NO.: 134917 DRAWING NUMBER:

CHECKED BY: PRAKASH SAHA

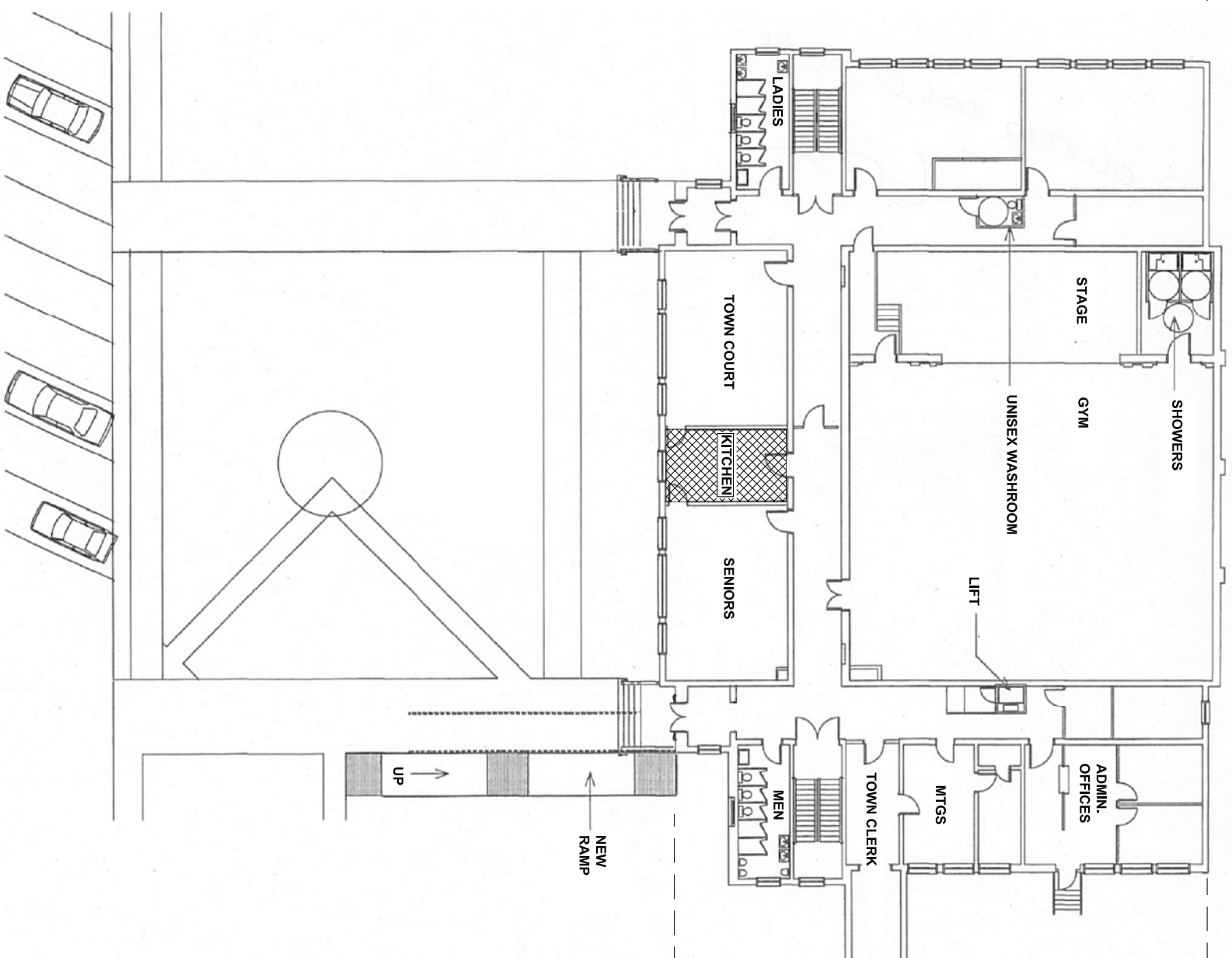
**BSL001**

DRAWING NUMBER:  
1 OF 1



**APPENDIX F:**

**ACM LOCATION PLAN**



SCHOOL LN

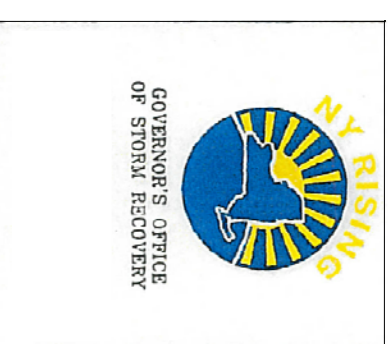
**1** FIRST FLOOR PLAN  
ACM001 SCALE: NOT TO SCALE



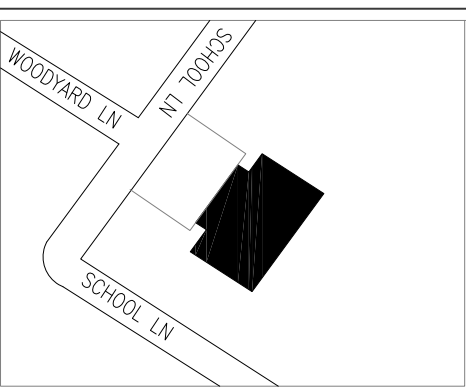
**2** PARTIAL BASEMENT FLOOR PLAN  
ACM001 SCALE: NOT TO SCALE

**LEGEND**

- LOCATION OF ASBESTOS CONTAINING ROPE GASKET TO OLD BOILER - GRAY
- LOCATION OF ASBESTOS CONTAINING FLOORING SYSTEM INCLUDING MASTIC TO BOTTOM LAYER - FLOOR TILE - BLACK, FLOOR TILE - BOTTOM LAYER - WHITE, 12" X 12" FLOOR TILE - TOP LAYER - BEIGE, MASTIC TO LINOLEUM - GRAY, LINOLEUM - BROWN



KEY PLAN



**Louis Berger**  
96 Madison Street, 8th Floor, New York, New York 10014  
TEL 212.612.7900 FAX 212.363.6341 WWW.LOUISSBERGER.COM

REVISIONS:

NUMBER	DESCRIPTION	DATE
1		
2		
3		
4		

**GOSR JAY COMMUNITY CENTER  
EMERGENCY SHELTER UPGRADE  
11 SCHOOL LN  
AU SABLE FORKS, NY 12912**

DRAWING TITLE:  
**ASBESTOS CONTAINING MATERIALS  
FIRST FLOOR AND PARTIAL BASEMENT  
FLOOR PLAN**

DRAWN BY: J. PEREZ  
INSR./INV.: J. LEDD  
CERTIFICATE NO.: 134917  
CHECKED BY: PRAKASH SAHA

SCALE: NOT TO SCALE  
DATE: 06/01/2018  
DRAWING NUMBER:  
**ACM001**  
DRAWING NUMBER:  
1 OF 1



# **Report of Environmental Survey Services**

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## **APPENDIX G:**

### **PHOTO LOG**



**JAY COMMUNITY CENTER  
11 SCHOOL LANE  
AU SABLE FORKS, NY**



**Photo 1:** Confirmed ACM Mastic to Bottom Layer Floor Tile – Black, Mastic to Linoleum – Gray, and Linoleum – Brown, along with ACM Contaminated Floor Tile – Bottom Layer - White and 12'x12' Floor Tile – Top Layer – Beige



**Photo 2:** Confirmed ACM Rope Gasket to Old Boiler – Gray

**JAY COMMUNITY CENTER  
11 SCHOOL LANE  
AU SABLE FORKS, NY**



**Photo 3: Non-ACM Ceiling Plaster and Wall Plaster**



**Photo 4: Non-ACM Ceramic Floor Tile Grout/Mortar – Gray, Ceramic Wall Tile Mortar – Gray, Ceramic Wall Tile Grout - White and Lead-Based Paint on Tile Wall**

**JAY COMMUNITY CENTER  
11 SCHOOL LANE  
AU SABLE FORKS, NY**



**Photo 5: Non-ACM Pipe Elbow to Fiberglass Pipes – Gray**



**Photo 6: Non-ACM Hatch Sealant to Old Boiler - Red**

**JAY COMMUNITY CENTER  
11 SCHOOL LANE  
AU SABLE FORKS, NY**



**Photo 7:** Non-ACM Brick Mortar to Exterior Steps at Main Entry – Gray

## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, and placement procedures for the following types of concrete mixes:
  - 1. Foundations (Stair cases, Ramps, Landings)
  - 2. Sidewalks
  - 3. Equipment Pads
- B. Related Sections:
  - 1. Division 31 Section "Aggregates for Earthwork" for aggregate subbase course.
  - 2. Division 31 Section "Earth Moving" for subgrade preparation.
  - 3. Division 32 Section "Concrete Sidewalks".

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
  - a. Submit all mix design requirements in one package including product information for admixtures.
  - b. Indicate where each mix will be used
  - c. Indicate proposed method of curing
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
  - 1. Location of construction joints is subject to approval of the Architect

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Cementitious materials.
  - 2. Admixtures.
  - 3. Form materials and form-release agents.

4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Semirigid joint filler.
13. Joint-filler strips.
14. Repair materials.

#### 1.4 QUALITY ASSURANCE

- A. Obtain cementitious materials from same source throughout project.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products, that complies with ASTM C 94/C 94M requirements for production facilities and equipment, and has a minimum three years experience.
  1. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation (NYSDOT).
  2. Truck mixers for concrete shall be currently approved by the New York State Department of Transportation (NYSDOT).
  4. Fly Ash supplier shall be on the New York State Department of Transportation's current "Approved List of Suppliers of Fly Ash".
  5. Source Quality Control: The Owner's Representative reserves the right to inspect and approve the following items, at his own discretion, either with his own forces or with a designated inspection agency.
  6. Notify the Owner's Representative and the testing agency at least 24 hours prior to placing any concrete.
- C. Installer Qualifications: Company specializing in performing work of this section with minimum three years documented experience.
- D. Perform work in accordance with:
  1. New York State Department of Transportation (NYSDOT) Sept 5, 2013 Standard Specifications:
    - a. Section 501: Portland Cement Concrete – General.
    - b. Section 608: Sidewalks, Driveways, and Bicycle Paths.
  2. ACI Publications:
    - a. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
    - b. ACI 301, "Specification for Structural Concrete."
    - c. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
  3. ASTM International:
    - a. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

- b. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
- c. ASTM C150 - Standard Specification for Portland Cement.
- d. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- e. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- f. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
- g. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
- h. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

E. Preinstallation Conference: Conduct conference at Project site.

## PART 2 - PRODUCTS

### 2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum
- D. 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.
- E. 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 (25 mm) to the plane of exposed concrete surface.
- F. Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface

### 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Galvanized Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, ASTM A 767/A 767M, Class I zinc coated after fabrication and bending.

- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."
  - 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
  - 2. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports

## 2.3 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer
- B. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. ASTM C 150, Type I or II Portland Cement.
  - 2. Use approved brand without change for the entire project.
  - 3. Cement used throughout the project shall be uniform in color so as not to prejudice the appearance of exposed concrete.
    - a. Fly Ash: ASTM C 618, Class F, as per NYSDOT Sept 5, 2013 Standard Specifications Section 711-10 (Fly Ash).
- C. Normal-Weight Aggregates: As per NYSDOT 2013 Standard Specifications Section 703-01 (Fine Aggregates) and 703-02 (Course Aggregate). Provide Aggregates from an approved NYSDOT source.
  - 1. Fine Aggregate:
    - a. Free of materials with deleterious reactivity to alkali in cement.
    - b. Clean, sharp, natural sand free from loam, clay, organic impurities or foreign materials meeting the requirements of ASTM C33.
  - 2. Coarse Aggregate: Crushed gravel or crushed stone meeting the requirements of ASTM C33. Aggregate size is dependent on mix type.
- D. Water: As per NYSDOT 2013 Standard Specifications Section 712-01 (Water) and ASTM C 94/C 94M, Potable. Approval of Owner's Representative is required for any water source other than a public potable water supply.
- E. Air-Entraining Admixture: As per NYSDOT 2013 Standard Specifications Section 711-08 (Admixtures) and ASTM C 260.
- F. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. All admixtures to be used shall be submitted to the Owner's



Representative for review. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.4 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Anti-Spalling, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B. Approved products and Manufactures include, but are not limited to, the following:
  1. Kure-N-Seal by Sonneborn, A Division of BASF.
  2. SealCure Emulsion by Conspec, A Dayton Superior Company.
  3. Cure & Seal by Symons Corp.

## 2.5 RELATED MATERIALS

- A. Expansion Joint Strips: As per NYSDOT 2013 Standard Specifications Section 705-07 (Premoulded Resilient Joint Filler) and ASTM D 1751, asphalt-saturated cellulosic fiber.
  1. Use a material/manufacturer from the NYSDOT Approved List.

## 2.6 CONCRETE MIXTURES

- 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, according to ACI 301.
- B. Cementitious Materials: Fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume may be used to reduce the total amount of portland cement.
- C. Optional Material: Fly ash may be substituted for (Portland) cement in normal weight and lightweight concrete up to a maximum of 15 percent by weight of the required minimum (Portland) cement. If fly ash is incorporated in a concrete design mix, make necessary

adjustments to the design mix to compensate for the use of fly ash as a partial replacement for (Portland) cement.

- D. All concrete shall be air-entrained.
- E. Cast-in-place concrete shall be normal weight concrete and shall have a minimum compressive strength of 4000 psi except as otherwise specified on the drawing notes. See table for location and concrete specifications.

Location	F'c (Min. 28-Day Comp. Strength) (psi)	Cement Unit Weight (lbs/cy) min.	ASTM C33 Aggregate (Size No.)	Range * Slump (Inches)	Water Cement Ratio (by Weight)	Air Entr. (percent) **
General Foundation (includes foundations for stairs, ramps & landings)	4,000	611	67 or 57	2"- 4"	0.46	4-8
Sidewalks & Pads	4,000	611	67 or 57	2"- 4"	0.46	4-8

\*Slump, as noted in table, is before the addition of any water-reducing admixtures. When a water-reducing admixture is used, maximum slump shall be 6 inches.

\*\*Use air-entraining admixture, not air-entrained cement.

- F. Admixtures: Do not use admixtures in concrete unless specified or approved in writing by the Owner's Representative. Use admixtures according to manufacturer's written instructions.
- G. Adjustment to Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to the Owner, and as accepted by the Owner's Representative. Laboratory test data for revised mix design and strength results must be submitted to and accepted by the Owner's Representative before using in the work.
- H. Synthetic Fiber: Uniformly disperse in concrete mixture at rates specified in Part 2.3A and Part 2.3B.

## 2.7 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."
- B. Place as per the project Plans.

## 2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete.

### 3.2 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. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

### 3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

### 3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Owner's Representative.
- C. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

### 3.5 CONCRETE PLACEMENT

- A. Place concrete in accordance with NYSDOT Sept 1, 2017 Standard Specifications, Section 608-3.01 (Concrete Sidewalks and Driveways).
- B. Before placing concrete, verify that
  - 1. Compacted subgrade soil is acceptable and ready to support paving and imposed loads.
  - 2. Compacted subbase is acceptable and ready to support paving and imposed loads.
  - 3. Gradients and elevations of base are correct.
  - 4. Installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed
  - 5. Moisten base to minimize absorption of water from fresh concrete.
  - 6. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.
  - 7. Notify Owner's Representative minimum 24 hours prior to commencement of concreting operations.
- C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- E. Weather Conditions: Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement and curing.
  - 1. Hot Weather:
    - a. Provide adequate controls to insure that the temperature of the concrete when placed does not exceed 90 degrees F., and make every effort to place it at a lower temperature. The temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set or cold joints. Ingredients may be cooled before mixing by shading the aggregates, fog spraying the coarse aggregate, chilling the mixing water or other approved means. Mixing water may be chilled with flake ice or well-crushed ice of a size that will melt completely during mixing, providing the water equivalent of the ice is calculated into the total amount of mixing water.
    - b. When air temperature is between 85 degrees F and 90 degrees F, reduce mixing and delivery time from 1 1/2 hours to 75 minutes, and when air temperature is above 90°F, reduce mixing and delivery time to 60 minutes. (ACI 305)
  - 2. Cold Weather:
    - a. When air temperature is below 40 degrees F heat the mixing water and, if necessary, the aggregates to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement. If the mixing

water is heated, do not exceed a temperature of 140 degrees F at the time it is added to the cement and aggregates. (ACI 306)

- F. Cold-Weather Placement: Comply with ACI 306.1.
- G. Hot-Weather Placement: Comply with ACI 301.
- H. Interruption of Concreting: Should placing of concrete be suspended or unavoidably interrupted, keyways and bulkheads shall be provided and steps taken to prevent feather-edging when work is resumed. Horizontal surfaces shall be roughened for bond.
- I. Concrete shall be deposited within thirty (30) minutes of completion of mixing. If set retarding admixtures are used, concrete shall be deposited as recommended by the admixture manufacturer. In either case, concrete shall be discharged within 150 minutes of addition of cement to mixer.
- J. Retempering concrete, at the project site, by adding water or other means shall not be permitted after the initial specified slump has been obtained and site added admixtures are discharged.

### 3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces not exposed to view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view, and to receive a rubbed finish
- C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
  - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  - 2. Apply to exposed surfaces of knee walls at the staircases.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.7 FINISHING FLOORS AND SLABS

- A. Perform work in accordance with Division 32 Sections “Rigid Paving”, and “Concrete Sidewalks”.

### 3.8 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Contractor has the option to apply evaporation retarder to uniformed concrete surfaces if hot, dry, or windy conditions cause rapid moisture loss. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Compound: Apply curing compound immediately after final finishing. Apply according to manufacturer's written instructions.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

### 3.9 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Owner's Representative. Remove and replace concrete that cannot be repaired and patched to Owner's Representative approval.

### 3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner's Representative will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

Testing Services: Tests shall be performed according to ACI 301.

- B. The following Inspections will be performed:

1. Steel reinforcement placement.
  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.
- C. Concrete Tests (to be performed by the independent testing agency): At each concrete placement that will include testing, two sets of concrete cylinders will be cast and field cured. Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to 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 will provide 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 C 143/C 143M; 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. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C 31/C 31M.
    - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    - b. 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.
  7. 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.
  8. 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 .
  9. Test results shall be reported in writing to the Owner's Representative, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in

- Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Owners Representative but will not be used as sole basis for approval or rejection of concrete.
  11. Additional Tests: 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 the Owner's Representative. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Owner's Representative.
  12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  13. Contractor shall correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents. Contractor's method of correcting any deficiencies in the work shall be approved by the Owner's Representative.

END OF SECTION 033000



## SECTION 054000 - COLD-FORMED METAL FRAMING

### 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. Interior non-load-bearing wall framing exceeding height limitations of standard, nonstructural metal framing.
  - 2. Floor joist framing.
  - 3. Ceiling joist framing.
  - 4. Soffit framing.
- B. Related Requirements:
  - 1. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies, with height limitations.
  - 2. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
  - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- C. Delegated-Design Submittal: For cold-formed steel framing.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.

- B. Welding certificates.
- C. Product Certificates: For each type of code-compliance certification for studs and tracks.
- D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.
  - 1. Steel sheet.
  - 2. Expansion anchors.
  - 3. Power-actuated anchors.
  - 4. Mechanical fasteners.
  - 5. Vertical deflection clips.
  - 6. Horizontal drift deflection clips
  - 7. Miscellaneous structural clips and accessories.
- E. Evaluation Reports: For nonstandard cold-formed steel framing from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, or the Steel Stud Manufacturers Association.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- E. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. CEMCO; California Expanded Metal Products Co.
  - 2. ClarkDietrich.
  - 3. Jaimes Industries.

4. [MarinoWARE](#).

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
  - 1. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    - a. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft..
  - 2. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F
  - 3. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
    - a. Upward and downward movement of 1/2 inch.
  - 4. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
  - 1. Floor and Roof Systems: AISI S210.
  - 2. Wall Studs: AISI S211.
  - 3. Headers: AISI S212.
  - 4. Lateral Design: AISI S213.
- D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
  - 1. Grade: ST33H.
  - 2. Coating: G60.

## 2.4 INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0329 inch.
  - 2. Flange Width: 1-3/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0329 inch.
  - 2. Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ClarkDietrich.
    - b. SCAFCO Steel Stud Company.
    - c. Simpson Strong-Tie Co., Inc.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0428 .
  - 2. Flange Width: 1 inch plus the design gap for one-story structures.
- E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

## 2.5 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0329 inch.
  - 2. Flange Width: 1-5/8 minimum.

## 2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
  - 1. Supplementary framing.
  - 2. Bracing, bridging, and solid blocking.
  - 3. Web stiffeners.
  - 4. Anchor clips.
  - 5. End clips.
  - 6. Foundation clips.
  - 7. Gusset plates.
  - 8. Stud kickers and knee braces.
  - 9. Joist hangers and end closures.
  - 10. Hole-reinforcing plates.
  - 11. Backer plates.

## 2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Anchor Bolts: ASTM F1554, Grade 36 threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.
- C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.
  - 1. Uses: Securing cold-formed steel framing to structure.
  - 2. Type: Torque-controlled expansion anchor.
  - 3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
- D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
  - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

## 2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M

- B. Cement Grout: Portland cement, ASTM C150/C150M, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.
- D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

## 2.9 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate framing assemblies using jigs or templates.
  - 2. Cut framing members by sawing or shearing; do not torch cut.
  - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
  - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:
  - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing 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.

### 3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.
- C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

### 3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
  - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
  - 1. Cut framing members by sawing or shearing; do not torch cut.
  - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

- a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
  - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

#### 3.4 INTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
  - 1. Stud Spacing: 16 inches.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  - 1. Install single deep-leg deflection tracks and anchor to building structure.
  - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
  - 3. Connect vertical deflection clips to studs and anchor to building structure.
  - 4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated but not more than 48 inches apart. Fasten at each stud intersection.
  - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.



2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
1. Install solid blocking at 96-inch.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.5 ERECTION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

### 3.6 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.7 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

## SECTION 061000 - ROUGH CARPENTRY

## 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. Framing with dimension lumber.
  - 2. Wood blocking, and nailers.
  - 3. Wood furring

## 1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
  - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
  - 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
  - 1. Power-driven fasteners.
  - 2. Post-installed anchors.
  - 3. Metal framing anchors.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

## PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Treatment shall not promote corrosion of metal fasteners.
  - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
  - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
  - 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664 and design value adjustment factors shall be calculated according to ASTM D6841.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
  - 1. For exposed lumber indicated to receive a stained or natural finish, **mark end or back of each piece**
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat all rough carpentry unless otherwise indicated

## 2.3 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.
  - 1. Application: All interior partitions.
  - 2. Species:
    - a. Hem-fir (north); NLGA.
    - b. Southern pine or mixed southern pine; SPIB.
    - c. Spruce-pine-fir; NLGA.
    - d. Hem-fir; WCLIB, or WWPA.

- e. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
- f. Northern species; NLGA.
- g. Eastern softwoods; NeLMA.
- h. Western woods; WCLIB or WWPA.

## 2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Rooftop equipment bases and support curbs.
  - 4. Cants.
  - 5. Furring.
  - 6. Grounds.
  - 7. Utility shelving.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:
  - 1. Hem-fir (north); NLGA.
  - 2. Mixed southern pine or southern pine; SPIB.
  - 3. Spruce-pine-fir; NLGA.
  - 4. Hem-fir; WCLIB or WWPA.
  - 5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
  - 6. Western woods; WCLIB or WWPA.
  - 7. Northern species; NLGA.
  - 8. Eastern softwoods; NeLMA.
- C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:
  - 1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
  - 2. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
  - 3. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
  - 4. Eastern softwoods; No. 2 Common grade; NeLMA.
  - 5. Northern species; No. 2 Common grade; NLGA.
  - 6. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

## 2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

## 2.6 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.
  - 2. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

## 2.7 METAL FRAMING ANCHORS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
  - 1. [Cleveland Steel Specialty Co.](#)
  - 2. [KC Metals Products, Inc.](#)
  - 3. [Phoenix Metal Products, Inc.](#)
  - 4. [Simpson Strong-Tie Co., Inc.](#)
  - 5. [USP Structural Connectors.](#)
- B. Allowable design loads, as published by manufacturer, shall meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
  - 1. Use for interior locations unless otherwise indicated.

- D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
  - 1. Use for wood-preservative-treated lumber and where indicated.
- E. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, [**Type 304**] [**Type 316**].
  - 1. Use for exterior locations and where indicated.

## 2.8 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- C. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
- D. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
- E. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.



- F. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- G. Do not splice structural members between supports unless otherwise indicated.
- H. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
  - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- I. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
  - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
  - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
  - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
  - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- J. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- K. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use inorganic boron for items that are continuously protected from liquid water.
  - 2. Use copper naphthenate for items not continuously protected from liquid water.
- L. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- M. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
  - 3. ICC-ES evaluation report for fastener.

- N. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

### 3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

### 3.3 INSTALLATION OF WOOD FURRING

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

### 3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

## SECTION 078413 - PENETRATION FIRESTOPPING

### 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. Penetrations in fire-resistance-rated walls.
  - 2. Penetrations in horizontal assemblies.
  - 3. Penetrations in smoke barriers.

#### 1.3 ALLOWANCES

- A. Penetration firestopping Work is part of an allowance.

#### 1.4 UNIT PRICES

- A. Work of this Section is affected by unit prices.

#### 1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
  - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

## 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

## 1.8 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

## 1.9 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

## 1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

## 1.11 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
  - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

- a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
  - 1) UL in its "Fire Resistance Directory."
  - 2) Intertek Group in its "Directory of Listed Building Products."
  - 3) FM Approval in its "Approval Guide."

## 2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. 3M Fire Protection Products.
    - b. A/D Fire Protection Systems Inc.
    - c. Construction Solutions.
    - d. Grabber Construction Products.
    - e. Hilti, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
  2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
  3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.
  1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.

- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
1. Permanent forming/damming/backing materials.
  2. Substrate primers.
  3. Collars.
  4. Steel sleeves.

## 2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

## 2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer

speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

### 3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
  1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  2. Contractor's name, address, and phone number.
  3. Designation of applicable testing and inspecting agency.
  4. Date of installation.
  5. Manufacturer's name.
  6. Installer's name.

### 3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

### 3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.



- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

## SECTION 092116.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

### 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 gypsum board shaft wall assemblies.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall assembly.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and support them on risers on a flat platform to prevent sagging.

#### 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with gypsum-shaftliner-board manufacturer's written instructions.
- B. Do not install finish panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E90 and classified according to ASTM E413 by a testing and inspecting agency.

### 2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

#### A. Gypsum Shaftliner Board:

- 1. Moisture- and Mold-Resistant, Fiberglass-Mat Faced: ASTM C1658/C1658M; manufacturer's proprietary fire-resistive liner panels with ASTM D3273 mold-resistance score of 10 as rated according to ASTM D3274, 1 inch thick, and with double beveled long edges.

- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1) American Gypsum.
- 2) Georgia-Pacific Gypsum LLC.
- 3) USG Corporation.

- B. Non-Load-Bearing Steel Framing, General: Complying with ASTM C645 requirements for metal unless otherwise indicated and complying with requirements for fire-resistance-rated assembly indicated.

- 1. Protective Coating: Coating with equivalent corrosion resistance of ASTM A653/A653M.

- C. Studs: Manufacturer's standard profile for repetitive, corner, and end members as follows:

- 1. Depth: 2-1/2 inches.
- 2. Minimum Base-Metal Thickness: 0.018 inch.

- D. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.

- 1. Minimum Base-Metal Thickness: Matching steel studs.

- E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. CEMCO; California Expanded Metal Products Co.
  - b. ClarkDietrich.
  - c. GCP Applied Technologies Inc.
  - d. Metal-Lite.
  - e. SCAFCO Steel Stud Company.

F. Finish Panels: Gypsum board as specified in Section 092900 "Gypsum Board".

G. Sound Attenuation Blankets: As specified in Section 092900 "Gypsum Board."

## 2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with shaft wall manufacturer's written instructions.

B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 092900 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written instructions for application indicated.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488/E488M conducted by a qualified testing agency.
2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.

E. Reinforcing: Galvanized-steel reinforcing strips with 0.033-inch minimum thickness of base metal (uncoated).

F. Acoustical Sealant: Section 079219 "Acoustical Joint Sealants."

G. Gypsum Board Cants:

1. Gypsum Board Panels: As specified in Section 092900 "Gypsum Board," Type X, 5/8-inch panels.
2. Adhesive: Laminating adhesive as specified in Section 092900 "Gypsum Board."
3. Non-Load-Bearing Steel Framing: As specified in Section 092216 "Non-Structural Metal Framing."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Section 078100 "Applied Fireproofing."
- B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

### 3.3 INSTALLATION

- A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated and manufacturer's written installation instructions.
- B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.
  - 1. Reinforcing: Provide where items attach directly to shaft wall assembly as indicated on Drawings; accurately position and secure behind at least one layer of face panel.
- D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons and floor indicators, and similar items.
- E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels while maintaining continuity of fire-rated construction.
- F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

- G. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.
- H. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.
- I. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

### 3.4 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092116.23

## SECTION 092900 - GYPSUM BOARD

## 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. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.
4. Texture finishes.

## B. Related Requirements:

1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
3. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
4. Section 092613 "Gypsum Veneer Plastering" for gypsum base for veneer plaster and for other components of gypsum-veneer-plaster finishes.
5. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

## 1.3 ACTION SUBMITTALS

## A. Product Data: For each type of product.

## B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

## C. Samples for Initial Selection: For each type of trim accessory indicated.

## D. Samples for Verification: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

#### 1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.
  - 1. Build mockups for the following:
    - a. Each level of gypsum board finish indicated for use in exposed locations.
    - b. Each texture finish indicated.
  - 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
  - 3. Simulate finished lighting conditions for review of mockups.
  - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

#### 1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.



## 2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

## 2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C1396/C1396M.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
  - a. [American Gypsum.](#)
  - b. [CertainTeed Corporation.](#)
  - c. [National Gypsum Company.](#)
  - d. [USG Corporation.](#)
2. Thickness: 1/2 inch.
3. Long Edges: Tapered.

- B. Gypsum Board, Type X: ASTM C1396/C1396M.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
  - a. [American Gypsum.](#)
  - b. [CertainTeed Corporation.](#)
  - c. [National Gypsum Company.](#)
  - d. [USG Corporation.](#)
2. Thickness: 5/8 inch.
3. Long Edges: Tapered.

- C. Gypsum Ceiling Board: ASTM C1396/C1396M.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
  - a. [American Gypsum.](#)
  - b. [CertainTeed Corporation.](#)
  - c. [CertainTeed Gypsum.](#)
  - d. [Georgia-Pacific Gypsum LLC.](#)
  - e. [National Gypsum Company.](#)
  - f. [USG Corporation.](#)
2. Thickness: 1/2 inch.
3. Long Edges: Tapered.

- D. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Gypsum.
  - b. CertainTeed Corporation.
  - c. CertainTeed Gypsum.
  - d. Georgia-Pacific Gypsum LLC.
  - e. National Gypsum Company.
  - f. USG Corporation.
2. Core: 5/8 inch, Type X].
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

## 2.4 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. CertainTeed Corporation.
    - b. Georgia-Pacific Gypsum LLC.
    - c. National Gypsum Company.
    - d. USG Corporation.
  2. Core: 5/8 inch, Type X.
  3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
- B. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. CertainTeed Corporation.
    - b. James Hardie Building Products, Inc.
    - c. National Gypsum Company.
    - d. USG Corporation.
  2. Thickness: 5/8 inch
  3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

## 2.5 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
  1. Material: Galvanized or aluminum-coated steel sheet.
  2. Shapes:

- a. Cornerbead.
  - b. Bullnose bead.
  - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
  - d. L-Bead: L-shaped; exposed long flange receives joint compound.
  - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
  - f. Expansion (control) joint.
  - g. Curved-Edge Cornerbead: With notched or flexible flanges.
- B. Exterior Trim: ASTM C1047.
1. Material: Hot-dip galvanized-steel sheet.
  2. Shapes:
    - a. Cornerbead.
    - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

## 2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
1. Interior Gypsum Board: Paper.
  2. Exterior Gypsum Soffit Board: Paper.
  3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
  4. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
  2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  4. Finish Coat: For third coat, use setting-type, sandable topping compound.
- D. Joint Compound for Tile Backing Panels:
1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
  2. Cementitious Backer Units: As recommended by backer unit manufacturer.
  3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

## 2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
  - 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Franklin International.
    - b. Hilti, Inc.
    - c. USG Corporation.

## 2.8 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 2.9 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

## 2.10 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  - 1. Wallboard Type: Vertical surfaces unless otherwise indicated.
  - 2. Ceiling Type: Ceiling surfaces.
  - 3. Mold-Resistant Type: As indicated on Drawings.
- B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
  - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
  - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws

- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

## 2.11 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at showers, tubs. Install with 1/4-inch gap where panels abut other construction or penetrations.
- B. Cementitious Backer Units: ANSI A108.11, at showers, tubs, and where indicated.
- C. Water-Resistant Backing Board: Install where indicated with 1/4-inch gap where panels abut other construction or penetrations.
- D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

## 2.12 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners.
  - 2. Bullnose Bead: Use at outside corners.

## 2.13 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Panels that are substrate for tile.
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

## 2.14 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900



## SECTION 095123 - ACOUSTICAL TILE CEILINGS

## 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. Acoustical tiles for interior ceilings.
  - 2. Fully concealed, direct-hung, suspension systems.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

## 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
- C. Samples for Initial Selection: For components with factory-applied finishes.
- D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
  - 1. Acoustical Tiles: Set of full-size Samples of each type, color, pattern, and texture.
  - 2. Concealed Suspension-System Members: 6-inch- long Sample of each type.
  - 3. Exposed Moldings and Trim: Set of 6-inch- long Samples of each type and color.
  - 4. Seismic Clips: Full size.
- E. Delegated-Design Submittal: For seismic restraints for ceiling systems.
  - 1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Ceiling suspension-system members.
  2. Structural members to which suspension systems will be attached.
  3. Method of attaching hangers to building structure.
    - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
  4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
  5. Size and location of initial access modules for acoustical tile.
  6. Items penetrating finished ceiling and ceiling-mounted items including the following:
    - a. Lighting fixtures.
    - b. Diffusers.
    - c. Grilles.
    - d. Speakers.
    - e. Sprinklers.
    - f. Access panels.
    - g. Perimeter moldings.
  7. Show operation of hinged and sliding components adjacent to acoustical tiles.
  8. Minimum Drawing Scale: 1/4 inch = 1 foot
  9. Coordinate "Qualification Data" Paragraph below with qualification requirements in Section 014000 "Quality Requirements" and as may be supplemented in "Quality Assurance" Article.
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical tile ceiling, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical tile ceiling suspension system from ICC-ES.
- E. Field quality-control reports.

## 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 5 percent of quantity installed.
2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to 5 percent of quantity installed.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

## 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
  1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations:
  1. Suspended Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.
  2. Directly Attached Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.
- B. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- C. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  1. Flame-Spread Index: Class C according to ASTM E1264.

2. Smoke-Developed Index: 450 or less.
- D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL or from the listings of another qualified testing agency.

## 2.3 ACOUSTICAL TILES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. [Armstrong World Industries, Inc.](#)
  2. [CertainTeed Corporation.](#)
  3. [USG Corporation.](#)
- B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Classification: Provide tiles as follows:
1. Type and Form: Type III, mineral base with painted finish.
  2. Pattern: C (perforated, small holes).
- D. Color: As selected from manufacturer's full range.
- E. Light Reflectance (LR): Not less than 0.65.
- F. Ceiling Attenuation Class (CAC): Not less than 20.
- G. Noise Reduction Coefficient (NRC): Not less than 0.50 .
- H. Articulation Class (AC): Not less than 170.
- I. Edge/Joint Detail: Square, kerfed, and rabbeted.
- J. Thickness: 5/8 inch
- K. Modular Size: As indicated on Drawings
- L. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

## 2.4 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Armstrong World Industries, Inc.
  2. USG Corporation.
- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, fully concealed, metal suspension system and accessories of type, structural classification, and finish indicated that complies with applicable requirements in ASTM C635/C635M.
1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635/C635M.
- C. Direct-Hung, Double-Web, Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation.
1. Structural Classification: Intermediate-duty system.
  2. Access: Upward and end pivoted with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.
    - a. Initial Access Opening: In each module, 24 by 24 inches.

## 2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E488/E488M or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.
    - a. Type: Cast-in-place anchors.
    - b. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B633, Class SC 1 (mild) service condition.
    - c. Corrosion Protection: Stainless-steel components complying with ASTM F593 and ASTM F594, Group 1 Alloy 304 or 316.
  2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E1190, conducted by a qualified testing and inspecting agency.

- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
  - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
  - 2. Stainless-Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
  - 3. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.
- F. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.
- H. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

## 2.6 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. [Armstrong World Industries, Inc.](#)
  - 2. [CertainTeed Corporation.](#)
  - 3. [Fry Reglet Corporation.](#)
  - 4. [USG Corporation.](#)
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.
  - 1. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
  - 2. Finish: Painted white.
- C. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.
  - 1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

## 2.7 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

## 2.8 MISCELLANEOUS MATERIALS

- A. Acoustical Tile Adhesive: Type recommended in writing by acoustical tile manufacturer, bearing UL label for Class 0-25 flame spread.
- B. Staples: 5/16-inch- long, divergent-point staples.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Testing Substrates: Before adhesively bonding tiles to wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.
- B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- C. Layout openings for penetrations centered on the penetrating items.

### 3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. Install suspended acoustical tile ceilings according to ASTM C636/C636M and manufacturer's written instructions.

1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
  4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
  6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
  7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
  8. Do not attach hangers to steel deck tabs.
  9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
  11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
  2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
  3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.



- F. Arrange directionally patterned acoustical tiles as follows:
  - 1. As indicated on reflected ceiling plans.
- G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.
  - 1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
  - 2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches o.c.
  - 3. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

### 3.4 INSTALLATION OF DIRECTLY ATTACHED ACOUSTICAL TILE CEILINGS

- A. Adhesive Installation: Install acoustical tile by bonding to substrate, using acoustical tile adhesive and procedure recommended in writing by tile manufacturer and as follows:
  - 1. Wipe and prime ceiling.
  - 2. Remove loose dust from backs of tiles by brushing.
  - 3. Install splines in joints between tiles and maintain bottom surface to a uniform level. Shim tile or correct substrate as required to maintain levelness.
  - 4. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.
- B. Stapled Installation: Fasten acoustical tile to substrate using a minimum of two staples per tile that are installed in flanges of tile and as follows:
  - 1. Form double-lapped joint between tiles by securely pressing tile tongues into corresponding tile grooves.
  - 2. Maintain bottom surface of tiles to a uniform level. Shim tile or correct substrate as required to maintain levelness.
  - 3. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.
- D. Arrange directionally patterned acoustical tiles with pattern running in one direction parallel to long axis of space.

### 3.5 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12, non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

### 3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
  - 1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Perform the following tests and inspections of completed installations of acoustical tile ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no tiles have been installed. Do not proceed with installations of acoustical tile ceiling hangers for the next area until test results for previously completed installations of acoustical tile ceiling hangers show compliance with requirements.
  - 1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
  - 2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical tile ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

### 3.7 ADJUSTING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

## SECTION 096513 - RESILIENT BASE AND 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. Resilient base.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Selection: For each type of product indicated.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

#### 1.5 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 THERMOSET-RUBBER BASE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Johnsonite Baseworks Thermoset Rubber Base or comparable product.
- B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
- C. Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Colors: As indicated on Drawings or approved equal.

### 2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are the same temperature as the space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

### 3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. Job-Formed Corners:
  - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
    - a. Form without producing discoloration (whitening) at bends.
  - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

### 3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
  - 1. Tightly adhere to substrates throughout length of each piece.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.
  - 2. Sweep and vacuum horizontal surfaces thoroughly.
  - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
  - 1. Apply one coat(s).
- E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

## SECTION 096519 - RESILIENT TILE FLOORING

## 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. Vinyl composition floor tile.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
  - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 2. Show details of special patterns.
- C. Samples: Full-size units of each color, texture, and pattern of floor tile required.
  - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.
- D. Samples for Initial Selection: For each type of floor tile indicated.
- E. Samples for Verification: Full-size units of each color and pattern of floor tile required.
  - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.
- F. Welded-Seam Samples: For seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.
- G. Product Schedule: For floor tile.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

## 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile 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. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Coordinate mockups in this Section with mockups specified in other Sections.
    - a. Size: Minimum 100 sq. ft. for each type, color, and pattern.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

## 1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F , in spaces to receive floor tile during the following periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.



- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

### 2.2 VINYL COMPOSITION FLOOR TILE Copy this article and re-edit for each product.

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. American Biltrite.
  - 2. Armstrong World Industries, Inc.
  - 3. Congoleum Corporation.
  - 4. Johnsonite; a Tarkett company.
- B. Tile Standard: ASTM F1066, Class 1, solid color.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: 12 by 12 inches.
- F. Colors and Patterns: As indicated by manufacturer's designations.

### 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

- C. Seamless-Installation Accessories:
  - 1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
    - a. Colors: As selected by Architect from manufacturer's full range to contrast with floor tile.
  - 2. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.
- D. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
  - 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

- C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- E. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  - 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles with grain running in one direction.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Seamless Installation:

1. Heat-Welded Seams: Comply with ASTM F1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.
2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to fuse sections permanently into a seamless flooring installation. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
  1. Remove adhesive and other blemishes from surfaces.
  2. Sweep and vacuum surfaces thoroughly.
  3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
  1. Apply two coats.
- E. Joint Sealant: Apply sealant to resilient terrazzo floor tile perimeter and around columns, at door frames, and at other joints and penetrations.
- F. Sealers and Finish Coats: Remove soil, visible adhesive, and surface blemishes from resilient terrazzo floor tile surfaces before applying liquid cleaners, sealers, and finish products.
  1. Sealer: Apply two base coats of liquid sealer.
  2. Finish: Apply two coats of liquid floor finish.
- G. Cover floor tile until Substantial Completion.

END OF SECTION 096519

## SECTION 097720 – DECORATIVE FIBERGLASS REINFORCED WALL PANELS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Prefinished polyester glass reinforced plastic sheets and adhered to plaster walls and FRP/ceramic tile wainscoting.
  - 1. Aluminum trim.
  - 2. PVC Wall base.
- B. Products Not Furnished or Installed under This Section:
  - 1. Gypsum substrate board.
  - 2. Resilient Base.

#### 1.2 RELATED SECTIONS

- A. Section 092900 – Gypsum substrate board.
- B. Section 054000 – Cold-formed Metal Framing
- C. Section 099123 – Interior Painting.
- D. Section 096513 - Resilient Base.

#### 1.3 REFERENCES

- A. American Society for Testing and Materials: Standard Specifications (ASTM)
  - 1. ASTM D 256 - Izod Impact Strengths (ft #/in)
  - 2. ASTM D 570 - Water Absorption (%)
  - 3. ASTM D 638 - Tensile Strengths (psi) & Tensile Modulus (psi)
  - 4. ASTM D 790 - Flexural Strengths (psi) & Flexural Modulus (psi)
  - 5. ASTM D 2583- Barcol Hardness
  - 6. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
  - 7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

#### 1.4 SUBMITTALS

- A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.

3. Installation methods.
- B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.
- C. Selection Samples: Submit manufacturer's standard color pattern selection samples representing manufacturer's full range of available colors and patterns.
- D. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture, and pattern required.
  1. Submit complete with specified applied finish.
  2. For selected patterns show complete pattern repeat.
  3. Exposed Molding and Trim: Provide samples of each type, finish, and color.
- E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives, sealants and other pertinent materials prior to their delivery to the site.

## 1.5 QUALITY ASSURANCE

- A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
  1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)
    - a. Wall Required Rating – Class C.
- B. Sanitary Standards: System components and finishes to comply with:
  1. United States Department of Agriculture (USDA) / Food Safety & Inspection Services (FSIS) requirements for food preparation facilities, incidental contact.
  2. Food and Drug Administration (FDA) 2013 Food Code 6-101.11.
  3. Canadian Food Inspection Agency (CFIA) requirements.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials factory packaged on strong pallets.
- B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (range of 60 to 75°F) for 48 hours prior to installation.

## 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Building are to be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work
- B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
  1. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

## 1.8 WARRANTY

- A. Furnish one-year guarantee against defects in material and workmanship.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design: Marlite 1 Marlite Drive, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: [info@marlite.com](mailto:info@marlite.com) [www.marlite.com](http://www.marlite.com).
- B. Product:
  - 1. Symmetrix™ with BlueSky™ Advanced Finishing

### 2.2 PANELS

- A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
  - 1. Finishing: High resolution digital imaging with controlled, low-temperature inline curing, water-based UV-cure coatings, free of VOC UV-cure inks.
  - 2. Dimensions:
    - a. Thickness – 0.090 “ (2.29mm) nominal
    - b. Width - 4'-0” (1.22m) nominal
    - c. Length – [10'-0” (3.0m)][8'-0” (2.4m) ][As indicated on the drawings] nominal
  - 3. Tolerance:
    - a. Length and Width: +/-1/8 “ (3.175mm)
    - b. Square - Not to exceed 1/8 “ for 8 foot (2.4m) panels or 5/32 “ (3.96mm) for 10 foot (2.4m) panels
- B. Properties for Symmetrix FRP. Resistant to rot, corrosion, staining, peeling and splintering.
  - 1. Flexural Strength –  $0.9 \times 10^4$  psi per ASTM D 790.
  - 2. Flexural Modulus –  $6.0 \times 10^6$  psi per ASTM D 790.
  - 3. Tensile Strength –  $11.5 \times 10^3$  psi per ASTM D 638.
  - 4. Tensile Modulus –  $0.45 \times 10^6$  psi per ASTM D 638.
  - 5. Water Absorption - 0.15% per ASTM D 570.
  - 6. Barcol Hardness (scratch resistance) - 28 per ASTM D 2583.
  - 7. Izod Impact Strength – 6.0 ft. lbs./in ASTM D 256.
  - 8. Mold & Mildew – pass per ASTM D 3273.
- C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.
- D. Front Finish:
  - a) A916-G63 White w/ Black Scoring Subway Tile
    - a. Surface: smooth surface texture.
    - b. Fire Rating: Class C Fire Rating.
    - c. Size: Use largest panels as allowable. Standard sizes are;

- 1) Marlite Symmetrix FRP
  - a) 48" x 96" x 0.090" nom.
  - b) 48" x 108" x .090" nom.
  - c) 48" x 120" x .090" nom.

## 2.3 BASE

- A. Marlite Base Molding for 0.090" thick FRP Panels
  1. Color: Black
  2. Profiles:
    - a. M 612 FRP Base Molding, 10' length
    - b. M 651 Inside Corner
    - c. M 660 Outside Corner
    - d. M 620 LH End Cap
    - e. M 625 RH End Cap

## 2.4 MOLDINGS

- A. Aluminum Anodized Trim: Heavy weight extruded aluminum 6063-T5 alloy prefinished at the factory.
  1. Profiles :
    - a. F 550 Inside Corner, 8' length
    - b. F 561 Outside Corner, 8' length
    - c. F 565 Division, 8' length
    - d. F566 Ribbed Designer Division, 8' length
    - e. F567 Radius Designer Division, 8' length
    - f. F568 Square Channel Designer Division, 8' length
    - g. F 570 Edge, 8' length
    - h. Color: Brite Satin Anodized
- B. Outside Corner Guard:
  1. F 560SS Stainless Corner Guard.

## 2.5 ACCESSORIES

- A. Adhesive: Either of the following construction adhesives complying with ASTM C 557.
  1. Marlite C-551 FRP Adhesive - Water- resistant, non-flammable adhesive.
  2. Marlite C-915 Construction Adhesive - Flexible, water-resistant, solvent based adhesive, formulated for fast, easy application.
  3. Titebond Advanced Polymer Panel Adhesive – VOC compliant, non-flammable, environmentally safe adhesive.
- B. Sealant:
  1. Marlite Brand MS-250 Clear Silicone Sealant.
  2. Marlite Brand MS-251 White Silicone Sealant.
  3. Marlite Brand - Color Match Sealant.



## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Examine backup surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface.
  - 1. Verify that stud spacing does not exceed 24" on-center.
- B. Repair defects prior to installation.
  - 1. Level wall surfaces to panel manufacturer's requirements. Remove protrusions and fill indentations.

### 3.2 INSTALLATION

- A. Comply with manufacturer's recommended procedures and installation sequence.
- B. Cut sheets to meet supports allowing 1/8" clearance for every 8 foot of panel.
  - 1. Cut and drill with carbide tipped saw blades or drill bits, or cut with shears.
- C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.
  - 1. Install panels with manufacturer's recommended gap for panel field and corner joints.
    - a. Adhesive trowel and application method to conform to adhesive manufacturer's recommendations.
- D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.
  - 1. All moldings must provide for a minimum 1/8 " of panel expansion at joints and edges, to insure proper installation.
  - 2. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

### 3.3 CLEANING

- A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.
- B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

END OF SECTION 09 7720

## SECTION 099123 - INTERIOR PAINTING

## 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 surface preparation and the application of paint systems on interior substrates.

## 1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
  - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

## 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. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

## 1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
  - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
  - b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
  - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

## 1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- 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. Behr Process Corporation.
  - 2. Benjamin Moore & Co.
  - 3. PPG Paints.
  - 4. Sherwin-Williams Company (The).
- B. Products: Subject to compliance with requirements, provide one of the products listed in the Interior Painting Schedule for the paint category indicated.

### 2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
  - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As selected by Architect from manufacturer's full range.

### 2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
  - 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
  - 2. Testing agency will perform tests for compliance with product requirements.

3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  1. Concrete: 12 percent.
  2. Fiber-Cement Board: 12 percent.
  3. Masonry (Clay and CMUs): 12 percent.
  4. Wood: 15 percent.
  5. Gypsum Board: 12 percent.
  6. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
  1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
  - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  - 2. Sand surfaces that will be exposed to view, and dust off.
  - 3. Prime edges, ends, faces, undersides, and backsides of wood.
  - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
1. Paint the following work where exposed in occupied spaces:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    - h. Other items as directed by Architect.
  2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

### 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
  2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.6 INTERIOR PAINTING SCHEDULE

#### A. Gypsum Board and Plaster Substrates:

##### 1. Latex System:

- a. Prime Coat: Primer sealer, latex, interior, MPI #50.
- b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
- c. Ceiling Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53
- d. Walls Topcoat: Latex, interior, eggshell (Gloss Level 3), MPI #52.

END OF SECTION 099123



## SECTION 102113.17 - PHENOLIC-CORE TOILET COMPARTMENTS

## 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. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.

## B. Related Requirements:

- 1. Section 061000 "Rough Carpentry" Section 061053 "Miscellaneous Rough Carpentry" for blocking overhead support of floor-and-ceiling-anchored compartments and overhead support of post-to-ceiling screens.
- 2. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

## 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 toilet compartments.

## B. Shop Drawings: For toilet compartments.

- 1. Include plans, elevations, sections, details, and attachment details.
- 2. Show locations of cutouts for compartment-mounted toilet accessories.
- 3. Show locations of centerlines of toilet fixtures.
- 4. Show locations of floor drains.
- 5. Show ceiling grid, ceiling-mounted items, and overhead support or bracing locations.

## C. Samples for Initial Selection: For each type of toilet compartment material indicated.

- 1. Include Samples of hardware and accessories involving material and color selection.

## D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

- 1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch-square Samples of same thickness and material indicated for Work.
- 2. Each type of hardware and accessory.

- E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments 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. Door Hinges: One hinge with associated fasteners.
  - 2. Latch and Keeper: One latch and keeper with associated fasteners.
  - 3. Door Bumper: One door bumper with associated fasteners.
  - 4. Door Pull: One door pull(s) with associated fasteners.
  - 5. Fasteners: Ten fasteners of each size and type.

#### 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 200 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

#### 2.2 PHENOLIC-CORE TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

### PHENOLIC-CORE TOILET COMPARTMENTS

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1. [Accurate Partitions Corp., an ASI Group Company.](#)
  2. [Bobrick Washroom Equipment, Inc.](#)
  3. [Bradley Corporation.](#)
  4. [Global Partitions Corp., an ASI Group Company.](#)
- B. Toilet-Enclosure Style: Overhead braced.
- C. Entrance-Screen Style: Overhead braced.
- D. Urinal-Screen Style: Post to ceiling.
- E. Door, Panel, Screen, and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges. Provide minimum 3/4-inch-thick doors and pilasters and minimum 1/2-inch-thick panels.
- F. Pilaster Shoes and [Sleeves (Caps): Formed from stainless steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.
- G. Urinal-Screen Post: Manufacturer's standard post design of monolithic phenolic urinal screen cutout at bottom to form a post matching that on the pilaster.
- H. Brackets (Fittings):
1. Stirrup Type: Ear or U-brackets, stainless steel.
  2. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- I. Phenolic-Panel Finish:
1. Facing Sheet Finish: One color and pattern in each room.
  2. Color and Pattern: As selected by Architect from manufacturer's full range, with manufacturer's standard dark color core.
  3. Edge Color: Manufacturer's standard.

## 2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.
1. Material: Chrome-plated zamac.
  2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door.
  3. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
  4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
  5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.

6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Hardware and Accessories: Manufacturer's heavy-duty operating hardware and accessories.
1. Hinges: Manufacturer's minimum 0.062-inch-thick stainless steel paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees allowing emergency access by lifting door. Mount with through-bolts.
  2. Latch and Keeper: Manufacturer's heavy-duty surface-mounted cast-stainless steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through-bolts.
  3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless steel hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Mount with through-bolts.
  4. Door Bumper: Manufacturer's heavy-duty rubber-tipped cast-stainless steel bumper at out-swinging doors. Mount with through-bolts.
  5. Door Pull: Manufacturer's heavy-duty cast-stainless steel pull at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through-bolts.
- C. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- D. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

## 2.4 MATERIALS

- A. Aluminum Castings: ASTM B26/B26M.
- B. Aluminum Extrusions: ASTM B221.
- C. Brass Castings: ASTM B584.
- D. Brass Extrusions: ASTM B455.
- E. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- F. Stainless Steel Castings: ASTM A743/A743M.
- G. Zamac: ASTM B86, commercial zinc-alloy die castings.

## 2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
- D. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.
- E. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide in-swinging doors for standard toilet compartments and 36-inch-wide out-swinging doors with a minimum 32-inch-wide clear opening for compartments designated as accessible.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
  - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
  - 1. Maximum Clearances:
    - a. Pilasters and Panels: 1/2 inch.
    - b. Panels and Walls: 1 inch.
  - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel.
    - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.

- b. Align brackets at pilasters with brackets at walls.
- 3. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
  - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
  - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.
- E. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.
- F. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

### 3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.17

## SECTION 102800 - TOILET, BATH, AND LAUNDRY 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. Public-use washroom accessories.

- B. Related Requirements:

- 1. Section 088300 "Mirrors" for frameless mirrors.
  - 2. Section 097720 Decorative Fiberglass Reinforced Wall Panels

#### 1.3 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Include electrical characteristics.

- B. Samples: Full size, for each exposed product and for each finish specified.

- 1. Approved full-size Samples will be returned and may be used in the Work.

- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

#### 1.7 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, visible silver spoilage defects.
  2. Warranty Period: [15] <Insert number> years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 OWNER-FURNISHED MATERIALS

- A. Owner-Furnished Materials: Soap Dispensers

#### 2.2 PERFORMANCE REQUIREMENTS

- 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.

#### 2.3 PUBLIC-USE WASHROOM ACCESSORIES

- A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.
- B. Toilet Tissue (Roll) Dispenser :
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AJW Architectural Products.
    - b. American Specialties, Inc.
    - c. Bobrick Washroom Equipment, Inc.
    - d. Bradley Corporation.



2. Description: Double-roll dispenser
3. Mounting: Surface mounted.
4. Operation: Noncontrol delivery with standard spindle
5. Capacity: Designed for 5-inch-diameter tissue rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Paper Towel (Folded) Dispenser

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AJW Architectural Products.
  - b. American Specialties, Inc.
  - c. Bobrick Washroom Equipment, Inc.
  - d. Bradley Corporation.
2. Mounting: Surface mounted.
3. Minimum Capacity: 400 C-fold or 525 multifold towels.
4. Material and Finish: Stainless steel, No. 4 finish (satin)
5. Lockset: Tumbler type.
6. Refill Indicator: Pierced slots at sides or front.

D. Grab Bar:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Specialties, Inc.
  - b. Bobrick Washroom Equipment, Inc.
  - c. Bradley Corporation.
  - d. Oatey.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
  - a. Finish: Smooth, No. 4 finish (satin)
4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: As indicated on Drawings

E. Vendor

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AJW Architectural Products.
  - b. American Specialties, Inc.
  - c. Bobrick Washroom Equipment, Inc.
  - d. Bradley Corporation.
2. Type: Sanitary napkin and tampon

3. Mounting: Surface mounted.
4. Capacity: 30-tampons and 20-napkins
5. Operation: No coin (free).
6. Exposed Material and Finish: Stainless steel, No. 4 finish (satin)
7. Lockset: Tumbler type with separate lock and key for coin box.

F. Mirror Unit

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AJW Architectural Products.
  - b. American Specialties, Inc.
  - c. Bobrick Washroom Equipment, Inc.
  - d. Bradley Corporation.
2. Frame: Stainless-steel angle, 0.05 inch thick.
  - a. Corners: Manufacturer's standard.
3. Integral Shelf: 5 inches deep.
4. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
  - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
  - b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
5. Size: 18"X24".

G. Coat Hook

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AJW Architectural Products.
  - b. American Specialties, Inc.
  - c. Bobrick Washroom Equipment, Inc.
  - d. Bradley Corporation.
2. Description: Double-prong unit.
3. Material and Finish: Stainless steel, No. 4 finish (satin).

2.4 PUBLIC-USE SHOWER ROOM ACCESSORIES

- A. Source Limitations: Obtain public-use shower room accessories from single source from single manufacturer.
- B. Shower Curtain Rod:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AJW Architectural Products.
  - b. American Specialties, Inc.
  - c. Bobrick Washroom Equipment, Inc.
  - d. Bradley Corporation.
2. Description: 1-inch OD; fabricated from nominal 0.0375-inch-thick stainless steel.
3. Mounting Flanges: Stainless-steel flanges designed for exposed fasteners.
4. Finish: Stainless steel, No. 4 finish (satin)

C. Shower Curtain

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AJW Architectural Products.
  - b. American Specialties, Inc.
  - c. Bobrick Washroom Equipment, Inc.
  - d. Bradley Corporation.
2. Size: Minimum 6 inches wider than opening by 72 inches high.
3. Material: Vinyl, minimum 0.006 inch thick, opaque, matte.
4. Color: White.
5. Grommets: Corrosion resistant at minimum 6 inches o.c. through top hem.
6. Shower Curtain Hooks: Chrome-plated or stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

D. Folding Shower Seat

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AJW Architectural Products.
  - b. American Specialties, Inc.
  - c. Bobrick Washroom Equipment, Inc.
  - d. Bradley Corporation.
2. Configuration: L-shaped seat, designed for wheelchair access.
3. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect); 0.05-inch minimum nominal thickness; with single-piece, pan-type construction and edge seams welded and ground smooth.
4. Mounting Mechanism: Stainless steel, No. 4 finish (satin)
5. Dimensions: 24"X16"

2.5 CHILDCARE ACCESSORIES

- A. Source Limitations: Obtain childcare accessories from single source from single manufacturer.

B. Diaper-Changing Station

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Specialties, Inc.
  - b. Diaper Deck & Company, Inc.
  - c. Koala Kare Products.
2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
  - a. Engineered to support minimum of 250-lb static load when opened.
3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: HDPE in manufacturer's standard color.
6. Liner Dispenser: Built in.

2.6 UNDERLAVATORY GUARDS

A. Underlavatory Guard

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Buckaroos, Inc.
  - b. Plumberex Specialty Products, Inc.
  - c. Truebro by IPS Corporation.
2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
3. Material and Finish: Antimicrobial, molded plastic, white.

2.7 MATERIALS

- A. Stainless Steel: ASTM A666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.
- C. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

## 2.8 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf when tested according to ASTM F446.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 102800

## SECTION 114000 - FOOD SERVICE EQUIPMENT

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. All drawings and general provisions of the contract, including general and supplementary conditions, apply to the work of this section.

#### 1.2 DESCRIPTION

##### A. Work Included:

1. The work of this section includes furnishing all labor, materials, transportation, appliances, and services necessary to complete all kitchen equipment and related work required by the drawings and/or herein specified, including, but not limited to, the following:
  - a. Furnishing, delivering, and setting in place of all food service equipment in spaces as shown and/or as hereinafter itemized.
  - b. All items of work reasonably inferred as necessary to complete the work of this section. Supply all necessary bolts, hangers, and brackets. Provide cut outs in equipment as necessary for electric, plumbing, or other utility lines required for hook up of the item.
  - c. Removal of all existing equipment to be reused from present locations to storage and installation of existing equipment in new locations after areas are ready.
  - d. All existing equipment not to be reused (including exhaust hood) shall be removed, and any items the owner does not wish to retain shall become the property of this contractor. Should the owner wish to retain an item, then this contractor shall move the item to a storage area as designated by the owner.

##### B. Related Work Described Elsewhere Performed by Others:

1. Supplying and installing all necessary drain traps, steam traps, vents, shut-offs, valves, pipe fittings, and/or other materials to complete final plumbing and electrical or steam connections between the rough-in and the connection or connections on each piece of equipment.
2. Ductwork and ductwork connections from hoods unless otherwise indicated.

3. Installing all drain fittings, tailpieces, faucets, operating switches, and/or starters.

### 1.3 QUALITY ASSURANCE

#### A. Manufacturer's Qualifications:

1. Firms regularly engaged in the manufacture of food service equipment of types, capacities, and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

#### B. Installer's Qualifications:

1. Firm with at least three (3) years of successful installation experience on projects with food service equipment similar to that required for project.

#### C. Fabricator's Qualifications:

1. Where units require custom fabrication, provide units fabricated by a shop that is skilled with a minimum of five (5) years of experience in similar work. Fabricate all custom equipment items at same shop. Where units cannot be fully shop-fabricated, complete fabrication work at project site. Fabricator shall be subject to the approval of the food service equipment consultant.

#### D. Codes and Standards:

1. All food service equipment shall be provided, fabricated, and installed in compliance with the following, where such standards have been set: NSF, AGA, UL, ASME, NEMA, NFPA, State Department of Health regulations, and other applicable State, County, and Local governing laws and ordinances.
2. Nothing in the contract documents shall be construed to conflict with any local or state laws or regulations governing the installation of any part of the work to be performed under this contract, and all requirements shall be in accordance therewith, without additional cost to the owner. Installation of equipment must comply with applicable regulations of the local health department.

### 1.4 SUBSTITUTIONS

- #### A.
- The materials, products, and equipment items or types shown on the Contract Drawings or listed in this Specification establish the standard of performance, quality, function, dimension, and appearance required. Products, materials, and equipment items not listed herein or on the Contract Drawings, but which achieve identical or superior performance to those specified in all aspects but particularly

with respect to gender, configuration, and finish are not excluded provided the established criteria described and required is met and such components are shown to be true equals to the satisfaction of the Owner, Architect, Engineer, and Food Facilities Consultant.

- B. The bidder may base his bid or proposal on the use of one or more of these items or an equivalent substitution. If substitutions are proposed, the bid must contain a list of all proposed substitutions. Also, each bidder shall list by Specification Sections, all materials, products, or equipment he proposes to offer as possible substitutions for specified items, together with all information on the product required for a complete review.
- C. No additional substitutions will be considered unless substitution is required due to a specified material, product, or equipment being removed from or made unavailable in the market place. Upon such circumstances, additional substitutions will be considered by the Architect and Food Service Consultant, but only at no charge to or at a credit to the Contract amount, and at no change in completion time.
- D. A request for substitution constitutes a representation that the submitter:
  - 1. Will coordinate installation and make changes to other work, which may be required for the work to be complete with no additional cost to the Owner or to other Contractors.
  - 2. Waives claims for additional costs or time extension, which may subsequently become apparent.
  - 3. Will reimburse the Owner, Architect/Engineer, and Food Facilities Consultant for review or redesign services associated with reapproval by authorities.

## 1.5 SUBMITTALS

- A. Shop Drawings:
  - 1. Within 45 days after award of contract, and before any kitchen equipment is delivered to the job site, submit complete shop drawings to the architect for approval. Show all conditions where equipment will interface with the work of other trades.
- B. Details:
  - 1. Rough-in drawings, showing detailed dimensions of all utility lines for all equipment, shall be furnished and drawn to a scale of not less than ¼" to 1'-0". Rough-in drawings shall contain the following *individual* drawings:



- a. A layout drawing showing all food service and related equipment with all items properly marked as to item number.
  - b. An individual mechanical layout drawing for each of the mechanical trades; i.e.: Electrical, Plumbing and Heating/Ventilating.
  - c. A drawing showing any required recesses in the floor for walk-ins etc.
2. Furnish shop drawings with details showing all dimensions and details of construction, installation, and related work. Shop drawings of fabricated equipment shall be drawn to a scale of not less than  $\frac{3}{4}$ " to 1'-0".
  3. Manufacturer's names, cuts, descriptive data, rated capacities, and other information necessary for approval of standard manufactured articles and equipment shall be submitted to architect for written approval before ordering or fabricating. Catalog cuts shall be submitted in bound booklet form with each item (including existing and spare numbers) having its own title sheet before the catalog cut. The title sheet shall contain the item number, quantity, make, model and any and all accessories provided.
  4. If submitting hard copies, submit eight (8) copies of all drawings and catalog cuts (in booklet form) to the architect's office for approval and distribution. The review of any and all drawings and catalog cuts will not relieve the contractor of any responsibility for providing the items, etc. as called for in the specifications.

C. Samples:

1. Samples shall be provided as requested by the architect.

## 1.6 PRODUCT DELIVERY, HANDLING, AND STORAGE

- A. Equipment shall be delivered when required and shall be safely stored on the premises and protected against damage.
- B. Deliver all equipment to the job promptly and in such time as not to delay the work of other trades. Cooperate with all other trades in the proper installation of this equipment. Set level, plumb, and true and anchor to floor, walls, or ceiling as required. Leave all equipment ready to receive final plumbing, electric, and ventilation connections, which shall be provided under respective sections.
- C. No deliveries shall be made unless this contractor's representative is on the job site to receive same and see that it is properly stored and protected. Neither the

owner, construction personnel or architect will receive any equipment or be in any way responsible for same.

- D. All responsibilities shall lie with the contractor for damage incurred, loss of materials, and loss of items while in the building or during transportation. Any articles found damaged shall be immediately replaced or repaired at this contractor's expense to the satisfaction of the architect.

## 1.7 JOB CONDITIONS

- A. Inspect surfaces to receive work of this section. Report any unsatisfactory conditions to the architect. Proceeding with the work shall be evidence of acceptance of job conditions.
- B. Take field measurements to assure accurate fit of all food service equipment.
- C. Check electrical characteristics and water, steam, and gas pressures. Provide pressure regulating valves where required for proper operation of equipment.

## 1.8 GUARANTEES

- A. This contractor shall fully guarantee all work and materials for a period of one year from date of acceptance. Should any defect in work or materials, not due to ordinary use, appear in the above-mentioned time, this contractor agrees to repair or replace the same without cost to the owner, as directed, immediately upon written notice of such defect from the owner or owner's previously-identified agent. All refrigerated items shall have an additional four (4) year warranty on all compressors.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Unless otherwise called for under the individual items of equipment set forth hereinafter or shown on the details, the general construction called for under each specific material and all detail drawings shall apply to all fabricated equipment.

### 2.2 METALS

- A. Stainless steel shall be AISI type 304, with not less than a #4 mill finish on all exposed surfaces. All welding wire used shall be type 308L. All sheets shall be free of buckles, warps, and surface imperfections.
- B. Galvanized iron shall be 1½" x 1½" x 1/8". Where galvanized iron has been welded, all seams shall be cleaned and scale removed and finished with a prime

coat of aluminum paint. All galvanize shall be 8% copper bearing alloy with an approved hot dip pure zinc galvanizing.

- C. A white metal (commercially known as nickel silver) casting is intended. Such metal to be of corrosion resistant quality and shall contain not less than 30% nickel. All castings shall be rough ground, polished, and buffed to a bright luster, free from pits, cold runs, checks, burrs, or other surface imperfections.
- D. Stainless steel pipe and tubing shall be seamless of gauge specified and of true roundness. All tubing, where exposed to view, shall be given a final grind of not less than 180 grit emery.
- E. All angles, bands, channels, or other structural shapes used for framing shall be of domestic manufacture, uniform and ductile in quality. Where such sections are specified as galvanized, they shall be galvanized by the hot dip process with all excess spelter removed, and be smooth and free from cold runs, blisters, and uncoated or scaly patches.

## 2.3 HARDWARE

- A. Where equipment is provided with handles, knobs, hinges, brackets, or other miscellaneous hardware, all shall be of either white metal or stainless steel of metallurgical composition previously specified.

## 2.4 FABRICATION

- A. Welding:
  - 1. All welding of stainless steel shall be done by the electric heliarc process. Carbon arc will not be permitted. All welding of galvanized iron shall be done by the electric fusion-metal-arc method. All welding shall be done in a thorough manner with welding rod as specified hereinbefore of stainless steel or of same composition as sheets or parts welded. Welds shall be complete welds, strong and ductile with excess metal ground off and joints finished smooth to match adjoining surfaces. Welds are to be free of mechanical imperfections such as gas holes, pits, runs, cracks, etc., and shall have same color as adjoining sheet surfaces. All joints in tops of fixtures, tables, drainboards, exposed shelving, sinks, fronts and ends of cabinets exposed to view, etc., shall be completely welded. Butt welds made with solder and finished by grinding will not be acceptable.
  - 2. All welded joints shall be homogeneous with the sheet metal itself. Where sheet sizes necessitate a joint, such joints shall be welded. Tops of fixtures shall be fabricated in the factory with welded joints to reduce field joints to a minimum. Wherever welds occur on surfaces not finished by grinding and polishing, such welds, and the accompanying discoloration, shall be suitably coated in the factory by means of metallic base paint to

prevent the possibility of progressive corrosion at such points. All field joints shall be welded, ground smooth, and polished.

B. Soldering:

1. Soldering, where required and/or permitted, shall be done with a solder consisting of no more lead than is allowable by code. Stainless steel requiring soldering shall be first thoroughly cleaned of surface oxides and shall then have applied a suitable stainless steel soldering flux. After the soldering has been completed, excess of remaining flux shall be removed and the entire soldered joint cleaned with liquid alkaline to prevent any attack of the stainless steel by soldering flux.

C. Grinding, Polishing, and Finishing:

1. All exposed welded joints shall be suitably ground flush with the adjoining material and neatly finished to harmonize therewith. Wherever material has been sunken or depressed by a welding operation, such depressions shall be suitably hammered and peened flush with the adjoining surfaces, and, if necessary, ground to eliminate low spots. All ground surfaces consistent with good workmanship. Care shall be exercised in all grinding operations to avoid excessive heating of the metal and metal discoloration. In all cases, the grain of rough grinding shall be removed by a successive finer polishing operation. The texture of the final polishing operations shall be uniform and smooth, consistent with reasonable care and good workmanship. The finish of all equipment shall be of a high grade.
2. Butt joints and contact joints, wherever they occur, shall be close fitting. Wherever brake bends occur, they shall be free of undue extrudence and shall not be flaky, scaly, or cracked in appearance, and where such brake work does mar the uniform appearance of the surface of the material, all such marks shall be removed by suitable grinding, polishing, and finishing. Wherever sheared edges occur, they shall be free from burrs, fins, or irregular projections and shall be finished to obviate all danger of cutting or laceration when the hand is drawn over such sheared edges. Where miters or bullnosed corners occur, they shall be neatly finished with the under edge of material neatly ground to a uniform condition, and in no case are overlapping materials to be acceptable.
3. All exposed surfaces shall have a #4 ground finish, except trim, which is to be of a more highly polished satin finish. Where specified, all cabinets, doors, and shelves, whether inside or outside of cabinets, and wherever exposed are to be #4 finish. This applies to inside finish of any cabinet having doors or otherwise. An exposed surface shall be interpreted as meaning an inside surface exposed to view when a sliding or swinging door is opened. The underside of shelf need not be #4 finish but such

finish shall be at least equal to #80 ground finish. The tops of tables, sinks, dishtables, where manufacturing operations and welding disturb the original #4 finish, shall be finished in a satin finish.

4. Deliver all stainless steel equipment to the job covered with a protective paper coating. Remove this coating when directed by the architect and restore any surfaces that are scratched or marred to their original finish, and to the approval of the architect.

D. Stainless Steel Tops:

1. Where specified, all tops shall be constructed of not less than 14 gauge stainless steel, with all edges rounded without burrs or excess metal. All edges shall be rolled on 180° roll 1½" in diameter on all exposed sides. Where table tops are placed against wall, refrigerators, cabinets, etc., they shall be turned up on the back and/or sides approximately 6" and returned 2" on a 45° break, with all exposed ends closed, welded, ground, and polished. All corners shall be reinforced on the underside with 1" x 4" x 1" stainless steel channels of not less than 14 gauge stainless steel. These channels shall be spaced not more than 30" apart in any direction and shall give full perimeter as well as interior support.

E. Stainless Steel Legs:

1. All legs shall be constructed of not less than 1-5/8" OD stainless steel seamless tubing, having a wall thickness of not less than 16 gauge. Stainless steel shall be of type as hereinbefore specified. Legs shall be spaced no more than 6'-0" on center. All legs shall be polished to a uniform finish.
2. Leg mounting shall be inserted into 16 gauge stainless steel conical gussets type 483-58 as manufactured by Standard Keil. Gussets shall be welded around entire circumference continuous, sealing gusset against underbracing channel.
3. All legs shall be provided with stainless steel adjustable feet type #A10-0851 as manufactured by Component Hardware, complete with #A10-0010 lock ring. Legs supporting sink units shall be fitted with stainless steel flanged feet type #A10-0854 with #A10-0010 lock ring as manufactured by Component Hardware.
4. Leg crossbracing, where required, shall be constructed of not less than 1" OD stainless steel seamless tubing as previously specified. All crossbracing shall run horizontal and level between legs and forming a box type framing between all legs, approximately 12" above the floor. Crossbracing shall be formed to and fully welded to the legs, with all welds ground and polished. Where one side of the boxed unit bracing is

omitted to provide space for carts, bins, etc., the adjacent leg shall be fully braced in the prescribed manner.

F. Undershelving:

1. Undershelving shall be constructed of not less than 16 gauge stainless steel. Each undershelf shall be the full depth of the individual unit. Front edges shall be turned down 1½" and returned ½", sides and rear to be turned up 2". Corners shall be notched at legs and welded, ground, and polished to same. Undershelves, where required, shall be provided with pipe slots of suitable size to accommodate necessary service lines. Slots shall be turned up on all sides to eliminate cutting or defacing of equipment on the job.

G. Drawers:

1. Unless otherwise noted, drawers shall be 20" x 20" x 5" die-stamped 20 gauge stainless steel having all inside corners coved. Drawer body shall be lift-out type. Front of drawers shall be double pan 16 gauge stainless steel exterior and 20 gauge stainless steel interior. Drawer shall be suspended by ball bearing heavy-duty extension slides, Model #9190, as manufactured by Standard Keil Hardware. The drawer slides shall be attached to channel bracing under the table top. Drawer pulls shall be Standard Keil #SS-12100.

H. Plumbing Fixtures:

1. Faucets:
  - a. Furnish faucets on sinks, steamtables, bain maries, water stations and other equipment as shown on plans, details and specifications. Furnish water saving devices where required by local codes. All faucets intended to dispense water for human consumption shall be manufactured of materials that contain no lead intentionally added to the product. Finish shall be polished stainless steel. All faucets specified to have standard lever type handle with internationally coded handle identification buttons (hot and cold) and ADA easy turn stems. All faucets shall have internal stainless steel seats and two part swivel stems. All plumbing fixtures shall be ANSI/NSF 61 sec. 9 certified, CSA Certified, California AB 1953 Compliant, Vermont S152 Compliant, and EPAAct 2005 compliant.
  - b. Faucets to have cartridges made of ceramic to prevent leaks and cross flow.
2. Pre Rinse Units:

- a. Shall have integral spring-loaded check stems to prevent cross flow, stainless steel seats in control valve, hose equipped with three ply hydraulic type hose liner, spray valves shall be 1.15 GPM for water conservation, be fitted with backflow prevention device (where required), and furnished complete with nipples, lock nuts, washers for secure and proper installation.

3. Waste Valves:

- a. Each sink compartment shall be provided with one ball valve type waste valve. Waste valve shall have a stainless steel rotating ball, two Teflon seals, 1½" and 2" outlet threads. Unless otherwise specified all waste valves shall have overflow tubes and fittings.

4. All faucets, pre-rinse units and fixture brand shall be consistent throughout project (except where specified otherwise) and shall be as manufactured by Fisher Manufacturing Company, or **equal** by T&S Brass and Bronze, Krowne or Dormont.

I. Sinks:

1. Where specified, there shall be single or multiple compartment sinks of size specified or shown on drawings. All sinks to be made entirely of 14 gauge stainless steel; all lengths, widths, and depths as hereinafter specified or as shown on drawings. Backsplash shall be drilled as required to accommodate faucets as specified and shown on drawings. Sink shall be of welded, seamless construction with all joints, crevices, etc., eliminated and all traces of welding removed. Corners, both horizontal and vertical, shall be rounded to 1" radius with intersections meeting in spherical coves. All edges shall be integrally rolled on 1½" diameter to a 180° closure with front corners fully rounded on outside of roll. Both rear corners to be curved and welded into the upturned splash. Bottoms shall be scored towards outlets to permit complete drainage. Die-stamped recess shall be formed in bottom of each compartment to accommodate waste outlet. In multiple compartment sinks, partitions shall be of coved corner construction consisting of two thicknesses of 14 gauge stainless steel formed from one sheet. Top edge of partition to be rounded on ½" radius, and all corners, where partitions meet the sides, shall be coved. Where partitions occur, there shall be no beads or straps on the outside of sink. Front, bottom, and back of sink shall be constructed of one sheet of metal in order to eliminate crevices between each compartment.

J. Drainboards:

1. Where called for, drainboards shall be of same gauge and material as sink and shall be full width of sink with exposed ends bullnosed. Backs shall be provided with high backsplashes to match backsplashes of sink. The front and ends shall be turned up 3", rolled and made continuous with roll of sink. The drainboards shall be pitched to drain to sink, welded, ground, and polished smooth to make entire unit into one piece. All welding shall be integral, and tack welding or bolted construction will not be acceptable. Support drainboards up to 36" in length by 1" diameter stainless steel tube welded to underside of drainboard and leg gusset. Support drainboards 36" and longer with legs. Cove horizontal and vertical corners with not less than 3/4" radius.

K. Dishtables:

1. Fabricate dishtables of 14 gauge stainless steel, with exposed edges formed into 1/2" x 190° rolled rim approximately 3" high. Provide built-in pitch of 1/4" minimum. Provide 10" high rim of type as indicated in the specifications. Cove horizontal and vertical corners with not less than 3/4" radius.

L. Framing:

1. Mount tops on 1 1/2" x 1 1/2" x 1/8" galvanized angle iron or 4" wide x 12 gauge galvanized channels. Mount dishtables and drainboards on 4" wide x 14 gauge stainless steel channels.
2. Run framework around entire perimeter of unit, and crossbrace on 30" centers. For dishtables and drainboards, run framing from front to back at each leg location, and run additional channel lengthwise, located at center of table width and welded to leg channels. Fasten framing to underside of top surfaces with 1/4" studs welded at approximately 12" centers. Provide each stud with suitable chrome-plated lockwashers and capnuts, and make stud lengths such that capnuts can be made up tight bringing top down snugly to framing.

M. Enclosed Cabinets:

1. Enclosed cabinets shall be constructed of angle iron frame as hereinbefore specified. Exposed angle shall be 1 1/2" x 1 1/2" x 1/8" stainless steel and concealed angle of galvanized iron. Frame construction shall provide a complete box-like welded frame with tops and fronts reinforced with angle iron on approximately 30" centers. Exterior of cabinets shall be 18 gauge stainless steel with openings, door frames, drawer openings, etc., having butt welded flush joints. Compressor compartments, refrigerated compartments, and open shelving areas shall have double pan bulkheads with full insulation where required. Where cold pans and other inserts are installed in a cabinet base, an apron shall



be provided the full depth of the insert and shall be of the same material as the body. Openings shall be formed in on all sides and reinforced where necessary.

N. Doors:

1. Sliding doors shall be constructed of 18 gauge stainless steel exterior and 20 gauge stainless steel interior, all double pan construction with all corners welded, ground, and polished. Door shall be suspended on overhead track Model #550 as manufactured by Standard Keil. Doors shall be retained at the bottom with a depressing pin Model #1906 as manufactured by Standard Keil. All doors shall be removable and fitted with recessed stainless steel pulls.
2. Hinged doors shall be of same construction as for sliding doors except they shall be mounted on full-length stainless steel continuous type hinges. Doors shall be fitted with recessed stainless steel pulls, permanent magnetic catches, and door locks where indicated. Door face shall be flush with cabinet body.

O. Shelves:

1. Cabinet shelves shall be of 16 gauge stainless steel all welded construction turned up 2" on back and ends and down on front. Bottom shelf shall be extended forward and be turned down at front flush with cabinet body. Fixed intermediate shelves shall be welded to 14 gauge stainless steel brackets, which in turn shall be welded cabinet interior in such a manner as to provide a 1" space between shelf and cabinet at back and ends. Removable shelves shall be set on full perimeter 14 gauge stainless steel channeling.

P. Sinks in Worktops:

1. Sinks incorporated into work surfaces shall be as hereinbefore specified, except rolls, inversions, and backsplashes shall be omitted and the bowl shall be completely welded integrally and flush with the work surface. Each sink shall be provided with drain and waste fitting as hereinbefore specified.

Q. Cold Pans:

1. Fabricate cold pans from 14 gauge stainless steel lining and 20 gauge stainless steel casing. Cove interior horizontal and vertical corners. Insulate sides, ends, and bottom with material thermally equal to 2" thickness of fiberglass. Sweat ½" diameter copper cooling coils to underside of cold pan, and seal in thermostatic material. Turn down counter top 1" into pan. Install completely concealed 1" wide plastic

breaker strip. Install 1" chrome plated drain with plug. Provide ½" high false bottom of 14 gauge perforated stainless steel in removable sections.

### PART 3 - EXECUTION

#### 3.1 SURFACE CONDITIONS

- A. Prior to installation, verify that kitchen equipment may be installed in accordance with the manufacturer's recommendations; notify the architect in the event of a discrepancy. Do not proceed until all such discrepancies have been fully resolved unless directed to do so.

#### 3.2 INSTALLATION

- A. Procedure:
  1. Move equipment into location specified and properly install all equipment per approved shop drawings and in strict accordance with the manufacturer's correct recommendations.
  2. Coordinate with electrical and mechanical contractors for their final connection to services required. All final plumbing and electrical connections shall be by electrical and mechanical contractors.
  3. Inspect all equipment for compliance and test by cycling equipment through various stages to verify proper operation.

#### 3.3 TESTING AND OPERATING INSTRUCTION

- A. After completion of installation, the manufacturer's representative shall test all equipment and instruct kitchen personnel in the use and care of all items of equipment. A representative from this contractor shall be present at time of demonstration(s).
- B. Provide two (2) sets of repair and maintenance manuals for each item of mechanically-operated equipment. All brochures shall be bound in booklet form. Also include a list of all service agencies with address and telephone numbers.

#### 3.4 ADJUSTMENT AND CLEANING

- A. Upon completion of installation and hook-up of equipment, put each item through a complete operating cycle and verify that all equipment is properly installed and properly operating; verify that all trim is in place; adjust all components as necessary to ensure continued proper operation; remove all labels and protective paper from equipment and remove all packing materials from the job site. Thoroughly clean all equipment.

### 3.5 PUNCH LIST

- A. A representative of this contractor shall be present at time of final inspection(s).

### PART 4 - LIST OF EQUIPMENT

#### 4.1 ITEM 1 - POT/PAN SINK - ONE (1) - EXISTING/RELOCATE

#### 4.2 ITEM 2 - HAND SINK - ONE (1) REQUIRED

- A. Hand sink shall be as manufactured by Eagle, Model #HSA-10-FAW.
- B. Hand sink shall be provided with all standard equipment.

#### 4.3 ITEM 3 - RANGE WITH OVEN - ONE (1) REQUIRED

- A. Range shall be as manufactured by Garland, Model #G36-6R.
- B. Range shall be provided with all standard equipment.

#### 4.4 ITEM 4 - EXHAUST HOOD - ONE (1) REQUIRED

- A. Exhaust hood shall be as manufactured by Caddy, Model #PB-C-W-48-ND-48.
- B. Exhaust hood shall be constructed of 18 gauge type 300 series stainless steel. All exposed surfaces to have a #4 finish. Construction to meet all requirements of NFPA96 and NSF Standard No. 2.
- C. Exhaust hood shall be a dry baffle cartridge type and be UL listed under the standards as set forth in UL710, "Exhaust Hoods for Commercial Cooking Equipment". Hood shall be 95% grease extraction efficient when operated and maintained in accordance with design specifications. Removable stainless steel baffle cartridges, containing a series of horizontal, self-draining baffles, shall be provided.
- D. A grease trough shall be concealed within the hood, sloping to a removable grease cup located at the end of the front exhaust canopy.
- E. All light fixtures shall be pre-wired to a single connection point. Ventilators built in multiple sections to be furnished with junction boxes for ease of field connection. Provide canopy complete with UL listed fluorescent lights, wired to a common junction box and left ready for final connections to power source.

- F. Ventilator shall be UL listed, NSF listed and be in accordance with all recommendations as set forth by NFPA96. Ventilator must meet all applicable codes.
- G. Furnish rod hanger brackets at front and center, same material as canopy and suspend from building structure above. Crossbrace as necessary so as to eliminate any and all sway.
- H. Exhaust hood shall be provided with enclosure panels, same material as hood, from the canopy to the finished ceiling above on front and ends. (on all sides.)
- I. Provide heat sensor assembly and thermal exhaust interlock assembly as part of the hood.
- J. Provide fire suppression system cabinet on one side of the hood.
- K. Front of the hood to have switches for lights and exhaust fan.

#### 4.5 ITEM 5 - FIRE SUPPRESSION SYSTEM - ONE (1) REQUIRED

- A. Fire suppression system shall be as manufactured by Ansul, Model #R-102.
- B. Fire suppression system shall cover the hood, duct, and any necessary appliances below. Provide all necessary electrical contacts and gas valves as may be required. The fire protection system shall comply to both NFPA96 and NFPA17 requirements.
- C. All components to be new from manufacturer, not recertified or remanufactured as new.
- D. Furnish a complete wet chemical fire suppression system model R102 as manufactured by "Ansul" or equal in compliance with U.L. 300 standards. The system shall include factory prepiped, all permits and test as required by the authority having jurisdiction.
- E. Automatic actuation shall be by means of fusible with no visible conduit.
- F. System shall be furnished and installed by an Ansul certified distributor in accordance with manufacturer's instructions and the authority having jurisdiction.
- G. Microswitches shall be furnished as part of the fire protection system for tie in of building alarm and for make up air/fire/fuel shut down.
- H. All access openings, holes, sleeves, chases, etc., in building structure necessary to permit piping and control tubing to be run between system unit, ventilator and duct work are to be provided by the General Contractor.

- I. The Building Alarm System Contractor is to furnish a control relay to detect operation of the system by connection to the microswitches supplied. The Electrical Contractor is to furnish shunt trip breakers as required and install all wiring required for the system specified.
- J. All exposed piping and nozzles of fire protection system shall be chrome or Stainless steel sleeved.
- K. All horizontal piping is to be done on the top of the ventilator unless otherwise specified.

4.6 ITEM 6 - WORKTABLE WITH ENCLOSED BASE - ONE (1) REQUIRED

- A. Worktable shall be as manufactured by Eagle, Model #CB2448SE-BS.
- B. Worktable shall be provided with all standard equipment, plus the following:
  - 1. Center Shelf
  - 2. Lock

4.7 ITEM 7 - REACH-IN FREEZER - ONE (1) REQUIRED

- A. Reach-in freezer shall be as manufactured by Beverage Air, Model #HF1HC-1S.
- B. Reach-in freezer shall be provided with all standard equipment.

4.8 ITEM 8 - REACH-IN REFRIGERATOR - ONE (1) REQUIRED

- A. Reach-in refrigerator shall be as manufactured by Beverage Air, Model #HR1HC-1S.
- B. Reach-in refrigerator shall be provided with all standard equipment.

4.9 ITEM 9 - WORKTABLE W/SINK - ONE (1) REQUIRED

- A. Worktable shall be as manufactured by Eagle, Model #T30120E-BS.
- B. Worktable shall be provided with all standard equipment, plus the following:
  - 1. Two (2) #502971 Drawer Assemblies with Drawer Locks
  - 2. One (1) 20" x 20" x 14" Sink Unit
  - 3. Splash on Right End
  - 4. Flange Feet on Front
  - 5. Overflow Hole
  - 6. Kit E Sink Kit

4.10 ITEM 10 - MOBILE WORKTABLE - ONE (1) REQUIRED

- A. Mobile worktable shall be as manufactured by Eagle, Model #T2448SE.
- B. Mobile worktable shall be provided with all standard equipment, plus 5" casters, all with brakes.

4.11 ITEM 11 - STORAGE CABINET - ONE (1) REQUIRED

- A. Storage cabinet shall be as manufactured by Piper, Model #7773-B.
- B. Storage cabinet shall be provided with all standard equipment.

END OF SECTION 11400

**ESSEX COUNTY EMERGENCY  
SHELTER  
Jay Community Center**

**FOOD SERVICE EQUIPMENT  
Catalog Cuts  
Revised December 17, 2018**



*Fetech* INC.

**"FOOD EQUIPMENT TECHNOLOGY"**

*Food Service Equipment Consultants*

PO Box 464

Canastota, NY 13032

315/697-3322

[www.fetechinc.com](http://www.fetechinc.com)

ESSEX COUNTY EMERGENCY SHELTER  
JAY COMMUNITY CENTER

---

ITEM #: 1

DESCRIPTION: Pot/Pan Sink

QUANTITY: One (1)

MANUFACTURER: Existing

MODEL #: Relocate

---

ACCESSORIES:

NOTES:



ESSEX COUNTY EMERGENCY SHELTER  
JAY COMMUNITY CENTER

---

ITEM #: 2

DESCRIPTION: Hand Sink

QUANTITY: One (1)

MANUFACTURER: Eagle

MODEL #: #HSA-10-FAW

---

ACCESSORIES:

NOTES:



Profit from the Eagle Advantage®

# Specification Sheet

## Short Form Specifications

Eagle Hand Sink, model HSA-10. Constructed of type 304 stainless steel, all-welded with deep-drawn positive drain sink bowl, inverted "V" edge to prevent spillage and basket drain. Unit less faucet.

Eagle Hand Sink, model HSA-10-F. Features the same as sink #HSA-10, plus splash mounted gooseneck faucet.

Eagle Hand Sink, model HSA-10-FA. Features the same as sink #HSA-10, plus p-trap, tailpiece, and splash mounted gooseneck faucet.

Eagle Hand Sink, model HSA-10-FAW. Features the same as sink #HSA-10, plus p-trap, tailpiece, and splash mounted gooseneck faucet with wrist handles.

Eagle Hand Sink, model HSA-10-FL. Constructed of type 304 stainless steel, all-welded with deep-drawn positive drain sink bowl, inverted "V" edge to prevent spillage, polymer lever drain, and splash mounted gooseneck faucet.

Eagle Hand Sink, model HSA-10-FO. Features the same as sink #HSA-10-FL, plus polymer lever drain includes overflow.



#HSA-10-F

Item No.:	_____
Project No.:	_____
S.I.S. No.:	_____

## Traditional Hand Sinks

### MODELS:

- HSA-10
- HSA-10-F
- HSA-10-FAW
- HSA-10-FA
- HSA-10-FL
- HSA-10-FO

### Design & Construction Features

- Heavy gauge type 304 stainless steel all-welded construction.
- Inverted "V" edge rim retards spillage.
- Unique deep-drawn positive-drain bowl assures complete drainage to meet the most stringent health code requirements.
- Water inlet: 1/2" (13mm) NPS.
- Drain outlet: 1 1/2" (38mm) NPS.
- Six models to choose from.

### Options / Accessories

- P-trap
- Tail piece
- End splashes
- Front skirt
- Side mount wall bracket
- MICROGARD®\* antimicrobial protection

\* For hand sinks #HSA-10, HSA-10-F, HSA-10-FA, and HSA-10-FAW

**EAGLE GROUP**  
 100 Industrial Boulevard, Clayton, DE 19938-8903 USA  
 Phone: 302-653-3000 • Fax: 302-653-2065  
 www.eaglegrp.com

**Foodservice Division: Phone 800-441-8440**  
**MHC/Retail Display Divisions: Phone 800-637-5100**

For custom configuration or fabrication needs, contact our **SpecFAB® Division**.  
 Phone: 302-653-3000 • Fax: 302-653-3091 • e-mail: quotes@eaglegrp.com



EG20.40 Rev. 02/13

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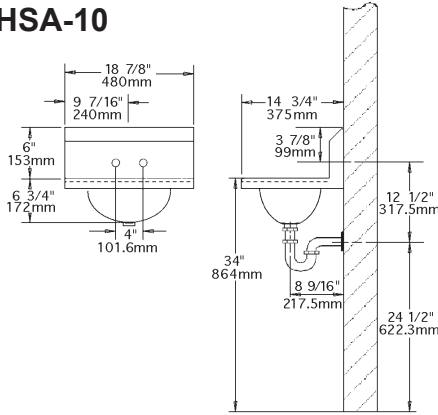


Profit from the Eagle Advantage®

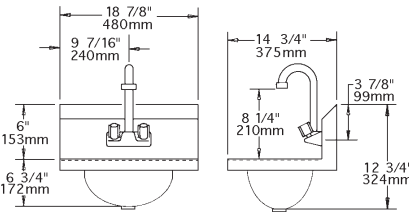
Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

# Traditional Hand Sinks

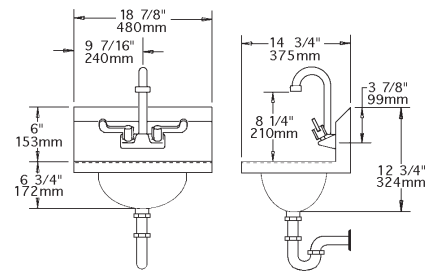
**HSA-10**



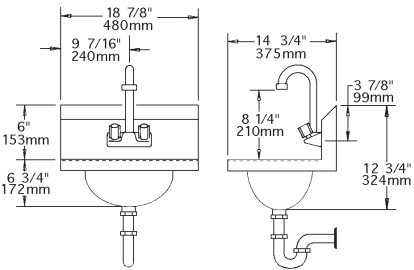
**HSA-10-F**



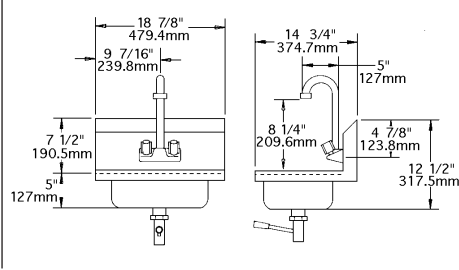
**HSA-10-FAW**



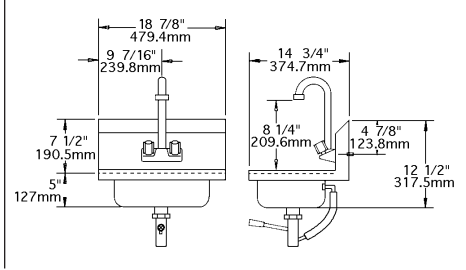
**HSA-10-FA**



**HSA-10-FL**



**HSA-10-FO**



model #	includes	bowl size		overall size		weight	
		width	length x depth	width	length x height	lbs.	kg
		in.	mm	in.	mm		
HSA-10 *	4" (102mm) centerline faucet holes, basket drain	9 3/4"	13 1/2" x 6 3/4"	248 x 343 x 173	14 3/4" x 18 7/8" x 12 3/4"	376 x 480 x 324	10 4.5
HSA-10-F	faucet, basket drain	9 3/4"	13 1/2" x 6 3/4"	248 x 343 x 173	14 3/4" x 18 7/8" x 12 3/4"	376 x 480 x 324	12 5.2
HSA-10-FA	faucet, p-trap, tail piece, basket drain	9 3/4"	13 1/2" x 6 3/4"	248 x 343 x 173	14 3/4" x 18 7/8" x 12 3/4"	376 x 480 x 324	14 6.4
HSA-10-FAW	faucet w/wrist handles, p-trap, tail piece, basket drain	9 3/4"	13 1/2" x 6 3/4"	248 x 343 x 173	14 3/4" x 18 7/8" x 12 3/4"	376 x 480 x 324	14 6.4
HSA-10-FL	faucet, polymer lever drain	10"	14" x 5"	254 x 256 x 127	14 3/4" x 18 7/8" x 12 1/2"	376 x 480 x 318	15 6.6
HSA-10-FO	faucet, polymer lever drain w/overflow	10"	14" x 5"	254 x 256 x 127	14 3/4" x 18 7/8" x 12 1/2"	376 x 480 x 318	13 5.9

\* To order hand sink with no faucet holes, add suffix "-NH" to model number (example: HSA-10-NH).

**EAGLE GROUP**  
 100 Industrial Boulevard, Clayton, DE 19938-8903 USA  
 Phone: 302-653-3000 • Fax: 302-653-2065  
 www.eaglegrp.com

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Rev. 02/13

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ESSEX COUNTY EMERGENCY SHELTER  
JAY COMMUNITY CENTER

---

ITEM #: 3

DESCRIPTION: Range with Oven

QUANTITY: One (1)

MANUFACTURER: Garland

MODEL #: #G36-6R

---

ACCESSORIES:

NOTES:

ESSEX COUNTY EMERGENCY SHELTER  
JAY COMMUNITY CENTER

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ITEM #: 4

DESCRIPTION: Exhaust Hood

QUANTITY: One (1)

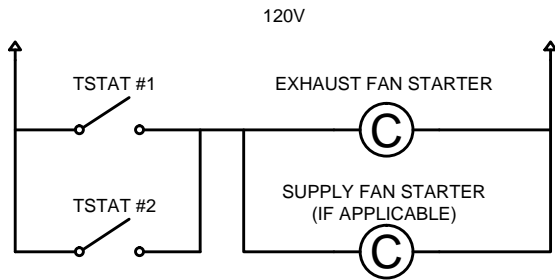
MANUFACTURER: Caddy

MODEL #: #PB-C-W-48-ND-48

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ACCESSORIES:

NOTES:



### THERMOSTAT WIRING DETAIL

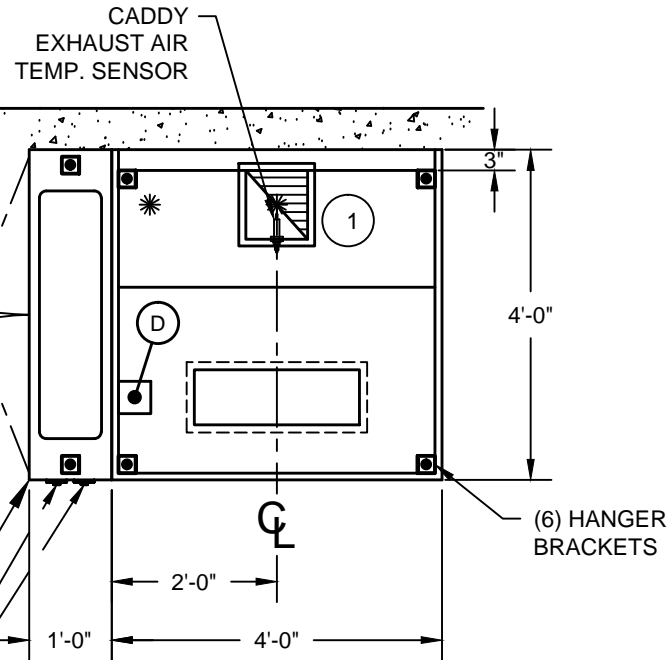
THERMOSTATS LOCATED IN EXHAUST DUCT COLLAR TO BE ENERGIZED ONCE TEMPERATURES REACH 105° F. EXHAUST AND SUPPLY FANS WILL TURN ON AT THIS POINT.

### OPTIONS

- (1) FAN AND LIGHT SWITCH
- (1) ANSUL BOX

- (D) (1) 24" FLUORESCENT LIGHT FIXTURE (0.08 K.W., 120/1/60 CONNECTED LOAD)

FIRE PROTECTION SYSTEM : ANSUL R-102  
(SURFACE, PLENUM, AND DUCT COLLAR PROTECTION).



### PLAN

TOTAL EXHAUST : 1,120 C.F.M.

1 10" X 9" EXHAUST DUCT  
1,120 C.F.M. @ 1.00" S.P.



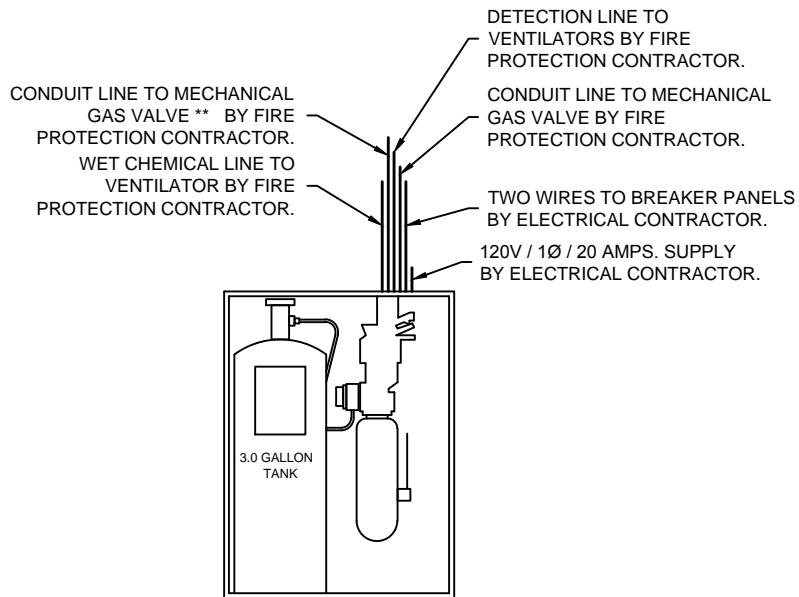
TOTAL EST. HANGING WT. : 450 LBS.



### Mechanical Air Data & Dimensions

ITEM #:	4	CADDY #:	34454	MODEL #:	PB-C-W-48-ND-48	
JOB NAME:	ESSEX COUNTY EMERGENCY SHELTER				DATE:	10/11/18
					DR. BY:	KCT
					SH. #:	1 OF 2

THIS DRAWING IS PROVIDED AS A PRELIMINARY DESIGN DATA SHEET.  
IT IS NOT TO BE USED FOR CONSTRUCTION OR FABRICATION APPROVAL PURPOSES.



**\*\* - FURNISHED BY CADDY AND INSTALLED BY P.C.**

DIMENSIONS : 16 1/2" L x 7 1/2" W x 23 1/2" H
HANGING HEIGHT : 7'-0" WHEN MOUNTED TO WALL
MOUNTING WEIGHT : 75 LBS.



**CADDY AirSystems**  
 509 SHARPTOWN ROAD  
 P.O. BOX 345 BRIDGEPORT NJ 08014  
 Tel:(856) 467-4222 Fax:(856) 467-5511

**Mechanical Air Data & Dimensions**

ITEM #: 5	CADDY #: 34454	MODEL #: ANSUL R-102 3
JOB NAME: ESSEX COUNTY EMERGENCY SHELTER		DATE: 10/11/18
		DR. BY: KCT
		SH. #: 2 OF 2

THIS DRAWING IS PROVIDED AS A PRELIMINARY DESIGN DATA SHEET.  
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ESSEX COUNTY EMERGENCY SHELTER  
JAY COMMUNITY CENTER

---

ITEM #: 5

DESCRIPTION: Fire Suppression System

QUANTITY: One (1)

MANUFACTURER: Ansul

MODEL #: #R-102

---

ACCESSORIES:

NOTES:



## R-102 Restaurant Fire Suppression Systems

### Features

- Low pH Agent
- Proven Design
- Reliable Gas Cartridge Operation
- Aesthetically Appealing
- UL Listed – Meets Requirements of UL 300
- ULC Listed – Meets Requirements of ULC/ORD-C1254.6
- CE Marked

### Application

The ANSUL® R-102 Restaurant Fire Suppression System is an automatic, pre-engineered, fire suppression system designed to protect areas associated with ventilating equipment including hoods, ducts, plenums, and filters. The system also protects auxiliary grease extraction equipment and cooking equipment such as fryers; griddles and range tops; upright, natural charcoal, or chain-type broilers; electric, lava rock, mesquite, or gas-radiant char-broilers; and woks.

The system is ideally suitable for use in restaurants, hospitals, nursing homes, hotels, schools, airports, and other similar facilities.

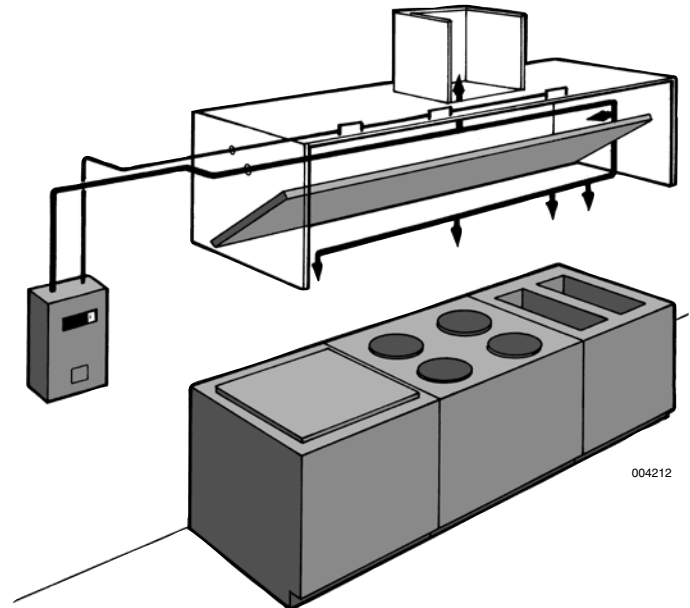
Use of the R-102 system is limited to indoor applications or locations that provide weatherproof protection within tested temperature limitations. The regulated release and tank assemblies must be mounted in an area where the air temperature will not fall below 32 °F (0 °C) or exceed 130 °F (54 °C). The system must be designed and installed within the guidelines of the UL/ULC Listed Design, Installation, Recharge, and Maintenance Manual.

### System Description

The restaurant fire suppression system is a pre-engineered, wet chemical, cartridge-operated, regulated pressure type with a fixed nozzle agent distribution network. It is listed with Underwriters Laboratories, Inc. (UL/ULC).



004215



004212

The system is capable of automatic detection and actuation as well as remote manual actuation. Additional equipment is available for building fire alarm panel connections, electrical shutdown and/or interface, and mechanical or electrical gas line shut-off applications.

The detection portion of the fire suppression system allows for automatic detection by means of specific temperature-rated alloy type fusible links, which separate when the temperature exceeds the rating of the link, allowing the regulated release to actuate.

A system owner's guide is available containing basic information pertaining to system operation and maintenance. A detailed technical manual, including system description, design, installation, recharge and resetting instructions, and maintenance procedures, is available to qualified individuals.

The system is installed and serviced by authorized distributors that are trained by the manufacturer.

The basic system consists of an AUTOMAN regulated release assembly which includes a regulated release mechanism and a wet chemical storage tank housed within a single enclosure. Nozzles with blow-off caps, detectors, cartridges, agent, fusible links, and pulley elbows are supplied in separate packages in the quantities needed for fire suppression system arrangements.

Additional equipment includes a remote manual pull station(s), mechanical and electrical gas valves, and electrical switches for automatic equipment and gas line shut-off. Accessories can be added such as alarms, warning lights, etc., to installations where required.

Additional tanks and corresponding equipment can be used in multiple arrangements to allow for larger hazard coverage. Each tank is limited to a listed maximum amount of flow numbers.



## Component Description

**Wet Chemical Agent** – The extinguishing agent is a mixture of organic salts designed for rapid flame knockdown and foam securement of grease related fires. It is available in plastic containers with instructions for wet chemical handling and usage.

**Agent Tank** – The agent tank is installed in a stainless steel enclosure or wall bracket. The tank is constructed of stainless steel.

Tanks are available in two sizes: 1.5 gallon (5.7 L) and 3.0 gallon (11.4 L). The tanks have a working pressure of 110 psi (7.6 bar), a test pressure of 330 psi (22.8 bar), and a minimum burst pressure of 660 psi (45.5 bar).

The tank includes an adaptor/tube assembly. The adaptor assembly includes a chrome-plated steel adaptor with a 1/4 in. NPT female gas inlet, a 3/8 in. NPT female agent outlet, and a stainless steel agent pick-up tube. The adaptor also contains a bursting disc seal which helps to prevent the siphoning of agent up the pipe during extreme temperature variations.

**Regulated Release Mechanism** – The regulated release mechanism is a spring-loaded, mechanical/pneumatic type capable of providing the expellant gas supply to one, two, or three agent tanks depending on the capacity of the gas cartridge used. It contains a factory installed regulator deadset at 110 psi (7.6 bar) with an external relief of approximately 180 psi (12.4 bar). It has automatic actuation capabilities by a fusible link detection system and remote manual actuation by a mechanical pull station.

The regulated release mechanism contains a release assembly, regulator, expellant gas hose, and agent storage tank housed in a stainless steel enclosure with cover. The enclosure contains knock-outs for 1/2 in. conduit. The cover contains an opening for a visual status indicator.

It is compatible with mechanical gas shut-off devices; or, when equipped with a field or factory-installed switch and manual reset relay, it is compatible with electric gas line or appliance shut-off devices.

**Regulated Actuator Assembly** – When more than two agent tanks (or three 3.0 gallon (11.4 L) tanks in certain applications) are required, the regulated actuator is available to provide expellant gas for additional tanks. It is connected to the cartridge receiver outlet of the regulated release mechanism providing simultaneous agent discharge. It contains a regulated actuator deadset at 110 psi (7.6 bar) with an external relief of approximately 180 psi (12.4 bar). It has automatic actuation capabilities using pressure from the regulated release mechanism cartridge.

The regulated actuator assembly contains an actuator, regulator, expellant gas hose, and agent tank housed in a stainless steel enclosure with cover. The enclosure contains knockouts to permit installation of the expellant gas line.

**Discharge Nozzles** – Each discharge nozzle is tested and listed with the R-102 system for a specific application. Nozzle tips are stamped with the flow number designation (1/2, 1, 2, or 3). Each nozzle must have a metal or rubber blow-off cap to keep the nozzle tip orifice free of cooking grease build-up.

**Agent Distribution Hose** – Kitchen appliances manufactured with or resting on casters (wheels/rollers) may include an agent distribution hose as a component of the suppression system. This allows the appliance to be moved for cleaning purposes without disconnecting the appliance fire suppression protection. The hose assembly includes a restraining cable kit to limit the appliance movement within the range (length) of the flexible hose.

**Flexible Conduit** – Flexible conduit allows for quicker installations and the convenience of being able to route the cable over, under and around obstacles. Flexible conduit can be used as a substitute for standard EMT conduit or can be used with EMT conduit.

Flexible conduit can be used only with the Molded Remote Manual Pull Station.

**Pull Station Assembly** – The remote manual pull station is made out of a molded red composite material. The red color makes the pull station more readily identifiable as the manual means for fire suppression system operation.

The pull station is compatible with the ANSUL Flexible Conduit.

## Approvals

- UL/ULC Listed
- CE Marked
- New York City Department of Buildings
- LPCB
- TFRI
- Marine Equipment Directive (MED)
- DNV
- ABS
- Lloyd's Register
- Meets requirements of NFPA 96 (Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment)
- Meets requirements of NFPA 17A (Standard on Wet Chemical Extinguishing Systems)

## Ordering Information

Order all system components through your local authorized ANSUL Distributor.

## Specifications

An ANSUL R-102 Fire Suppression System shall be furnished. The system shall be capable of protecting all hazard areas associated with cooking equipment.

### 1.0 GENERAL

#### 1.1 References

- 1.1.1 Underwriters Laboratories, Inc. (UL)
  - 1.1.1.1 UL Standard 1254
  - 1.1.1.2 UL Standard 300
- 1.1.2 Underwriters Laboratories of Canada (ULC)
  - 1.1.2.1 ULC/ORD-C 1254.6
- 1.1.3 National Fire Protection Association (NFPA)
  - 1.1.3.1 NFPA 96
  - 1.1.3.2 NFPA 17A

#### 1.2 Submittals

- 1.2.1 Submit two sets of manufacturer's data sheets
- 1.2.2 Submit two sets of piping design drawings

#### 1.3 System Description

- 1.3.1 The system shall be an automatic fire suppression system using a wet chemical agent for cooking grease related fires.
- 1.3.2 The system shall be capable of suppressing fires in the areas associated with ventilating equipment including hoods, ducts, plenums, and filters as well as auxiliary grease extraction equipment. The system shall also be capable of suppressing fires in areas associated with cooking equipment, such as fryers; griddles and range tops; upright, natural charcoal, or chain-type broilers; electric, lava rock, mesquite or gas-radiant char-broilers; and woks.
- 1.3.3 The system shall be the pre-engineered type having minimum and maximum guidelines established by the manufacturer and listed by Underwriters Laboratories (UL/ULC).
- 1.3.4 The system shall be installed and serviced by personnel trained by the manufacturer.
- 1.3.5 The system shall be capable of protecting cooking appliances by utilizing either dedicated appliance protection and/or overlapping appliance protection.

#### 1.4 Quality Control

- 1.4.1 Manufacturer: The R-102 Restaurant Fire Suppression System shall be manufactured by a company with at least forty years experience in the design and manufacture of pre-engineered fire suppression systems. The manufacturer shall be ISO 9001 registered.
- 1.4.2 Certificates: The wet agent shall be a specially formulated, aqueous solution of organic salts with a pH range between 7.7 – 8.7, designed for flame knockdown and foam securement of grease-related fires.

#### 1.5 Warranty, Disclaimer, and Limitations

- 1.5.1 The pre-engineered restaurant fire suppression system components shall be warranted for five years from date of delivery against defects in workmanship and material.

#### 1.6 Delivery

- 1.6.1 Packaging: All system components shall be securely packaged to provide protection during shipment.

### 1.7 Environmental Conditions

- 1.7.1 The R-102 system shall be capable of operating within a temperature range of 32 °F to 130 °F (0 °C to 54 °C).

### 2.0 PRODUCT

#### 2.1 Manufacturer

- 2.1.1 Tyco Fire Protection Products, One Stanton Street, Marinette, Wisconsin 54143-2542, Telephone (715) 735-7411.

#### 2.2 Components

- 2.2.1 The basic system shall consist of an AUTOMAN regulated release assembly which includes a regulated release mechanism and a wet chemical storage tank housed within a single enclosure. Nozzles, blow-off caps, detectors, cartridges, agent, fusible links, and pulley elbows shall be supplied in separate packages in the quantities needed for fire suppression system arrangements. Additional equipment shall include remote manual pull station, mechanical and electrical gas valves, and electrical switches for automatic equipment and gas line shut-off, and building fire alarm control panel interface.
- 2.2.2 Wet Chemical Agent: The extinguishing agent shall be a specially formulated, aqueous solution of organic salts with a pH range between 7.7 – 8.7, designed for flame knockdown and foam securement of grease related fires.
- 2.2.3 Agent Tank: The agent tank shall be installed in a stainless steel enclosure or wall bracket. The tank shall be constructed of stainless steel. Tanks shall be available in two sizes; 1.5 gallon (5.7 L) and 3.0 gal (11.4 L). The tank shall have a working pressure of 110 psi (7.6 bar), a test pressure of 330 psi (22.8 bar), and a minimum burst pressure of 660 psi (45.5 bar). The tank shall include an adaptor/tube assembly containing a burst disc union.
- 2.2.4 Regulated Release Mechanism: The regulated release mechanism shall be a spring-loaded, mechanical/pneumatic type capable of providing the expellant gas supply to one or two agent tanks depending on the capacity of the gas cartridge used or three 3.0 gallon (11.4 L) agent storage tanks in certain applications. It shall contain a factory installed regulator deadset at 110 psi (7.6 bar) with an external relief of approximately 180 psi (12.4 bar).  
It shall have the following actuation capabilities: automatic actuation by a fusible link detection system and remote manual actuation by a mechanical pull station.  
The regulated release mechanism shall contain a release assembly, regulator, expellant gas hose, and agent storage tank housed in a stainless steel enclosure with cover. The enclosure shall contain knock-outs for 1/2 in. conduit. The cover shall contain an opening for a visual status indicator.  
It shall be compatible with mechanical gas shut-off devices; or, when equipped with a field or factory-installed switch(es), it shall be compatible with electric gas line or appliance shut-off devices, or connections to a building fire alarm control panel.

## Specifications (Continued)

- 2.2.5 Regulated Actuator Assembly: When more than two agent tanks or three agent tanks in certain applications are required, the regulated actuator shall be available to provide expellant gas for additional tanks. It shall be connected to the cartridge receiver outlet of the regulated release mechanism providing simultaneous agent discharge. The regulator shall be deadset at 110 psi (7.6 bar) with an external relief of approximately 180 psi (12.4 bar). The regulated actuator assembly shall contain an actuator, regulator, expellant gas hose, and agent tank housed in a stainless steel enclosure with cover. The enclosure shall contain knockouts to permit installation of the expellant gas line.
- 2.2.6 Discharge Nozzles: Each discharge nozzle shall be tested and listed with the R-102 system for a specific application. Nozzles tips shall be stamped with the flow number designation (1/2, 1, 2, or 3). Each nozzle shall have a metal or rubber blow-off cap to keep the nozzle tip orifice free of cooking grease build-up.
- 2.2.7 Distribution Piping: Distribution piping shall be Schedule 40 black iron, chrome-plated, or stainless steel conforming to ASTM A120, A53, or A106.
- 2.2.8 Detectors: The detectors shall be the fusible link style designed to separate at a specific temperature.
- 2.2.9 Cartridges: The cartridge shall be a sealed steel pressure vessel containing either carbon dioxide or nitrogen gas. The cartridge seal shall be designed to be punctured by the releasing device supplying the required pressure to expel wet chemical agent from the storage tank.
- 2.2.10 Agent Distribution Hose: An optional agent distribution hose shall be available for kitchen appliances manufactured with or resting on casters (wheels/rollers). This shall allow the appliance to be moved for cleaning purposes without disconnecting the appliance fire suppression protection. Hose assembly shall include a restraining cable kit to limit the appliance movement within the range (length) of the flexible hose.
- 2.2.11 Flexible Conduit: The manufacturer supplying the Restaurant Fire Suppression System shall offer flexible conduit as an option to rigid EMT conduit for the installation of pull stations and/or mechanical gas valves. The flexible conduit shall be UL Listed and include all approved components for proper installation.
- 2.2.12 Pull Station Assembly: The Fire Suppression System shall include a remote pull station for manual system actuation. The pull station shall be designed to include a built-in guard to protect the pull handle. The pull station shall also be designed with a pull handle to allow for three finger operation and shall be red in color for quick visibility.

## 3.0 IMPLEMENTATION

### 3.1 Installation

- 3.1.1 The R-102 fire suppression system shall be designed, installed, inspected, maintained, and recharged in accordance with the manufacturer's listed instruction manual.

### 3.2 Training

- 3.2.1 Training shall be conducted by representatives of the manufacturer.

ANSUL, R-102, and the product names listed in this material are marks and/or registered marks. Unauthorized use is strictly prohibited.

ESSEX COUNTY EMERGENCY SHELTER  
JAY COMMUNITY CENTER

---

ITEM #: 6

DESCRIPTION: Worktable with Enclosed Base

QUANTITY: One (1)

MANUFACTURER: Eagle

MODEL #: #CB3048SE-BS

---

ACCESSORIES:

Center Shelf  
Lock

NOTES:



Profit from the Eagle Advantage®

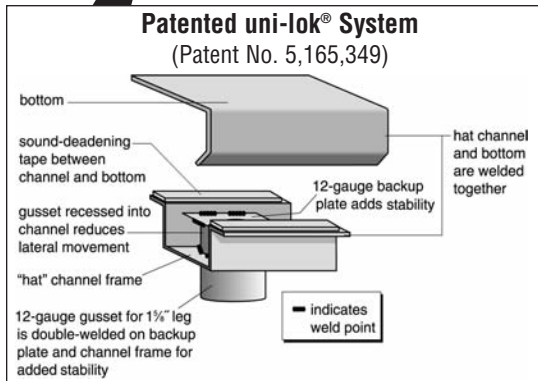
# Specification Sheet

## Short Form Specifications

Eagle Spec-Master® Enclosed Base Worktable, model \_\_\_\_\_ . Top is 14/304 stainless steel, sides and back are heavy gauge stainless steel. (Open Front, Stainless Steel Sliding Door, or Stainless Steel Hinged Door) models with 1½" rolled edge on front, sides turned down, and 4" backsplash on rear. Constructed with uni-lok® patented gusset system, with the gussets recessed into the hat channels to reduce lateral movement. 1½" O.D. stainless steel tubular legs with adjustable bullet feet.



enclosed worktable with hinged doors



**EAGLE GROUP**  
100 Industrial Boulevard, Clayton, DE 19938-8903 USA  
Phone: 302-653-3000 • Fax: 302-653-2065  
www.eaglegrp.com

**Foodservice Division: Phone 800-441-8440**  
**MHC/Retail Display Divisions: Phone 800-637-5100**

For custom configuration or fabrication needs, contact our **SpecFAB® Division**.  
Phone: 302-653-3000 • Fax: 302-653-3091 • e-mail: specfab@eaglegrp.com

Item No.: \_\_\_\_\_  
Project No.: \_\_\_\_\_  
S.I.S. No.: \_\_\_\_\_

## Spec-Master® Enclosed Worktables with Backsplash

### MODELS:

- |                                       |                                       |  |
|---------------------------------------|---------------------------------------|--|
| <input type="checkbox"/> OB2436SE-BS  | <input type="checkbox"/> CB2436SE-BS  | <input type="checkbox"/> CBH2436SE-BS  |
| <input type="checkbox"/> OB2448SE-BS  | <input type="checkbox"/> CB2448SE-BS  | <input type="checkbox"/> CBH2448SE-BS  |
| <input type="checkbox"/> OB2460SE-BS  | <input type="checkbox"/> CB2460SE-BS  | <input type="checkbox"/> CBH2460SE-BS  |
| <input type="checkbox"/> OB2472SE-BS  | <input type="checkbox"/> CB2472SE-BS  | <input type="checkbox"/> CBH2472SE-BS  |
| <input type="checkbox"/> OB2484SE-BS  | <input type="checkbox"/> CB2484SE-BS  | <input type="checkbox"/> CBH2484SE-BS  |
| <input type="checkbox"/> OB2496SE-BS  | <input type="checkbox"/> CB2496SE-BS  | <input type="checkbox"/> CBH2496SE-BS  |
| <input type="checkbox"/> OB24120SE-BS | <input type="checkbox"/> CB24120SE-BS | <input type="checkbox"/> CBH24120SE-BS |
| <input type="checkbox"/> OB3036SE-BS  | <input type="checkbox"/> CB3036SE-BS  | <input type="checkbox"/> CBH3036SE-BS  |
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| <input type="checkbox"/> OB3060SE-BS  | <input type="checkbox"/> CB3060SE-BS  | <input type="checkbox"/> CBH3060SE-BS  |
| <input type="checkbox"/> OB3072SE-BS  | <input type="checkbox"/> CB3072SE-BS  | <input type="checkbox"/> CBH3072SE-BS  |
| <input type="checkbox"/> OB3084SE-BS  | <input type="checkbox"/> CB3084SE-BS  | <input type="checkbox"/> CBH3084SE-BS  |
| <input type="checkbox"/> OB3096SE-BS  | <input type="checkbox"/> CB3096SE-BS  | <input type="checkbox"/> CBH3096SE-BS  |
| <input type="checkbox"/> OB30120SE-BS | <input type="checkbox"/> CB30120SE-BS | <input type="checkbox"/> CBH30120SE-BS |

### Features

- All-welded design.
- Available with open front, sliding doors, or hinged doors.
- Doors are 20 gauge type 430 stainless steel.
- Top mechanically polished to satin finish.
- Top is 14 gauge type 304 stainless steel reinforced with a full length "hat" channel support.
- Body is heavy gauge type 430 stainless steel.
- Sound-deadened between top and frame.
- 1½" (42mm)-diameter type 304 stainless legs.
- 1" (25mm) adjustable stainless steel feet.
- 1½" (38mm) sanitary rolled rim on front.
- 4½" (114mm) backsplash on rear.
- Square edge on ends for flush fit.
- Optional fixed center shelf available. To order, add suffix "-CS" to model number. Example: OB2436SE-BS-CS

### Options / Accessories

- Lock (for units with doors)
- Casters\*
- Overshelf
- Center shelf

\* To order table with 4" (102mm)-diameter casters, add suffix "-CA" (ex: OB3048SE-BS-CA). To order table with 5" (127mm)-diameter casters, add suffix "-CAH" (ex: CB3048SE-BS-CAH).

### Certifications / Approvals

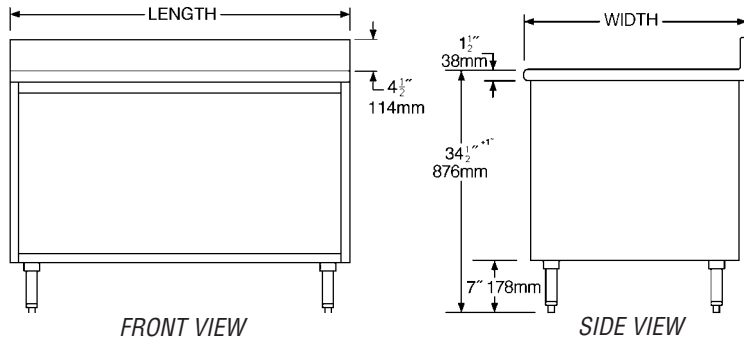


Spec sheets available for viewing, printing or downloading from our online literature library at [www.eaglegrp.com](http://www.eaglegrp.com)



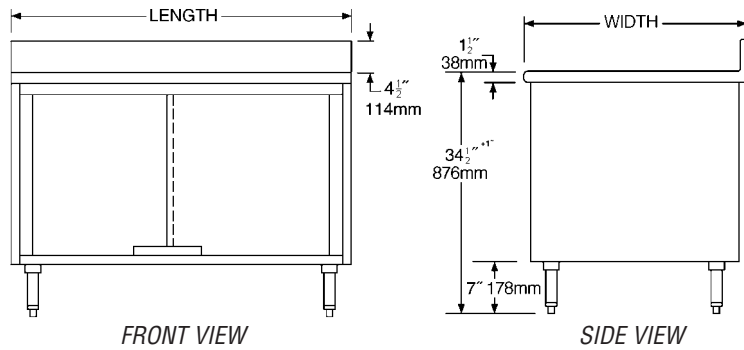
Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

### Spec-Master® Enclosed Worktables with Open Front



model #	width		length		weight	
	in.	mm	in.	mm	lbs.	kg
OB2436SE-BS	24"	610	36"	914	133	60.3
OB2448SE-BS	24"	610	48"	1219	161	73.0
OB2460SE-BS	24"	610	60"	1524	202	91.6
OB2472SE-BS	24"	610	72"	1829	243	110.2
OB2484SE-BS	24"	610	84"	2134	284	128.8
OB2496SE-BS	24"	610	96"	2438	326	147.9
OB24120SE-BS	24"	610	120"	3048	390	176.9
OB3036SE-BS	30"	762	36"	914	137	62.1
OB3048SE-BS	30"	762	48"	1219	167	75.8
OB3060SE-BS	30"	762	60"	1524	201	91.2
OB3072SE-BS	30"	762	72"	1829	251	113.9
OB3084SE-BS	30"	762	84"	2134	299	135.6
OB3096SE-BS	30"	762	96"	2438	344	156.0
OB30120SE-BS	30"	762	120"	3048	438	198.7

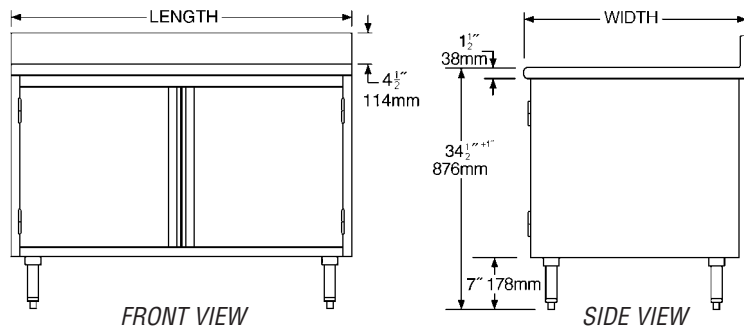
### Spec-Master® Enclosed Worktables with Sliding Doors



model #	width		length		weight	
	in.	mm	in.	mm	lbs.	kg
CB2436SE-BS	24"	610	36"	914	139	63.1
CB2448SE-BS	24"	610	48"	1219	171	77.6
CB2460SE-BS	24"	610	60"	1524	214	97.1
CB2472SE-BS	24"	610	72"	1829	256	116.1
CB2484SE-BS*	24"	610	84"	2134	304	137.9
CB2496SE-BS*	24"	610	96"	2438	343	155.6
CB24120SE-BS*	24"	610	120"	3048	390	176.9
CB3036SE-BS	30"	762	36"	914	143	64.9
CB3048SE-BS	30"	762	48"	1219	174	78.9
CB3060SE-BS	30"	762	60"	1524	221	100.2
CB3072SE-BS	30"	762	72"	1829	264	119.8
CB3084SE-BS*	30"	762	84"	2134	319	144.7
CB3096SE-BS*	30"	762	96"	2438	355	161.0
CB30120SE-BS*	30"	762	120"	3048	458	207.8

\* Note: Worktables 84" (2134mm) and longer have two sets of doors.

### Spec-Master® Enclosed Worktables with Hinged Doors



model #	width		length		weight	
	in.	mm	in.	mm	lbs.	kg
CBH2436SE-BS	24"	610	36"	914	139	63.1
CBH2448SE-BS	24"	610	48"	1219	171	77.6
CBH2460SE-BS	24"	610	60"	1524	214	97.1
CBH2472SE-BS	24"	610	72"	1829	256	116.1
CBH2484SE-BS*	24"	610	84"	2134	304	137.9
CBH2496SE-BS*	24"	610	96"	2438	343	155.6
CBH24120SE-BS*	24"	610	120"	3048	390	176.9
CBH3036SE-BS	30"	762	36"	914	143	64.9
CBH3048SE-BS	30"	762	48"	1219	174	78.9
CBH3060SE-BS	30"	762	60"	1524	221	100.2
CBH3072SE-BS	30"	762	72"	1829	264	119.8
CBH3084SE-BS*	30"	762	84"	2134	319	144.7
CBH3096SE-BS*	30"	762	96"	2438	355	161.0
CBH30120SE-BS*	30"	762	120"	3048	458	207.8

\* Note: Worktables 84" (2134mm) and longer have two sets of doors.

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Foodservice Division: Phone 800-441-8440  
 MHC/Retail Display Divisions: Phone 800-637-5100

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Rev. 11/08

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ESSEX COUNTY EMERGENCY SHELTER  
JAY COMMUNITY CENTER

---

ITEM #: 7

DESCRIPTION: Reach-In Freezer

QUANTITY: One (1)

MANUFACTURER: Beverage Air

MODEL #: #HF1HC-1S

---

ACCESSORIES:

NOTES:





# BEVERAGE-AIR

Project: \_\_\_\_\_

AIA#

Item: \_\_\_\_\_

Location: \_\_\_\_\_

SIS#

Approved: \_\_\_\_\_

## HF 32" Base Freezers

HF1HC-1S Top Mount Reach-In Freezer  
Hydrocarbon Series

**MODELS:**  
**HF1HC-1S**



HF1HC-1S

**3 Year Parts/Labor Warranty**  
**Additional 2 Year Compressor Warranty**

### CABINET CONSTRUCTION

- Stainless steel front, gray painted sides
- Interior liner is made of corrosion resistant aluminum
- One piece grille
- Full electronic control with 1-touch defrost
- LED light standard
- Self-closing door(s) with 120° stay-open feature, on cam-lift hinges
- Field reversible door(s) are easily removed for service and cleaning
- Door lock(s)
- Magnetic gasket attached to each door for positive seal
- Anti-microbial door handle(s)
- Three (3) heavy duty epoxy coated wire shelves per section and four shelf clips included per shelf
- 6" Casters, 2 with brakes standard
- Maintains product temperatures of -10°F

### OPTIONS & ACCESSORIES

- Glass door with lock(s)
- Chrome shelves
- Stainless steel rim support tray slide
- Stainless steel bottom mount angle tray slide
- Stainless steel universal tray slide
- Epoxy coated wire rod tray slide
- 3" Casters
- 6" Legs

### REFRIGERATION SYSTEM

- Refrigeration system uses R290 refrigerant to comply with all environmental concerns
- Automatic, non-electric evaporator
- System is serviceable from rear
- Epoxy coated evaporator coil
- Expansion Valve technology

HF1HC-1S 32" Base Top Mount Reach-In: Horizon Series



3779 Champion Blvd., Winston-Salem, NC 27105  
1-888-845-9800 Fax: 1-336-245-6453  
Beverage-Air.com sales@bevair.com



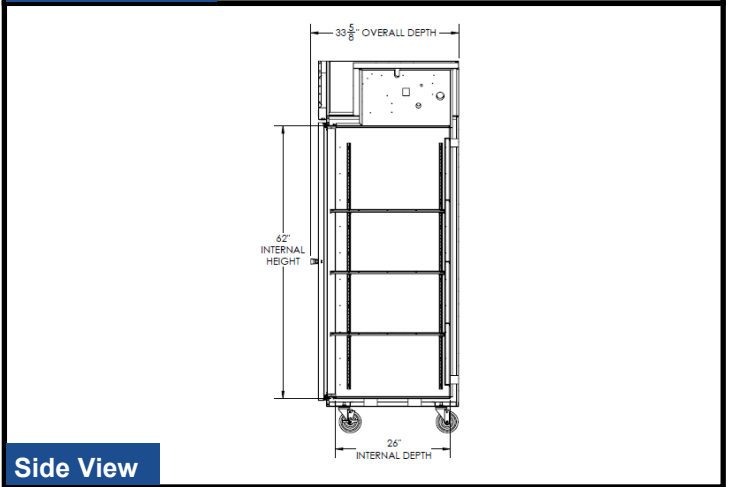
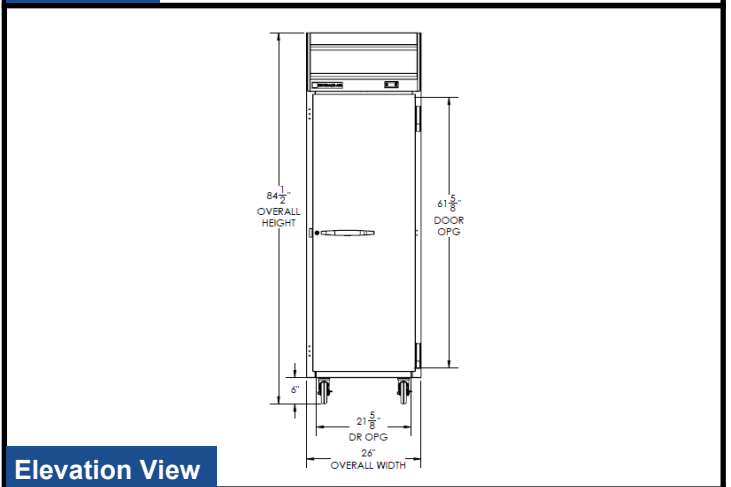
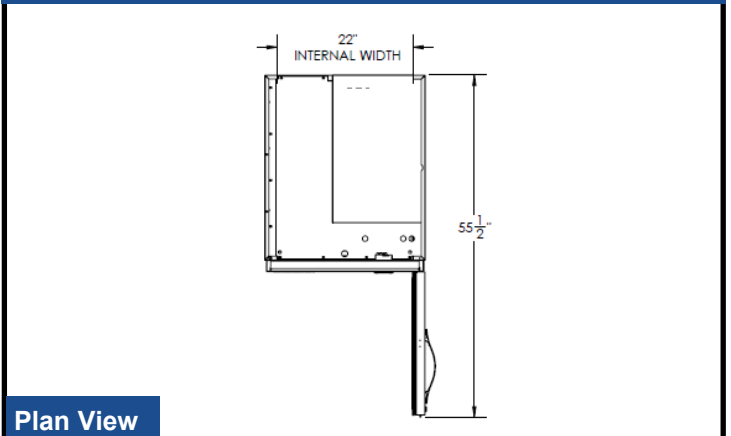
# BEVERAGE-AIR

MODEL	HF1HC-1S
<b>EXTERNAL DIMENSIONAL DATA</b>	
Width Overall	26"
Depth Overall	33 5/8"
Height Overall with 6" Casters	84 1/2"
Number of Doors	1
Depth with Door Open 90 °	55 1/2"
Clear Door Opening (in)	21 5/8" x 61 5/8"
Shelf Area (sq. in)	552 1/2"
<b>INTERNAL DIMENSIONAL DATA</b>	
NET Capacity (cubic ft.)	21.7
Internal Width Overall (in)	22"
Internal Depth Overall (in)	26"
Internal Height Overall (in)	62
Number of Shelves	3
<b>ELECTRICAL DATA</b>	
Full Load Amperes 115/60/1	4.3
<b>REFRIGERATION DATA</b>	
Horsepower	3/4
Capacity (BTU/Hr)*	1997
<b>WEIGHT DATA</b>	
Gross Weight (Crated lbs)	334 lbs
Height - Crated	88"
Width - Crated	33"
Depth - Crated	41"

## Top Mount Reach-In Freezer

Model: HF1HC-1S

### Model Views



### ELECTRICAL CONNECTION



115/60/1  
NEMA-5-15P

Units pre-wired at factory and include 8' long cord and plug set.



an Ali Group Company



The Spirit of Excellence

3779 Champion Blvd., Winston-Salem, NC 27105  
1-888-845-9800 Fax: 1-336-245-6453

ESSEX COUNTY EMERGENCY SHELTER  
JAY COMMUNITY CENTER

---

ITEM #: 8

DESCRIPTION: Reach-In Refrigerator

QUANTITY: One (1)

MANUFACTURER: Beverage Air

MODEL #: #HR1HC-1S

---

ACCESSORIES:

NOTES:



# BEVERAGE-AIR

Project: \_\_\_\_\_

AIA#

Item: \_\_\_\_\_

Location: \_\_\_\_\_

SIS#

Approved: \_\_\_\_\_

## HR HORIZON REFRIGERATOR

### HR1HC-1S Solid Door Top Mount Reach-In Refrigerator

### Hydrocarbon Series

**MODELS:**  
**HR1HC-1S**



**HR1HC-1S**

**3 Year Parts/Labor Warranty**  
**Additional 2 Year Compressor Warranty**

### CABINET CONSTRUCTION

- Exterior is stainless steel front and gray painted sides
- Interior liner is made of corrosion resistant aluminum
- Full electronic control
- One piece grille
- LED interior light
- Self-closing door with 120° stay-open feature, on cam-lift hinges
- Field reversible doors are easily removed for service and cleaning
- Magnetic gasket attached to each door for positive seal
- Door lock
- Anti-microbial door handle
- Three (3) heavy duty epoxy coated wire with four (4) shelf clips shelves
- 6" Heavy-duty casters, two (2) with brakes
- Maintains product temperatures between 36 - 38°F

### OPTIONS & ACCESSORIES

- Glass and half glass doors with locks
- Chrome shelves
- Stainless steel rim support tray slide
- Stainless steel bottom mount angle tray slide
- Stainless steel universal tray slide
- Epoxy coated wire rod tray slide
- 3" Casters
- 6" Legs

### REFRIGERATION SYSTEM

- Refrigeration system uses R290 refrigerant to comply with all environmental concerns
- Automatic, non-electric evaporator
- Epoxy coated evaporator coil

**HR1HC-1S Top Mount Reach-In: Horizon Series**



3779 Champion Blvd., Winston-Salem, NC 27105  
1-888-845-9800 Fax: 1-336-245-6453  
Beverage-Air.com sales@bevair.com



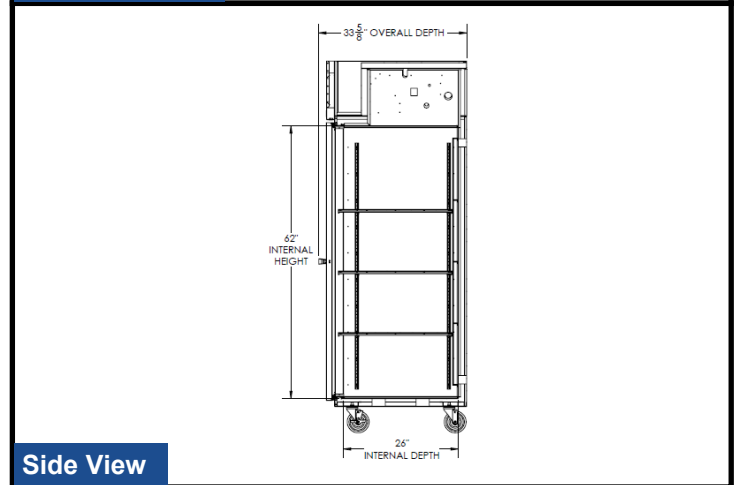
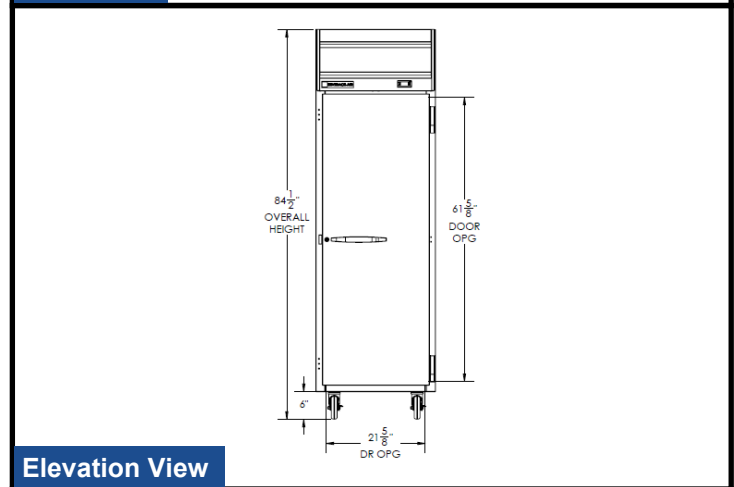
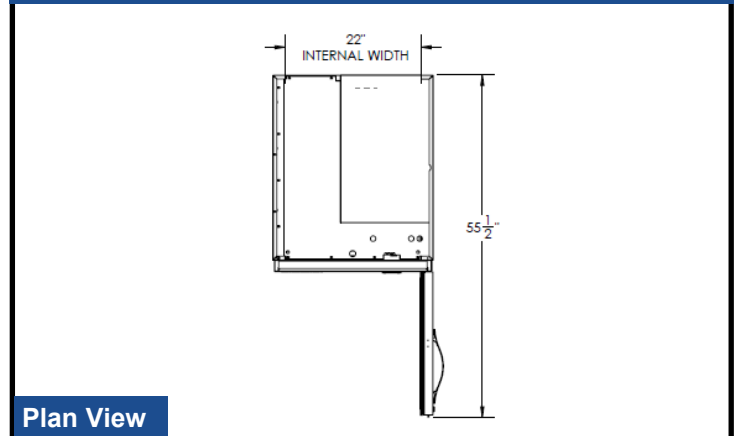
# BEVERAGE-AIR

MODEL	HR1HC-1S
<b>EXTERNAL DIMENSIONAL DATA</b>	
Width Overall	26"
Depth Overall with Handle	33 5/8"
Height Overall with 6" Casters	84 1/2"
Number of Doors	1
Depth with Door Open 90 °	55 1/2"
Door Opening (in)	21 5/8" x 61 5/8"
Shelf Area (sq. in)	552 1/2"
<b>INTERNAL DIMENSIONAL DATA</b>	
NET Capacity (cubic ft.)	20.75
Internal Width Overall (in)	22"
Internal Depth Overall (in)	26"
Internal Height Overall (in)	62
Number of Shelves	3
<b>ELECTRICAL DATA</b>	
Full Load Amperes 115/60/1	4.3
<b>REFRIGERATION DATA</b>	
Horsepower	1/4
Capacity (BTU/Hr)*	1997
<b>WEIGHT DATA</b>	
Gross Weight (Crated lbs)	356 lbs
Height - Crated	88"
Width - Crated	33"
Depth - Crated	41"

## Top Mount Reach-In Refrigerator

Model: HR1HC-1S

### Model Views



### ELECTRICAL CONNECTION



115/60/1  
NEMA-5-15P

Units pre-wired at factory and include 8' long cord and plug set.



an Ali Group Company



The Spirit of Excellence

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1-888-845-9800 Fax: 1-336-245-6453  
Beverage-Air.com sales@bevair.com

ESSEX COUNTY EMERGENCY SHELTER  
JAY COMMUNITY CENTER

---

ITEM #: 9

DESCRIPTION: Worktable with Sink

QUANTITY: One (1)

MANUFACTURER: Eagle

MODEL #: #T30120E-BS

---

ACCESSORIES:

Two (2) #502971 Drawer Assemblies with Drawer Locks  
One (1) 20" x 20" x 14" Sink Unit  
Splash on Right End  
Flange Feet on Front  
Overflow Hole  
Kit E Sink Kit

NOTES:



Profit from the Eagle Advantage®

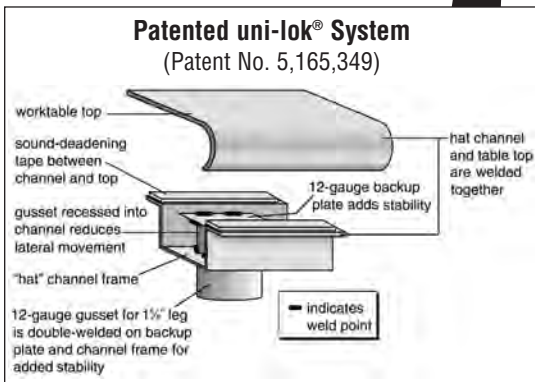
# Specification Sheet

## Short Form Specifications

Eagle worktables, Spec-Master® series, model \_\_\_\_\_.  
 Top constructed of 14 gauge 300 series stainless steel with 1½" roll on front, 4½" backsplash, and sides turned down 90°. Undershef is adjustable and constructed of heavy gauge galvanized steel. Top reinforced with welded hat channels, and sound deadened. Constructed with uni-lok® patented gusset system with the gussets recessed into the hat channels to reduce lateral movement. Legs are 1½" O.D. galvanized tubing, with galvanized gussets and 1" hi-impact plastic bullet feet.



worktable with backsplash and undershef



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Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

## Worktables with Backsplash and Galvanized Base with Undershef —Spec-Master® Series

### MODELS:

- |                                    |                                     |                                     |                                     |
|------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> T2424E-BS | <input type="checkbox"/> T24108E-BS | <input type="checkbox"/> T3072E-BS  | <input type="checkbox"/> T3660E-BS  |
| <input type="checkbox"/> T2430E-BS | <input type="checkbox"/> T24120E-BS | <input type="checkbox"/> T3084E-BS  | <input type="checkbox"/> T3672E-BS  |
| <input type="checkbox"/> T2436E-BS | <input type="checkbox"/> T24132E-BS | <input type="checkbox"/> T3096E-BS  | <input type="checkbox"/> T3684E-BS  |
| <input type="checkbox"/> T2448E-BS | <input type="checkbox"/> T24144E-BS | <input type="checkbox"/> T30108E-BS | <input type="checkbox"/> T3696E-BS  |
| <input type="checkbox"/> T2460E-BS | <input type="checkbox"/> T3030E-BS  | <input type="checkbox"/> T30120E-BS | <input type="checkbox"/> T36108E-BS |
| <input type="checkbox"/> T2472E-BS | <input type="checkbox"/> T3036E-BS  | <input type="checkbox"/> T30132E-BS | <input type="checkbox"/> T36120E-BS |
| <input type="checkbox"/> T2484E-BS | <input type="checkbox"/> T3048E-BS  | <input type="checkbox"/> T30144E-BS | <input type="checkbox"/> T36132E-BS |
| <input type="checkbox"/> T2496E-BS | <input type="checkbox"/> T3060E-BS  | <input type="checkbox"/> T3648E-BS  | <input type="checkbox"/> T36144E-BS |

### Tabletop

- Patented uni-lok® gusset system (patent #5,165,349): gussets are recessed into hat channel, reducing lateral movement.
- Top reinforced with welded-on hat channel.
- Sound-deadened between top and channels.
- 4½" (114mm)-high 90° backsplash with 1" (25mm) turn at 90°.
- 1½" (38mm)-diameter 180° rolled edge on front. Ends are turned down 90°, providing for flush installations when required.
- 14 gauge 300 series polished stainless steel.

### Adjustable Undershef

- Heavy gauge, galvanized.
- Gusset welded to each corner.

### Legs—1½" (41mm)-diameter

- Tables 96" (2438mm) and longer come with six legs or more.
- Heavy gauge galvanized steel.
- 1" (25mm) adjustable hi-impact plastic feet.

### Options / Accessories

- |  |   |
|--|---|
| <input type="checkbox"/> Drawer                              | <input type="checkbox"/> Duplex receptacles       |
| <input type="checkbox"/> Lock                                | <input type="checkbox"/> Pot rack                 |
| <input type="checkbox"/> Casters                             | <input type="checkbox"/> Sink                     |
| <input type="checkbox"/> Stainless steel bullet feet         | <input type="checkbox"/> Additional undershef     |
| <input type="checkbox"/> Overshelves                         | <input type="checkbox"/> Stabilizer Bar (for 30"- |
| <input type="checkbox"/> Power strip (for material handling) | and 36"-wide tables)                              |

### Certifications / Approvals



### AUTOQUOTES



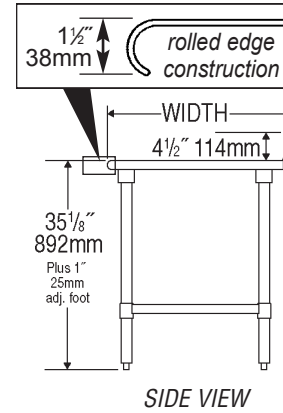
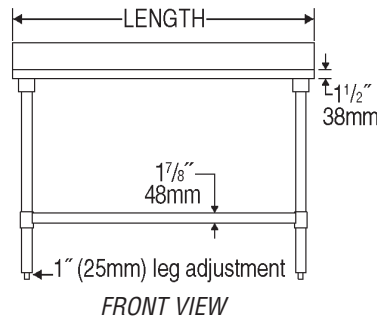
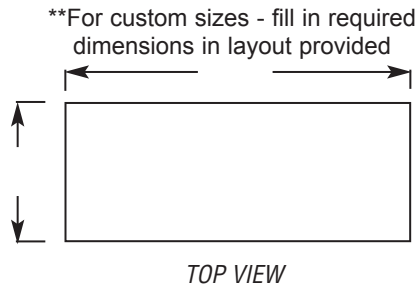
Catalog Specification Sheet No. **EG10.44C** Spec-Master® Series Worktables with Backsplash and Galvanized Base with Undershef

EG10.44C Rev. 10/15



Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

## Worktables with Backsplash and Galvanized Base with Undershelf—Spec-Master® Series



model #	# of legs	width		length		weight	
		in.	mm	in.	mm	lbs.	kg
T2424E-BS	4	24"	610	24"	610	47	21.3
T2430E-BS	4	24"	610	30"	762	53	24.0
T2436E-BS	4	24"	610	36"	914	58	26.3
T2448E-BS	4	24"	610	48"	1219	69	31.3
T2460E-BS	4	24"	610	60"	1524	80	36.3
T2472E-BS	4	24"	610	72"	1829	94	42.6
T2484E-BS	4	24"	610	84"	2134	107	48.5
T2496E-BS	6	24"	610	96"	2438	126	57.2
T24108E-BS	6	24"	610	108"	2743	156	70.8
T24120E-BS	6	24"	610	120"	3048	170	77.1
T24132E-BS	8	24"	610	132"	3353	183	83.0
T24144E-BS	8	24"	610	144"	3658	196	88.9
T3030E-BS	4	30"	762	30"	762	55	24.9
T3036E-BS	4	30"	762	36"	914	58	26.3
T3048E-BS	4	30"	762	48"	1219	77	34.9
T3060E-BS	4	30"	762	60"	1524	89	40.4
T3072E-BS	4	30"	762	72"	1829	103	46.3
T3084E-BS	4	30"	762	84"	2134	119	54.0
T3096E-BS	6	30"	762	96"	2438	143	64.9
T30108E-BS	6	30"	762	108"	2743	165	74.8
T30120E-BS	6	30"	762	120"	3048	187	84.8
T30132E-BS	8	30"	762	132"	3353	207	93.9
T30144E-BS	8	30"	762	144"	3658	228	103.4
T3648E-BS	4	36"	914	48"	1219	85	38.6
T3660E-BS	4	36"	914	60"	1524	99	44.9
T3672E-BS	4	36"	914	72"	1829	117	53.1
T3684E-BS	4	36"	914	84"	2134	135	61.2
T3696E-BS	6	36"	914	96"	2438	145	65.8
T36108E-BS	6	36"	914	108"	2743	186	84.4
T36120E-BS	6	36"	914	120"	3048	211	95.7
T36132E-BS	8	36"	914	132"	3353	238	108.0
T36144E-BS	8	36"	914	144"	3658	263	119.3

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# Specification Sheet

Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

## Sink Accessories/Replacements —Faucets and Prerinse Units

### STANDARD FAUCETS

8" (203mm) centers.

model #	description
313918	8" (203mm) spout, standard, splash mounted
300716	12" (305mm) spout, standard, splash mounted
300804	14" (356mm) spout, standard, splash mounted
313919	16" (406mm) spout, standard, splash mounted
301001	12" (305mm) spout, heavy duty, splash mounted
301002	14" (406mm) spout, heavy duty, splash mounted
301003	19" (489mm) double-jointed spout, splash mounted
313075	gooseneck, splash mounted

### REPAIR KIT FOR STANDARD FAUCETS

model #	description	for faucets #
304146	hot/cold stems, handles, seats, bonnet nuts, O-rings	313918, 313919
368421	hot/cold ceramic cartridge	300716, 300804

### STANDARD FAUCETS WITH WRIST HANDLES

Deck mounted with 4" (102mm) centers. Features include 4" (102mm) long wrist handles and rigid gooseneck spout.

model #	description
301005	standard
301004	heavy duty



19" (483mm) double-jointed spout faucet



12" (305mm) heavy duty faucet



standard wrist handle faucet



12" (305mm) T&S faucet



T&S wrist handle faucet



### T&S EXTRA HEAVY DUTY FAUCETS **OUR BEST**

Top-of-the-line. Splash mounted with 8" (203mm) centers. Features T&S quality products.

model #	description
313920	8" (203mm) spout
340380	10" (254mm) spout
313293	12" (305mm) spout
313294	14" (356mm) spout



### T&S EXTRA HEAVY DUTY FAUCET WITH WRIST HANDLES **OUR BEST**

Top-of-the-line T&S quality. Deck mounted with 4" (102mm) centers. 4" (102mm) long wrist handles and rigid gooseneck spout.

model #	description
313304	extra heavy duty

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#### Certifications / Approvals



(fabricated to NSF-applicable standards)





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Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

## Sink Accessories/Replacements—Faucets and Prerinse Units

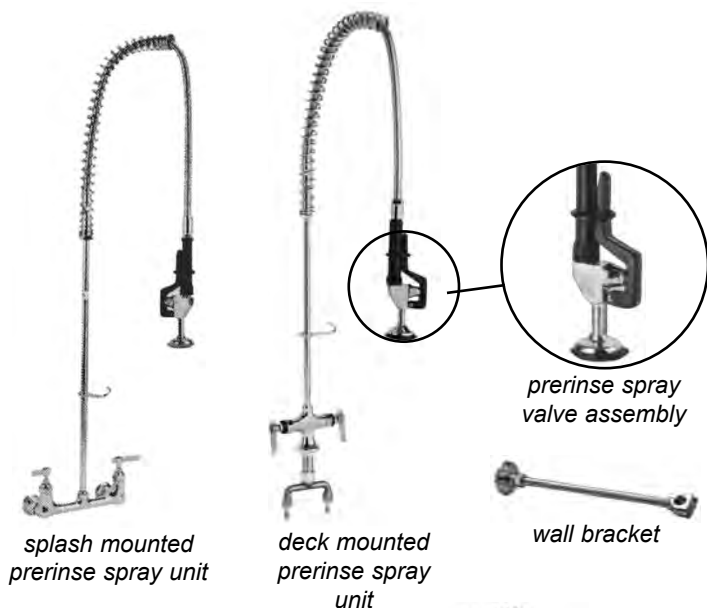
PowerPulse™  
spray valve



### POWERPULSE™ PRERINSE SPRAY UNITS

Patent-pending design. Uses pulsating jets of water to power-off dried and baked-on food in only 12 seconds (Fisher-Nickel test). Saves water, but does not sacrifice cleaning performance. Easily retrofits onto most existing prerinse.

model #	description
384794	uses 0.74 gallons per minute
384795	uses 1.05 gallons per minute



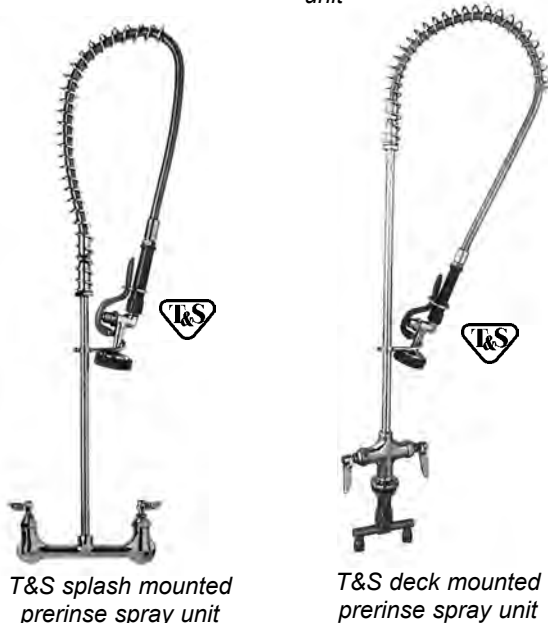
splash mounted  
prerinsing spray unit

deck mounted  
prerinsing spray unit

wall bracket

### STANDARD PRERINSE UNITS AND COMPONENTS

model #	description
300719	splash mounted spray unit
300718	deck mounted spray unit
301189	faucet add-on with 12" (305mm) spout
301190	wall bracket
313116	prerinsing hose, 36" (914mm) length
313323	prerinsing spray valve assembly for spray units #300718 and 300719



T&S splash mounted  
prerinsing spray unit

T&S deck mounted  
prerinsing spray unit

### T&S EXTRA HEAVY DUTY **OUR BEST** PRERINSE UNITS AND COMPONENTS

Top-of-the-line.

model #	description
313296	splash mounted spray unit with wall bracket
313295	deck mounted spray unit with wall bracket
313297	faucet add-on with 12" (305mm) spout for use with #313296 unit



T&S  
prerinsing faucet add-on

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# Specification Sheet

Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

Catalog Specification Sheet No.

**EG10.13B**

Tier Drawers and Drawer Assemblies for Stainless Steel and Hardwood Tables

## Tier Drawers and Drawer Assemblies for Stainless Steel and Hardwood Tables

### MODELS:

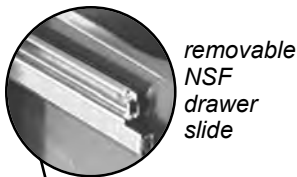
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|---------------------------------|---------------------------------|---------------------------------|
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| <input type="checkbox"/> 502943 | <input type="checkbox"/> 606826 | <input type="checkbox"/> NTD3   |
| <input type="checkbox"/> 502946 | <input type="checkbox"/> 608115 | <input type="checkbox"/> NTD3L  |
| <input type="checkbox"/> 502947 | <input type="checkbox"/> 608116 | <input type="checkbox"/> TD3    |
| <input type="checkbox"/> 502971 | <input type="checkbox"/> 608117 | <input type="checkbox"/> TD3L   |



#TD3

### Regular Tier Drawers

- Heavy gauge type 430 stainless steel cabinet with three roller-track drawers.
- Available with nylon feet or legs.
- Includes guides, zinc-plated full-extension slides, and stainless steel drawer.
- Hemmed safety pull handle on each drawer.
- All shipping weights are approximate.



removable NSF drawer slide



#NTD3L

### NSF-Approved Tier Drawers

- Utilizes totally removable drawer slides certified by the National Sanitation Foundation.
- Otherwise, design and features are the same as tier drawers listed above.
- Hemmed safety pull handle on each drawer.
- Optional pan replacement available: Model #608120.

model #	description	width x length x height		weight	
		in.	mm	lbs.	kg
TD3	3 drawers, with nylon feet	22½" x 24" x 22"	572 x 610 x 559	75	34.0
TD3L	3 drawers, with legs	22½" x 24" x 34½"	572 x 610 x 876	78	35.4

model #	description	width x length x height		weight	
		in.	mm	lbs.	kg
NTD3	3 drawers, with nylon feet	22½" x 24" x 22"	572 x 610 x 559	75	34.0
NTD3L	3 drawers, with legs	22½" x 24" x 34½"	572 x 610 x 876	78	35.4

### Options / Accessories

- Drawer lock (suffix "-L")
- Pan replacement for NSF-Approved Tier Drawers
- Pan replacement for drawer assemblies

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EG10.13B Rev. 06/18

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Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

## Tier Drawers and Drawer Assemblies

### Drawer Capacity Per Table

Drawers can be centered, left or right.

table length in. mm	15" x 20" (381 x 508mm) drawer capacity per table	20" x 20" (508 x 508mm) * drawer capacity per table
24" 610	0	0
30" 762	1 centered	0
36" 914	1 centered	1 centered
48" 1219	1 centered; or 1 left & 1 right	1 centered
60" 1524	1 centered; or 1 left & 1 right	1 centered; or 1 left & 1 right
72" 1829	3 (1 centered, 1 left, 1 right)	1 centered; or 1 left & 1 right
84" 2134	4	1 centered; or 1 left & 1 right
96" 2438	4 (2 left, 2 right)	2 (1 left, 1 right)
108" 2743	4 (2 left, 2 right)	4 (2 left, 2 right)
120" 3048	4 (2 left, 2 right)	4 (2 left, 2 right)
132" 3353	6 (3 left, 3 right)	4 (2 left, 2 right)
144" 3658	6 (3 left, 3 right)	4 (2 left, 2 right)

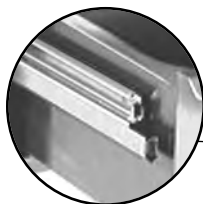
\* Holes are predrilled for 20" x 20" drawers only.



enclosed drawer assembly



SPEC-MASTER® heavy duty drawer assembly



removable NSF drawer slide



drawer assembly with NSF-approved slides

### Enclosed Drawer Assemblies **NSF**

- Removable drawer pan.
- Type 430 stainless steel assemblies.
- Hemmed safety pull handle on each drawer.

model #	width x length x height (drawer pan only)		weight lbs. kg	Optional Pan Replacement model #
	in.	mm		
502943 *	20" x 15" x 5"	508 x 381 x 127	35 15.9	608115
501572	20" x 20" x 5"	508 x 508 x 127	35 15.9	608118 **

\* Tables must be field drilled for mounting.

\*\* #608118 does NOT fit drawer assembly #501572 with optional lock (#501572-L).  
 Drawer assembly #501572-L accepts only pan replacement #608119.

### Enclosed SPEC-MASTER® Heavy Duty Drawer Assemblies **NSF**

- Removable drawer pan.
- Type 304 stainless steel assemblies.
- Insulated front.
- Self-closing drawer slides that fully extend from housing.
- These drawer assemblies are stackable.

model #	width x length x height (drawer pan only)		weight lbs. kg	Optional Pan Replacement model #
	in.	mm		
502972 *	20" x 15" x 5"	508 x 381 x 127	40 18.1	608117
502971	20" x 20" x 5"	508 x 508 x 127	40 18.1	606826

\* Tables must be field drilled for mounting.

### Drawer Assemblies with NSF-Approved Slides **NSF**

- Removable drawer slides, making it easy to clean for complete sanitation.
- Type 430 stainless steel.
- Requires no tool.
- All-stainless steel housing and frame.
- Drawer consists of full-length front pull flange and removable drawer pan with large radius corners.
- Hemmed safety pull handle on each drawer.

model #	width x length x height (drawer pan only)		weight lbs. kg	Optional Pan Replacement model #
	in.	mm		
502947 *	20" x 15" x 5"	508 x 381 x 127	35 15.9	608115
502946	20" x 20" x 5"	508 x 508 x 127	35 15.9	608116 **

\* Tables must be field drilled for mounting.

\*\* #608116 does NOT fit drawer assembly #502946 with optional lock (#502946-L).  
 Drawer assembly #502946-L accepts only pan replacement #608119.

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ESSEX COUNTY EMERGENCY SHELTER  
JAY COMMUNITY CENTER

---

ITEM #: 10

DESCRIPTION: Mobile Worktable

QUANTITY: One (1)

MANUFACTURER: Eagle

MODEL #: #T3048SE

---

ACCESSORIES:

5" Casters, All with Brakes

NOTES:

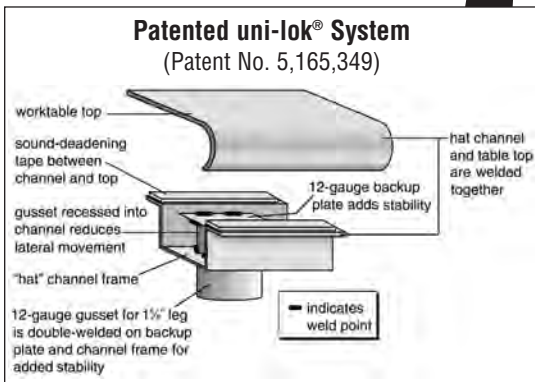


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# Specification Sheet

## Short Form Specifications

Eagle worktables, Spec-Master® series, model \_\_\_\_\_.  
 Top constructed of 14 gauge 300 series stainless steel, with 1½" roll on front and rear, and sides turned down 90°. Undershef is adjustable and constructed of 18 gauge 300 series stainless steel with marine edge. Top reinforced with stainless steel hat channels and sound deadened. Constructed with uni-lok® patented gusset system with the gussets recessed into the hat channels to reduce lateral movement. Legs are 1½" O.D., stainless steel, with stainless steel gussets and 1" stainless steel adjustable bullet feet.



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Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

## Worktables with Flat Top and Stainless Steel Base with Undershef—Spec-Master® Series

### MODELS:

- |                                   |                                   |                                   |                                   |
|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| <input type="checkbox"/> T2424SE  | <input type="checkbox"/> T24144SE | <input type="checkbox"/> T30132SE | <input type="checkbox"/> T36144SE |
| <input type="checkbox"/> T2430SE  | <input type="checkbox"/> T3030SE  | <input type="checkbox"/> T30144SE | <input type="checkbox"/> T4848SE  |
| <input type="checkbox"/> T2436SE  | <input type="checkbox"/> T3036SE  | <input type="checkbox"/> T3648SE  | <input type="checkbox"/> T4860SE  |
| <input type="checkbox"/> T2448SE  | <input type="checkbox"/> T3048SE  | <input type="checkbox"/> T3660SE  | <input type="checkbox"/> T4872SE  |
| <input type="checkbox"/> T2460SE  | <input type="checkbox"/> T3060SE  | <input type="checkbox"/> T3672SE  | <input type="checkbox"/> T4884SE  |
| <input type="checkbox"/> T2472SE  | <input type="checkbox"/> T3072SE  | <input type="checkbox"/> T3684SE  | <input type="checkbox"/> T4896SE  |
| <input type="checkbox"/> T2484SE  | <input type="checkbox"/> T3084SE  | <input type="checkbox"/> T3696SE  | <input type="checkbox"/> T48108SE |
| <input type="checkbox"/> T2496SE  | <input type="checkbox"/> T3096SE  | <input type="checkbox"/> T36108SE | <input type="checkbox"/> T48120SE |
| <input type="checkbox"/> T24108SE | <input type="checkbox"/> T30108SE | <input type="checkbox"/> T36120SE | <input type="checkbox"/> T48132SE |
| <input type="checkbox"/> T24120SE | <input type="checkbox"/> T30120SE | <input type="checkbox"/> T36132SE | <input type="checkbox"/> T48144SE |
| <input type="checkbox"/> T24132SE |                                   |                                   |                                   |

### Tabletop

- Patented uni-lok® gusset system (patent #5,165,349): gussets are recessed into hat channel, reducing lateral movement.
- Top reinforced with welded-on hat channel.
- Sound-deadened between top and channels.
- 1½" (38mm)-diameter 180° rolled edges on front and rear. Ends are turned down 90° providing for flush installations when required.
- 14 gauge 300 series polished stainless steel.

### Adjustable Undershef

- 18 gauge 300 series stainless steel.
- Gusset welded to each corner.
- Heavy duty marine edge design.

### Legs—1½" (41mm)-diameter

- 24" to 36" (610 to 914mm)-wide units that are 96" (2438mm) and longer come with six legs or more. 48" (1219mm)-wide units that are 72" (1829mm) and longer come with six legs or more.
- Heavy gauge stainless steel.
- 1" (25mm) adjustable stainless steel feet.

### Options / Accessories

- |  |  |
|--|--|
| <input type="checkbox"/> Drawer                      | <input type="checkbox"/> Duplex receptacles                            |
| <input type="checkbox"/> Lock                        | <input type="checkbox"/> Pot rack                                      |
| <input type="checkbox"/> Casters                     | <input type="checkbox"/> Sink  |
| <input type="checkbox"/> Stainless steel bullet feet | <input type="checkbox"/> Additional undershef                          |
| <input type="checkbox"/> Overshelves                 | <input type="checkbox"/> Stabilizer Bar (for 30"- and 36"-wide tables) |

### Certifications / Approvals



## AUTOQUOTES



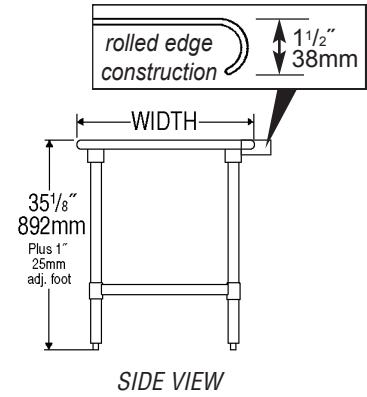
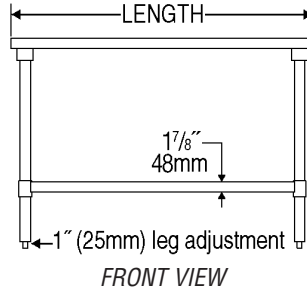
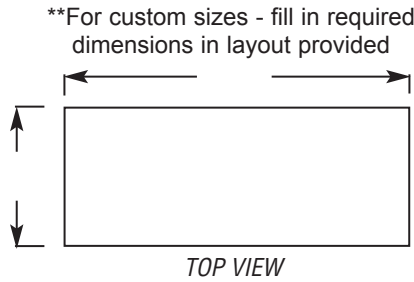
EG10.41C Rev. 09/15

Catalog Specification Sheet No. **EG10.41C** Spec-Master® Series Worktables with Flat Top and Stainless Steel Base with Undershef



Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

## Worktables with Flat Top and Stainless Steel Base with Undershelf—Spec-Master® Series



model #	# of legs	width		length		weight	
		in.	mm	in.	mm	lbs.	kg
T2424SE	4	24"	610	24"	610	46	20.9
T2430SE	4	24"	610	30"	762	50	22.7
T2436SE	4	24"	610	36"	914	55	24.9
T2448SE	4	24"	610	48"	1219	67	30.4
T2460SE	4	24"	610	60"	1524	78	35.4
T2472SE	4	24"	610	72"	1829	90	40.8
T2484SE	4	24"	610	84"	2134	103	46.3
T2496SE	6	24"	610	96"	2438	125	56.7
T24108SE	6	24"	610	108"	2743	144	65.3
T24120SE	6	24"	610	120"	3048	163	73.9
T24132SE	8	24"	610	132"	3353	186	84.4
T24144SE	8	24"	610	144"	3658	200	90.7
T3030SE	4	30"	762	30"	762	54	24.5
T3036SE	4	30"	762	36"	914	57	25.9
T3048SE	4	30"	762	48"	1219	75	34.0
T3060SE	4	30"	762	60"	1524	87	39.5
T3072SE	4	30"	762	72"	1829	101	45.8
T3084SE	4	30"	762	84"	2134	116	52.6
T3096SE	6	30"	762	96"	2438	139	63.1
T30108SE	6	30"	762	108"	2743	161	73.0
T30120SE	6	30"	762	120"	3048	182	82.6
T30132SE	8	30"	762	132"	3353	204	92.5
T30144SE	8	30"	762	144"	3658	224	101.6
T3648SE	4	36"	914	48"	1219	83	37.6
T3660SE	4	36"	914	60"	1524	97	44.0
T3672SE	4	36"	914	72"	1829	114	51.7
T3684SE	4	36"	914	84"	2134	132	59.9
T3696SE	6	36"	914	96"	2438	153	69.4
T36108SE	6	36"	914	108"	2743	180	81.6
T36120SE	6	36"	914	120"	3048	207	93.9
T36132SE	8	36"	914	132"	3353	234	106.1
T36144SE	8	36"	914	144"	3658	261	118.4
T4848SE	4	48"	1219	48"	1219	136	61.7
T4860SE	4	48"	1219	60"	1524	161	73.0
T4872SE	6	48"	1219	72"	1829	188	85.3
T4884SE	6	48"	1219	84"	2134	217	98.4
T4896SE	8	48"	1219	96"	2438	265	120.2
T48108SE	8	48"	1219	108"	2743	306	138.8
T48120SE	8	48"	1219	120"	3048	348	157.9
T48132SE	8	48"	1219	132"	3353	388	176.0
T48144SE	8	48"	1219	144"	3658	430	195.0

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Profit from the Eagle Advantage®

# Specification Sheet

Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

## Table Accessories

**MODELS:**

- 24\*GADJUS
- 24\*SADJUS\*
- 30\*GADJUS
- 30\*SADJUS\*
- CA\*-SB
- PS\*
- SB-1
- W TSA30

\* See charts for complete model numbers.

**Spice Bin**

- Designed for either overshelf or wall shelf applications.
- 22 gauge stainless steel with fully covered deep-drawn construction.
- Complete with label holders.

model #	width		length		height*		weight	
	in.	mm	in.	mm	in.	mm	lbs.	kg
<b>SB-1</b>	6½"	165	5½"	140	6"	156	1.5	0.7

\* Must allow 7¾" (197mm) space. Bin slides on stainless steel angle supports secured to underside of shelf.

**Power Strips for Stainless Steel Tables with Backsplash**

- Mounts onto backsplash via two stainless steel clips—no tools required.
- Brushed aluminum finish.
- 15' (4572mm)-long cord and plug.
- ON-OFF toggle switch and reset button.

model #	length		number of outlets
	in.	mm	
<b>PS2408</b>	24"	610	8
<b>PS3612</b>	36"	914	12
<b>PS4816</b>	48"	1219	16
<b>PS6020</b>	60"	1524	20

**Stabilizer Bars (pair)\*\***

- Fits standard 30" and 36" (762 and 914mm)-wide worktables.
- Positioned at an angle to add maximum stability to table.
- 12 gauge Valu-Master® epoxy coated gussets welded onto ends of each 12 gauge galvanized angle bar.
- Stands 19½" (495mm) when mounted to table.

model # (pair): **W TSA30**

\*\* Stabilizer Bars and Extra Undershelves will not work together.



**Casters (NSF) — chart on back page**

- Offered in sets of four, six, and eight casters.
- Available in zinc with resilient or poly tread, or polymer cart washable with polymer tread.

**Extra Undershelves\*\* — chart on back page**

- For tables with uni-lok® hat channel frame.
- Designed for storage of shorter, smaller items under worktable where only one undershelf might not suffice.
- Adjustable, available in galvanized or stainless steel.

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Profit from the Eagle Advantage®

Item No.: \_\_\_\_\_  
 Project No.: \_\_\_\_\_  
 S.I.S. No.: \_\_\_\_\_

## Table Accessories

### Casters

set of	caster diameter		ZINC WITH RESILIENT TREAD			ZINC WITH POLY TREAD			POLY CART WASHABLE WITH POLY TREAD		
	in.	mm	model #	wt. cap. per caster		model #	wt. cap. per caster		model #	wt. cap. per caster	
				lbs.	kg		lbs.	kg		lbs.	kg
4 swivel (2 with brake)	4"	102	CA4-SB	115	52.2	n/a			n/a		
6 swivel (3 with brake)	4"	102	CA6-SB	115	52.2	n/a			n/a		
8 swivel (4 with brake)	4"	102	CA8-SB	115	52.2	n/a			n/a		
4 swivel (2 with brake)	5"	127	CAH4-SB	200	90.7	CAHP4-SB	250	113.4	CAHW4-SB	250	113.4
6 swivel (3 with brake)	5"	127	CAH6-SB	200	90.7	CAHP6-SB	250	113.4	CAHW6-SB	250	113.4
8 swivel (4 with brake)	5"	127	CAH8-SB	200	90.7	CAHP8-SB	250	113.4	CAHW8-SB	250	113.4

### Extra Undershelves

Note: When ordering an extra or replacement undershelf, please order per the size of your tabletop. Please note the "for table size" column in chart below.

GALVANIZED	STAINLESS STEEL		for table size *				weight	
	model #	model #	width	length	width	length	lbs.	kg
			in.	mm	in.	mm		
2424GADJUS	2424SADJUS-18/4	2424SADJUS-18/3	24"	610	24"	610	15	6.6
2430GADJUS	2430SADJUS-18/4	2430SADJUS-18/3	24"	610	30"	762	18	8.2
2436GADJUS	2436SADJUS-18/4	2436SADJUS-18/3	24"	610	36"	914	21	9.6
2448GADJUS	2448SADJUS-18/4	2448SADJUS-18/3	24"	610	48"	1219	27	12.2
2460GADJUS	2460SADJUS-18/4	2460SADJUS-18/3	24"	610	60"	1524	33	15.0
2472GADJUS	2472SADJUS-18/4	2472SADJUS-18/3	24"	610	72"	1829	39	17.6
2484GADJUS	2484SADJUS-18/4	2484SADJUS-18/3	24"	610	84"	2134	45	20.4
2496GADJUS	2496SADJUS-18/4	2496SADJUS-18/3	24"	610	96"	2438	51	23.1
24108GADJUS	24108SADJUS-18/4	24108SADJUS-18/3	24"	610	108"	2743	57	25.9
24120GADJUS	24120SADJUS-18/4	24120SADJUS-18/3	24"	610	120"	3048	63	28.6
24132GADJUS	24132SADJUS-18/4	24132SADJUS-18/3	24"	610	132"	3353	69	31.3
24144GADJUS	24144SADJUS-18/4	24144SADJUS-18/3	24"	610	144"	3658	75	34.0
3024GADJUS	3024SADJUS-18/4	3024SADJUS-18/3	30"	762	24"	610	17	7.5
3030GADJUS	3030SADJUS-18/4	3030SADJUS-18/3	30"	762	30"	762	21	9.5
3036GADJUS	3036SADJUS-18/4	3036SADJUS-18/3	30"	762	36"	914	24	10.7
3048GADJUS	3048SADJUS-18/4	3048SADJUS-18/3	30"	762	48"	1219	30	13.6
3060GADJUS	3060SADJUS-18/4	3060SADJUS-18/3	30"	762	60"	1524	36	16.3
3072GADJUS	3072SADJUS-18/4	3072SADJUS-18/3	30"	762	72"	1829	42	19.1
3084GADJUS	3084SADJUS-18/4	3084SADJUS-18/3	30"	762	84"	2134	48	21.8
3096GADJUS	3096SADJUS-18/4	3096SADJUS-18/3	30"	762	96"	2438	54	24.5
30108GADJUS	30108SADJUS-18/4	30108SADJUS-18/3	30"	762	108"	2743	60	27.2
30120GADJUS	30120SADJUS-18/4	30120SADJUS-18/3	30"	762	120"	3048	66	29.9
30132GADJUS	30132SADJUS-18/4	30132SADJUS-18/3	30"	762	132"	3353	72	32.7
30144GADJUS	30144SADJUS-18/4	30144SADJUS-18/3	30"	762	144"	3658	78	35.4

\* Undershelves for 30" (762mm)-wide tables listed above also fit 36" (915mm)-wide tables.

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ESSEX COUNTY EMERGENCY SHELTER  
JAY COMMUNITY CENTER

---

ITEM #: 11

DESCRIPTION: Storage Cabinet

QUANTITY: One (1)

MANUFACTURER: Piper

MODEL #: #7773-B

---

ACCESSORIES:

NOTES:

JOB \_\_\_\_\_ ITEM # \_\_\_\_\_ QTY # \_\_\_\_\_

**MODEL NUMBER**

- 7773-B
- 7773-M

**OPTIONS**

- (SRA) - Single reinforcing angles
- (DRA) - Double reinforcing angles



7773-M



7773-B

Series 7700 enclosed stainless steel storage cabinets, stationary or mobile.

**CABINET**

The cabinet is constructed of stainless steel panels, assembled into a rigid structure and reinforced at the base and corners. The interior of the cabinet is fitted with four vertical slotted channels which accept shelf clips adjustable on 2" centers.

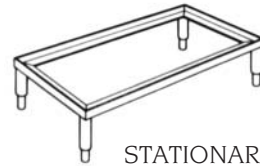
**DOORS**

Each door is fabricated of a single sheet of stainless steel, turned in 1-1/4" and hemmed on all four sides, and reinforced with a full height channel in the center. Each door is supported on three concealed hinges. Each pair of doors is equipped with a paracentric lock and handle connecting to locking bars which secure the doors at top, bottom and center. The handle has a built-in key lock.

**SHELVES**

Each shelf is formed of a single sheet of stainless steel, with all four sides turned down and in for rigidity. Shelf support clips fit into the slotted channels and are adjustable on 2" centers.

MODEL NUMBER	DIMENSIONS W-D-H	NO. OF SHELVES	BASE FRAME	SHIPPING WEIGHT (LBS.)
7773	36"x24"x72"	4	No base	270
7773-B	36"x24"x78"	4	Stationary	280
7773-M	36"x24"x78"	4	Mobile	280



STATIONARY (-B)  
Raises Cabinet Off Floor.  
Adjustable Bullet Feet  
For Leveling



MOBILE (-M)  
Permits Easy Movement  
Of Cabinets.

**SHELF SELECTION**

**STANDARD**



FORMED EDGES

**OPTION1**



SINGLE REINFORCING ANGLE

**OPTION2**



DOUBLE REINFORCING ANGLES

**LIMITED WARRANTY:** PIPER PRODUCTS warrants to the original purchaser parts and labor for a period of twelve (12) months from the date of purchase. See manufacturer's complete warranty for details.

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**SPEC H-7**

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## SECTION 220529 - SUPPORTS AND ANCHORS

### PART 1 GENERAL

#### 1.1 SCOPE

- A. Pipe hangers, supports, and associated anchors.
- B. Flashing and sealing.
- C. Sleeves and seals.
- D. Equipment curbs, bases and supports.

#### 1.2 RELATED WORK

- A. Section 22 0700 – Piping Insulation
- B. Section 22 3000 – Plumbing – General
- C. Division 3 – Concrete
- D. Division 5 – Miscellaneous Metal Work: Steel Angle and Channel

#### 1.3 REFERENCES

- A. ANSI Standards
- B. ASME Standards
- C. Plumbing Code of New York State

#### 1.4 QUALITY ASSURANCE

- A. In conformance with Structural Safety Requirements of the Building Code of New York State.

#### 1.5 SUBMITTALS

- A. Product Data: Manufacturer's descriptive literature indicating specifications, load capacity and construction for products furnished.

## PART 2 PRODUCTS

### 2.1 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel, adjustable swivel, split ring.
- B. Hangers for all Pipe Sizes 2 to 3 Inches and Cold Pipe Sizes Over 3 inches: Carbon steel, adjustable, clevis.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for hot pipe sizes 6 inches and over.
- D. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- E. Vertical Support: Steel riser clamp.
- F. Floor Support for Hot Pipe Sizes to 3 Inches and All Cold Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- G. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- H. Shield for Insulated Piping 2 Inches and Smaller: 18 gage galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.
- I. Shield for Insulated Piping 2-1/2 Inches and Larger (Except Cold Water Piping): Pipe covering protective saddles.
- J. Manufacturer: Grinnell or equal.

### 2.2 MISCELLANEOUS HANGERS AND SUPPORTS

- A. Beam Clamps.
  - 1. Material: Malleable Iron.
  - 2. Service: Recommended for use on American Standard I-beams and wide flange beams.
  - 3. UL listed.
  - 4. Manufacturer: Grinnell or equal.

### 2.3 HANGER RODS

- A. Steel Hanger Rods: Cadmium plated, threaded both ends, threaded one end, or continuous threaded.

### 2.4 INSERTS AND FASTENERS

- A. Concrete Inserts: Malleable iron body and nut of galvanized finish for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms. Manufacturer: CB - Universal or equal.

- B. Concrete Fasteners: Steel shell and expander plug for threaded connection. Manufacturer: Phillips or equal.
- C. Size inserts and fasteners to suit threaded hanger rods.

## 2.5 FLASHING

- A. Metal Flashing: 26 gage galvanized steel.
- B. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

## 2.6 EQUIPMENT, BASES AND SUPPORTS

- A. Bases: Concrete - Refer to Division 3.
- B. Supports: Steel channel and/or angle - Refer to Division 5.

## 2.7 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gage galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe or 18 gage galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated sleeves including seals, UL listed.
- D. Stuffing, Fire Stopping Insulation: Glass fiber type, non-combustible.
- E. Caulk: Acrylic sealant.
- F. Fire Resistant Joint Sealers: Two part, foamed in place, silicone sealant formulated for use in through penetration fire stopping around pipe penetrations through fire rated walls and floors.
- G. Sleeves shall be two sizes larger than the pipe passing through.

## 2.8 FABRICATION

- A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- B. Design hangers without disengagement of supported pipe.

## 2.9 FINISH

- A. Hangers and supports shall be galvanized steel unless otherwise specified.
- B. Prime coat exposed black steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

## PART 3 EXECUTION

### 3.1 INSERTS AND FASTENERS

- A. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- B. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.
- C. Provide inserts and fasteners for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- D. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

### 3.2 PIPE HANGERS AND SUPPORTS

- A. Support piping as follows and in accordance with the Plumbing Code of New York State.

<u>PIPE SIZE</u>	<u>MAX. HANGER SPACING</u>	<u>HANGER DIAMETER</u>
Less than 1 inch	5'-0"	3/8"
1 to 1-1/4 inch	6'-0"	3/8"
1-1/2 to 2 inch	9'-0"	3/8"
2-1/2 to 3 inch	10'-0"	1/2"
4 to 6 inch	10'-0"	5/8"
PVC (All Sizes)	4'-0"	1/2"
C.I. Bell and Spigot (or No-Hub)	5'-0"	Refer to Pipe Size and at Joints

- B. Anchorage shall be provided to restrain drainage piping from axial movement. For pipe sizes greater than 4 inches, restraints shall be provided for drainpipes at all changes in diameter greater than two pipe sizes. Braces, blocks, rodding and other suitable methods as specified by the coupling manufacturer shall be utilized.
- C. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.

- D. Place a hanger within 12 inches of each horizontal elbow.
- E. Use hangers with 1-1/2 inch minimum vertical adjustment.
- F. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- G. Support vertical piping at every other floor. Support vertical cast iron pipe at each floor at hub.
- H. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- I. Bases of stacks shall be supported by concrete, brick laid in cement mortar or metal brackets attached to the building.
- J. Support riser piping independently of connected horizontal piping.
- K. Rigid support sway bracing shall be provided at changes in direction greater than 45 degrees for pipe sizes 4 inches and larger.

### 3.3 EQUIPMENT BASES AND SUPPORTS

- A. Provide equipment bases of concrete type specified in Division 3.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct support of steel angle and/or channel or steel pipe and fittings. Brace and fasten with flanges bolted to structure.

### 3.4 FLASHING

- A. Provide flexible flashing and metal counterflashing where piping, floor drains, etc. penetrates weather or waterproofed walls, floors and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash and seal.
- C. Seal drains watertight to adjacent materials.

### 3.5 SLEEVES

- A. Cutting, notching, bored holes and penetrations shall be in accordance with the Plumbing Code of New York State.
- B. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- C. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth and



provide floor plate.

- D. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with stuffing, fire stopping insulation and caulk seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- E. Install chrome plated steel escutcheons at finished surfaces.
- F. All penetrations shall be coordinated with General Contractor.

END OF SECTION 220529

## SECTION 220553 - PIPING IDENTIFICATION

### PART 1 GENERAL

#### 1.1 SCOPE

- A. Nameplates
- B. Tags
- C. Pipe Markers

#### 1.2 RELATED WORK

- A. Section 22 0529 – Supports and Anchors
- B. Section 22 0700 – Piping Insulation
- C. Section 22 3000 – Plumbing - General

#### 1.3 REFERENCES

- A. ASME A13.1 - Scheme for the Identification of Piping Systems.

#### 1.4 SUBMITTALS

- A. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- B. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

#### 1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 1.
- B. Record actual locations of tagged valves.

## PART 2 PRODUCTS

### 2.1 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

### 2.2 TAGS

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- C. Chart: Typewritten letter size list in anodized aluminum frame.

### 2.3 PIPE MARKERS

- A. Color: Conform to ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

### 2.4 CEILING TACKS

- A. Description: Steel with 3/4 inch diameter color coded head.
- B. Color code as follows:
  - 1. Green – Plumbing valves

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

### 3.2 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Identify pumps, water heater equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify valves in main and branch piping with tags.
- H. Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- I. Provide ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 220553

## SECTION 220700 - PIPING INSULATION

### PART 1 GENERAL

#### 1.1 SCOPE

- A. Piping insulation.
- B. Jackets and accessories.

#### 1.2 RELATED WORK

- A. Section 22 0529 - Supports and Anchors.
- B. Section 22 0553 - Piping Identification.
- C. Section 22 3000 - Plumbing - General.

#### 1.3 REFERENCES

- A. ASTM Standards.
- B. NFPA Standards.
- C. UL Standards.

#### 1.4 SUBMITTALS

- A. Submit product data: Provide product description, list of materials and thickness for each service, and locations.
- B. Manufacturer's Installation Instructions: Indicate procedures, which ensure acceptable workmanship and installation standards will be achieved.

#### 1.5 QUALITY ASSURANCE

- A. Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM, NFPA, and UL Standards.

#### 1.6 QUALIFICATIONS

- A. Applicator: Company specializing in performing the work of this section with minimum three years experience.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Division 1.
- B. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Store insulation in original wrapping and protect from weather and construction traffic.
- D. Protect insulation against dirt, water, chemical, and mechanical damage.

## 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

## PART 2 PRODUCTS

### 2.1 GLASS FIBER

- A. Insulation: ASTM C547; rigid molded, noncombustible.
  - 1. 'K' ('ksi') value: ASTM C335, 0.24 at 75 degrees F.
  - 2. Minimum Service Temperature: -20 degrees F.
  - 3. Maximum Service Temperature: 300 degrees F.
  - 4. Maximum Moisture Absorption: 0.2 percent by volume.
- B. Vapor Barrier Jacket
  - 1. ASTM C921, White kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
  - 2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
  - 3. Secure with self sealing longitudinal laps and butt strips.
  - 4. Secure with outward clinch expanding staples and vapor barrier mastic.
- C. Tie Wire: 18 gage stainless steel with twisted ends on maximum 12 inch centers.
- D. Vapor Barrier Lap Adhesive
  - 1. Compatible with insulation.
- E. Insulating Cement/Mastic
  - 1. ASTM C195; hydraulic setting on mineral wool.

- F. Fibrous Glass Fabric
  - 1. Cloth: Untreated; 9 oz/sq yd weight.
  - 2. Blanket: 1.0 lb/cu ft density.

- G. Indoor Vapor Barrier Finish

- 1. Vinyl emulsion type acrylic, compatible with insulation, white color.

## 2.2 JACKETS

- A. PVC Plastic

- 1. Jacket: ASTM C921, One-piece molded type fitting covers and sheet material, off white color.
    - a) Minimum Service Temperature: -40 degrees F.
    - b) Maximum Service Temperature: 150 degrees F.
    - c) Moisture Vapor Transmission: ASTM E96; 0.002 perm inches.
    - d) Maximum Flame Spread: ASTM E84; 25.
    - e) Maximum Smoke Developed: ASTM E84; 50.
    - f) Thickness: 10 mil.
    - g) Connections: Brush on welding adhesive, Tacks or Pressure sensitive color matching vinyl tape.
  - 2. Covering Adhesive Mastic
    - a) Compatible with insulation.

- B. Canvas Jacket: UL listed

- 1. Fabric: ASTM C921, 6 oz/sq yd, plain weave cotton treated with dilute fire retardant lagging adhesive.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

### 3.2 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.

- B. On exposed piping, locate insulation and cover seams in least visible locations.
- C. Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:
  1. Provide vapor barrier jackets, factory applied or field applied.
  2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.
  3. Finish with glass cloth and vapor barrier adhesive.
  4. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
  5. Insulate entire system.
- D. For insulated pipes conveying fluids above ambient temperature:
  1. Provide standard jackets, with or without vapor barrier, factory applied or field applied.
  2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.
  3. PVC fitting covers may be used.
- E. Inserts and Shields:
  1. Application: Piping 1-1/2 inches diameter or larger.
  2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
  3. Insert Location: Between support shield and piping and under the finish jacket.
  4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
  5. Insert Material: ASTM C640 cork, hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- F. Finish insulation at supports, protrusions, and interruptions.
- G. For pipe exposed in mechanical equipment rooms or in finished spaces, finish with PVC jacket and fitting covers.
- I. Insulate all domestic hot water return and cold water piping and exposed water and drain piping at handicapped lavs, sinks and water coolers.

### 3.3 GLASS FIBER INSULATION SCHEDULE

PIPING SYSTEMS	PIPE SIZE Inch	THICKNESS Inch
A. Plumbing Systems		
Domestic Hot Water Supply	1-1/4 inch & less	1"
Domestic Hot Water Supply	1-1/2 inch & above	1-1/2"
Domestic Hot Water Recirc	1-1/4 inch & less	1"
Domestic Cold Water Supply	1-1/4 inch & less	1/2"
Domestic Cold Water Supply	1-1/2 inch & above	1

END OF SECTION 220700



## SECTION 223000 – PLUMBING – GENERAL

### PART 1 GENERAL

#### 1.1 SCOPE

- A. Sanitary Sewer System
- B. Domestic Water System
- C. Propane Gas System
- D. Indirect Waste Drainage System
- E. Pipe and Pipe Fittings
- F. Valves
- G. Floor Drains
- H. Floor Sinks
- I. Clean Outs
- J. Grease Interceptor
- K. Hose Bibs
- L. Thermostatic Electronic Mixing Valve
- M. Water Heaters
- N. Inline Pumps
- O. Pressure Gauges
- P. Thermometers
- Q. Backflow Preventer

#### 1.2 RELATED WORK

- A. Section 22 0529 - Supports and Anchors
- B. Section 22 0553 - Piping Identification
- C. Section 22 0700 - Piping Insulation
- D. Section 22 4000 - Plumbing Fixtures
- E. Division 26 - Electrical Power Supply and Control Wiring and Connections for products provided under this Section shall be by the Division 26 Contractor.

#### 1.3 REFERENCES

- A. ANSI Standards
- B. ASME Standards
- C. ASSE Standards
- D. AWWA Standards
- E. ASTM Standards
- F. PDI Standards
- G. Local and State Building Codes
- H. National Fuel Gas Code
- I. American Gas Association
- J. National Electrical Code
- K. AWS Standards

#### 1.4 SUBMITTALS

- A. Include data on pipe material, valves, drains, cleanouts, grease interceptors, hose bibbs, water heater, pressure gauges, thermometers, inline pumps.

#### 1.5 QUALITY ASSURANCE

- A. Potable water supply system components, plumbing appliances, backflow prevention devices and water distribution system safety devices shall be Third-Party Certified.
- B. Sanitary, vent, and storm system plastic pipe, fittings and pipe related components shall be Third-Party Certified. All other pipe materials shall be Third-Party Tested.
- C. All piping, valves, etc., shall meet the NSF Standard 61 (low lead).
- D. All cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and be listed by NSF International.
- E. Hubless Couplings: Standard, stainless-steel shielded, couplings shall conform to CISPI 310 and ASTM C 1277. Shield assemblies shall consist of a stainless steel bi-directional corrugated shield; stainless-steel bands and tightening devices; and an ASTM C 564, rubber sleeve. Couplings shall bear the NSF Trademark, and be manufactured in the USA.

### PART 2 PRODUCTS

#### 2.1 SANITARY SEWER PIPING – BURIED

- A. Cast Iron Pipe:                   ASTM A74 service weight  
Fittings:                            Cast iron  
Joints:                               Hub & Spigot, ASTM C564, neoprene gasketing system

#### 2.2 SANITARY SEWER PIPING – ABOVE GRADE

- A. Cast Iron Pipe:                   ASTM A888, CISPI 301, hubless  
Fittings:                            ASTM A888, CISPI 310, hubless cast iron  
Joints:                               Neoprene gaskets and stainless steel clamp and shield assemblies  
NOTE:                               All cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International. All couplings for hubless cast iron shall conform to CISPI 310 and be certified by NSF International.
- B. Copper Pipe:                     ASTM B306, DWV  
Fittings:                            ANSI/ASME B16.3, cast bronze, or  
  ANSI/ASTM B32, solder, Grade Sn50

- C. PVC Pipe: ASTM D1785/D2665  
 Fittings: PVC  
 Joints: ASTM D2665, solvent weld  
 (NOTE: DO NOT USE FOR KITCHEN FIXTURE PIPING DUE TO HIGH TEMPERATURES)

2.3 DOMESTIC WATER PIPING – ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L hard drawn  
 Fittings: ANSI/ASTM B16.23 or B16.18, cast brass or ANSI/ASME B16.22 wrought copper or, B16.29, wrought copper, ANSI/ICC 1002  
 Joints: ANSI/ASTM B32, solder, Grade Sn95  
 Permanent push to connect  
 Grooved mechanical couplings

2.4 INDIRECT WASTE DRAINAGE PIPING – ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type M, hard drawn  
 Fittings: ANSI/ASME B16.23 cast brass or ANSI/ASME B16.29, wrought copper  
 Joints: ANSI/ASTM B32, solder, Grade Sn95  
 Grooved mechanical couplings

2.5 PROPANE GAS PIPING – ABOVE GRADE

- A. Steel Pipe: ASTM B88, Type M, hard
- B. Fittings: ANSI/ASME B16.3, malleable iron
- C. Joints: Screwed  
 (NOTE: PAINTED WITH CORROSION RESISTANT PAINT)

2.6 FUEL OIL PIPING – ABOVE GROUND

- A. Copper Tubing: ASTM B88, Type [M,] [L,] [K,] [hard drawn] [annealed]  
 Fittings: ANSI/ASME B16.23, cast brass, or ANSI/ASME B16.29, wrought copper  
 Joints: ANSI/ASTM B32, solder, Grade Sn95
- B. Copper Tube: ASTM B 88 Type L or K hard drawn or annealed  
 Fittings: ANSI/ASTM B16.18, bronz, or B16.22 copper, and ANSI LC4 ProPress G W/HNBR sealing element and Smart Connect (SC) feature. Sealing elements shall be verified for the intended use.  
 Joints: ½” thru 2” ProPress G bronze or copper.

## 2.7 FLANGES, UNIONS AND COUPLINGS

- A. Pipe size 2 inches and under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
- B. Pipe size over 2 inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; neoprene gaskets for gas service.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, water impervious isolation barrier.

## 2.8 BALL VALVES

- A. Bronze body, stainless steel ball, teflon seats and stuffing box ring, lever handle and balancing stops, solder or threaded ends with union.

## 2.9 GAS COCKS

- A. Bronze body, bronze tapered plug, non-lubricated, Teflon packing, threaded ends.

## 2.10 SWING CHECK VALVES

- A. Up to 2 inches: Bronze 45 degree swing disc, solder or screwed ends.
- B. Over 2 inches: Iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.

## 2.11 BALANCING VALVES

- A. Calibrated flow measuring and balancing device, ½” through 2” to be 300 psi and 250 degrees F, Y-pattern globe type with soldered or threaded ends. Brass copper alloy body that provides di-electric protection, EPDM o-ring seals, multiple turn digital readout handwheel for balancing and concealed memory feature with hidden mechanical memory, built in check valves provided for connecting a portable differential pressure meter for flow reading. Valve to provide flow measurement, flow balancing, shut-off with no drip seat and potential drain connection capabilities. Each valve can be installed in any direction without affecting flow measurement; Series 78K, 786 or 787 manufactured by Victaulic or equal. NOTE: No balancing valves using a ¼ turn device for setting will be permitted.

## 2.12 RELIEF VALVES

- A. Bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

2.13 FLOOR DRAINS

- A. Floor Drain, FD, (Toilets, Showers): Coated cast iron body with 6-inch square nickel bronze adjustable strainer with square holes, Model zn415S manufactured by Zurn or equal.

2.14 FLOOR SINKS

- A. FS-1: Coated cast iron body with dome strainer and seepage flange; Model Z1910 manufactured by Zurn or equal.

2.15 CLEANOUTS

- A. Interior Unfinished Accessible Areas (CO): Caulked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders; manufactured by Zurn or equal.

2.16 GREASE INTERCEPTORS

- A. Construction: Epoxy coated fabricated steel for on floor installation, with anchor flange, multi-weir baffle assembly, integral deep seal trap, removable integral flow control, and aluminum cover with gasket securing handle, and enzyme injection port; Model G.2635 (left hand) manufactured by Rockford or equal.
- B. Unit Rating: 35 gal/min flow and 120 lbs grease capacity.

2.17 THERMOSTATIC ELECTRONIC MIXING VALVE

- A. Provide 1 inch electronic tempering mixing valve including sensor, stainless valve, actuator and control module, capacity 26 gal/min at 5 psi pressure drop, with check valve, Model Number 915672-00 manufactured by Heat Timer Corporation or equal. Valve shall conform to ASSE 1017.

2.18 HOSE BIBBS

- A. Hose Bibb (HB): Lead-free bronze or brass, replaceable hexagonal disc, 3/4" hose thread spout, chrome plated where exposed to finished spaces, with vacuum breaker in conformance with ANSI/ASSE 1011; manufactured by Acorn or equal.

2.19 COMMERCIAL FUEL OIL WATER HEATER (DWH)

- A. Refer to SCHEDULE A1 on Drawing P-001.

2.20 EXPANSION TANK (ET)

- A. Refer to SCHEDULE A1 on Drawing P-001.

2.21 IN-LINE CIRCULATOR PUMPS (RP)

- A. Refer to SCHEDULE A1 on Drawing P-001.

## 2.22 PRESSURE GAUGE

- A. Standard die cast case, 4 1/2-inch diameter white dial with black figures, Bourdon type glass front and bronze spring; select range so that normal operating pressure reads approximately at midscale; install with stop cock; located after water meter and when shown on drawings; manufactured by Terrice or equal.

## 2.22 THERMOMETERS

- A. Straight or inclined as required for easy reading from floor level: Cast aluminum case, glass front, 8 inches long; Range 60°F to 250°F, install in copper or stainless steel wells, completely immersed in liquid, socket to be separable and mounted in a tee or other fittings; install in line leaving every water heater and when on drawings; manufactured by Terrice or equal.

## 2.23 BACKFLOW PREVENTERS

- A. Reduced Pressure Backflow Preventers (RPZ): ANSI/ASSE 1013; lead-free construction, bronze body with bronze and plastic and stainless steel internal parts; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve which opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with 1/4 turn resilient seated ball and four test cocks; Series LF009 manufactured by Watts or equal.
- B. Double Check Valve Assemblies (DCV): ANSI/ASSE 1015; lead-free construction, bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent; assembled with two 1/4 turn resilient seated ball valves; and four test cocks; Series LF007 manufactured by Watts or equal.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Ream pipe and tube ends, remove burrs and bevel plain end of ferrous pipe.
- B. Remove scale and dirt, inside and outside of pipe, before assembly.
- C. Remove welding slag or foreign material from pipe and fitting materials.
- D. Coordinate cutting and forming floor construction to receive drains to required invert elevations.

### 3.2 INSTALLATION AND APPLICATION

- A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing piping, joints or connected equipment.
- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not exposed.
- H. Slope water piping and arrange to drain at low points.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Prepare pipe, fittings, supports and accessories not prefinished, ready for finish painting.
- K. ProPress bronze, copper and stainless steel fittings: Pipe ends shall be cut on a right angle (square) to the pipe. Pipe ends shall be reamed and chamfered, all grease, oil or dirt shall be removed from the pipe end with a clean rag. Visually examine the fitting sealing element to insure there is no damage and it is properly seated into the fitting. Insert pipe fully into the fitting. Make a mark with a felt tip pen on the pipe at the face of the fitting. Select the properly sized Ridgid ProPress tool. Always examine the tube to insure it is fully inserted into the fitting prior to pressing the joint.
  1. Sealing elements shall be verified as suitable for the intended service as specified.
  2. Installers shall follow the latest edition of Viega's installation guidelines and use Ridgid ProPress tools.

### 3.3 TESTS

- A. Tests and inspections shall comply with the Plumbing Code of New York State.
- B. Above Grade and Sanitary, Vent, Indirect Waste, Piping: Seal openings; fill with water at minimum 10 feet of head and hold water level constant for two hours. Section test system so that maximum test pressure at any point in system does not exceed 40 psi. Locate test tees as required.

### 3.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/l residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in systems for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/l, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/l.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C601.

END OF SECTION 223000



## SECTION 224000 - PLUMBING FIXTURES

### PART 1 GENERAL

#### 1.1 SCOPE

- A. Water closets
- B. Urinals
- C. Lavatories
- D. Showers
- E. Mop basin

#### 1.2 RELATED WORK

- A. Section 22 0529 - Supports and Anchors
- B. Section 22 3000 - Plumbing - General
- C. Division 7 - Joint Sealers: Seal fixtures to walls and floors.

#### 1.3 REFERENCES

- A. ANSI Standards
- B. ARI Standards
- C. ADA Standards

#### 1.4 SUBMITTALS

- A. Product data including fixtures, sizes, utility sizes, trim and finishes.

#### 1.6 QUALITY ASSURANCE

- A. Plumbing fixtures shall be Third-Party Tested.
- B. Faucets shall conform to NSF Standard 61 (low lead).

## PART 2 PRODUCTS

### 2.1 WATER CLOSET (WC)

- A. Bowl: ANSI A112.19.2; floor mounted, 15 inch high, vitreous china, reverse trap, close-coupled closet combination with elongated bowl, insulated vitreous china closet tank with fittings and lever flushing handle, bolt caps; Model 2462.016 manufactured by American standard or equal.
- B. Seat: Solid white plastic with open front, brass bolts; manufactured by American Standard or equal.

### 2.1 WATER CLOSET (WC-1)

- A. Bowl: ANSI A112.19.2; floor mounted, 16 ½ inch high, vitreous china, reverse trap, close-coupled closet combination with elongated bowl, insulated vitreous china closet tank with fittings and lever flushing handle, bolt caps; Model 2467.016 manufactured by American standard or equal.
- B. Seat: Same as Water closet (WC).

### 2.3 URINAL (UR)

- A. Urinal: ANSI A112.19.2; vitreous china, wall hung, siphon jet urinal with shields, integral trap, removable stainless steel strainer, 3/4 inch top spud, steel supporting hanger; Model 6561.017 manufactured by American Standard or equal.
- B. Flush Valve: ANSI A112.18.1; exposed chrome plated, diaphragm type with oscillating handle, escutcheon, integral screwdriver stop, vacuum breaker, maximum 1 gallon flush; Model 186-1.0 manufactured by Sloan or equal.

### 2.4 URINAL (UR-1)

- A. Same as UR, except for handicapped use.

### 2.5 LAVATORY (LAV)

- A. Basin: ANSI A112.19.2; vitreous china wall-hung lavatory 18 ½ x 17 inch minimum, with 4 inch high back, drillings on 4 inch centers, rectangular basin with splash lip, front overflow, and soap depression; Model 0321.026 manufactured by American Standard or equal.
- B. Trim: ANSI A112.18.1; chrome plated combination supply fitting with open grid strainer, water economy aerator, indexed handles, Model 8948 manufactured by Moen or equal. Chrome plated 17 gage brass P-trap [with clean-out plug] and arm with escutcheon; chrome plated supplies, loose key stops, escutcheons; manufactured by McGuire or equal.

## 2.6 SHOWER (SH)

- A. ANSI A112.18.1; concealed shower supply with pressure balanced mixing valves, bent shower arm with 2.5 gpm adjustable spray ball joint shower head and escutcheon; Model 8375 manufactured by Moen or equal.
- B. Shower console:
  - a) Material: Compression molded vikrel material with high gloss finish.
  - b) Construction: Four piece modular design with pivot snap together installation.
  - c) Dimensions: 36" x 36" x 75 3/4"
  - d) Basis of design: Sterling / 72240100 and for ADA compliance Freedom / APFQ3682BF75

## 2.7 SHOWER (SH-1)

- A. ANSI A112.18.1; concealed shower supply with pressure balanced mixing valves, 30 inch slide bar, drop ell, hand held 2.5 gpm shower with ADA compliant lever handle, showerhead and escutcheon; Model T8346 manufactured by Moen or equal.

## 2.8 MOP BASIN (MB)

- A. Bowl: 24 x 24 x 10-inch high white molded stone, floor mounted, with one-inch-wide shoulders, stainless steel strainer; Model MSB-2424 manufactured by Fiat or equal.
- B. Trim: ANSI A112.18.1; exposed wall type supply with cross handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges; Model 830AA manufactured by Fiat or equal. 2.5 feet of 5/8-inch diameter plain end reinforced rubber hose, hose clamp, mop hanger; manufactured by Fiat or equal.

## PART 3 EXECUTION

### 3.1 INSPECTION

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.
- B. Verify adjacent construction is ready to receive rough-in work of this Section.

### 3.2 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key angle stops reducers, and escutcheons.

- C. Install components level and plumb.
- C. Install and secure fixtures in place with wall supports and bolts.
- D. Seal fixtures to wall and floor surfaces with sealant, color to match fixture.
- E. Repair leaky faucets and valves prior to final inspection.
- F. Insulate water and drain pipes below handicapped lavatories and sinks.
- G. Mount fixtures to the following heights above finished floor:

Water Closet:

Standard	15 inches to top of bowl rim
Handicapped	18 inches to top of seat

Urinal:

Standard	24 inches to top of bowl rim
Handicapped	17 inches to top of bowl rim

Lavatory:

Handicapped	29 inches clear from floor to the bottom of apron
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Showerheads:

Adult male	69.5 inches to bottom of head
Adult female	64.5 inches to bottom of head

### 3.3 ADJUSTING AND CLEANING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.
- B. At completion clean plumbing fixtures and equipment.
- C. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

### 3.4 FIXTURE ROUGH-IN SCHEDULE

- A. Rough-in fixture piping connections in accordance with following table of minimum sizes for particular fixtures.

	<u>Hot Water</u>	<u>Cold Water</u>	<u>Waste</u>	<u>Vent</u>
Lavatory	1/2 inch	1/2 inch	1-1/2 inch	1-1/2 inch
Mop basin	1/2 inch	1/2 inch	2 inch	1-1/2 inch
Water Closet (Tank Type)	---	1/2 inch	4 inch	2 inch
Urinal (Flush Valve)	---	3/4 inch	2 inch	1-1/2 inch
Shower	1/2 inch	1/2 inch	2 inch	1-1/2 inch

END OF SECTION 224000

## SECTION 230500 – COMMON WORK RESULTS FOR HVAC

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Dielectric fittings.
  - 3. Sleeves.
  - 4. Grout.
  - 5. HVAC demolition.
  - 6. Equipment installation requirements common to equipment sections.
  - 7. Concrete bases.

#### 1.2 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, 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.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- 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.

#### 1.3 SUBMITTALS

- A. Welding certificates.

#### 1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
  - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

## PART 2 - PRODUCTS

### 2.1 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

### 2.2 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.
- E. Welding Filler Metals: Comply with AWS D10.12.
- F. Solvent Cements for Joining Plastic Piping:
  - 1. CPVC Piping: ASTM F 493.
  - 2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

### 2.3 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

## 2.4 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

## 2.5 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

# PART 3 - EXECUTION

## 3.1 HVAC DEMOLITION

- A. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
  - 3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
  - 4. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner, existing hot water heater.

## 3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. 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 in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. 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.
- 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. Select system components with pressure rating equal to or greater than system operating pressure.
- K. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- L. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- M. Verify final equipment locations for roughing-in.
- N. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

- E. 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 unless dry seal threading is specified.
  - 2. 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.
- F. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

### 3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

### 3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC 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.
- D. Install equipment to allow right of way for piping installed at required slope.

### 3.6 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to existing concrete base according to equipment manufacturer's written instructions.

### 3.7 GROUTING

- A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 230500

## SECTION 230523 - VALVES

### PART 1 GENERAL

#### 1.1 ABBREVIATIONS

- A. IBBM: Iron body, bronze mounted.
- B. OS&Y: Outside screw and yoke.
- C. WOG: Water, oil, gas.
- D. WSP: Working steam pressure.

#### 1.2 SUBMITTALS

- A. Product Data: Catalog sheets, specifications and installation instructions for each valve type.
- B. Valve Schedule: List type of valve, manufacturer's model number, and size for each service application.

### PART 2 PRODUCTS

#### 2.1 VALVES - GENERAL

- A. Valve Standardization: Valves from one or more manufacturers may be used, however valves supplied for each specific valve type shall be the product of one manufacturer.
- B. Valves shall be first quality, free from all imperfections and defects, with body markings indicating manufacturer and rating.
- C. Valve parts of same manufacturer, size and type shall be interchangeable.
- D. Manually operated gate, globe and angle valves shall be of rising stem type, unless otherwise specified.
- E. Manually operated valves shall open in a counterclockwise direction by means of round ventilated type handwheels.
  - 1. Exception: Cross handle type handwheels are acceptable for valves up to 3 inches in size.
- F. In open position, wedge and stem of gate valves shall clear the waterway completely.
- G. Valves which use packing shall be capable of being packed when wide open and under full working pressure.

- H. Size valves the same size as the piping in which they are installed, unless otherwise specified.

## 2.2 MATERIALS

- A. Body:
  - 1. Cast Iron: ASTM A 126 66, Class B, higher strength cast iron.
  - 2. Bronze: For use up to 150 psig WSP, ASTM B 62 and over 150 psig to 300 psig WSP, ASTM B 61.
  - 3. Cast Steel: ASTM A 216 Grade WCB.
  - 4. Forged Steel: ASTM A 105 Grade 2.
- B. Stem:
  - 1. Cast Manganese Bronze: ASTM B 584.
  - 2. Cast Silicon Brass: ASTM B 584.
  - 3. Rolled Silicon Brass: ASTM B 98 Alloy D.
  - 4. Rolled Aluminum Bronze: ASTM B 150 Alloy 1.
  - 5. Rolled Manganese Bronze: ASTM B 138 Alloy A (half hard).
  - 6. Naval Brass: ASTM B 21 Alloy A or Alloy C (hard).
  - 7. Carbon Steel: As specified for particular type of valve.
  - 8. Stainless Steel: As specified for particular type of valve.
- C. Trim: As specified for particular type of valve.

## 2.3 GATE VALVES

- A. Type A: 125 psig WSP, 200 psig WOG, bronze body, union bonnet, solid wedge disc, and threaded ends. Acceptable Valves: Crane 428UB, Hammond IB617, Jenkins 47CU, Milwaukee 1152, Nibco T134, and Stockham B105.
- B. Type C: 125 psig WSP, 200 psig WOG up to 12 inch size, and 150 psig WOG for 14 inch and 16 inch sizes; IBBM OS&Y, bolted bonnet, solid wedge disc, and threaded or flanged ends depending on size. Acceptable Valves: Crane 464-1/2 & 465-1/2, Hammond IR1140, Milwaukee F2885, Nibco T6170 & F6170,

## 2.4 GLOBE AND ANGLE VALVES

- A. Type J: 125 WSP, 200 psig WOG, bronze body, threaded bonnet, and threaded ends. Acceptable Valves: Crane 1, Hammond IB440 & IB463, Jenkins 101J, Milwaukee 502, Nibco T211 & T311, and Stockham B16.
- B. Type K: 125 psig WSP, 200 psig WOG, IBBM OS&Y, bolted bonnet, and threaded or flanged ends depending on size. Acceptable Valves: Crane 351 & 353, Hammond IR116, Jenkins 613C & 615C, Milwaukee F2981, Nibco F718B & F818B, and Stockham G512, & G515.

## 2.5 CHECK VALVES

- A. Type S: 125 psig WSP, 200 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and threaded ends. Face discs for cold water service with teflon. Acceptable Valves: Crane 37, Hammond IB940, Jenkins 4092, Milwaukee 509, Nibco T413Y, and Stockham B319Y.
- B. Type V: 125 psig WSP, 200 psig WOG, IBBM, horizontal swing, bolted bonnet, regrindable and renewable seat ring and disc, and threaded or flanged ends depending on size. Discs on valves 4 inch size and larger may be cast iron with bronze face. Acceptable Valves: Crane 372, & 373, Hammond IR1124, Jenkins 623CJ & 624CJ, Milwaukee F2974, Nibco F918, and Stockham G927 & G931.

## 2.7 RELIEF VALVES

- A. General Requirements: Valves shall be as specified by ASME Code governing manufacture of such valves within scope of their particular usage, i.e., Heating Boilers, Power Boilers, Unfired Pressure Vessels, etc., shall be tested, rated and listed by National Board of Boiler and Pressure Vessel Inspections and shall bear symbol of ASME and NBB and PVI, unless otherwise specified. Liquid relief valves do not require ASME tagging or marking, or NBB and PVI Certification. Valves for applications specified shall conform to the ASME Code, Section IV, Heating Boilers and the following:
  - 1. Valves for Unfired Pressure Vessels: Safety and safety relief valves on secondary side of unfired pressure tanks, water heaters and heat exchangers shall comply with Code requirements governing applicable equipment as outlined in ASME Code, Section IV, Article 4, Paragraph HG 400.3 and as follows: Secondary side of heat exchanger shall be protected by officially rated valves, set for same pressure or temperature as heretofore specified, when secondary side furnishes steam or hot water for purpose equivalent to purposes for which a boiler would be installed; valves for this purpose shall be sized in accordance with Unfired Vessel Code.
  - 2. End Connections: Unless otherwise specified, safety valves, relief valves and safety relief valves, in sizes 3/4 inch to 3 inches IPS inclusive, may be furnished with male or female pipe thread inlet and female pipe thread outlet; valves over 3 inches IPS must be furnished with 125 lb. or 250 lb. flanged inlet and may be equipped with female threaded or 125 lb. flanged outlet.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. General: Install valves at locations noted on the drawings or specified.

### 3.2 DISCHARGE PIPING FROM LIQUID RELIEF VALVES

- A. Connection vent piping to the discharge outlet of all relief valves and terminate over floor drain, bell outlet or other approved point of waste.

### 3.3 VALVE APPLICATION SCHEDULE

- A. Schedule of valve applications for the different services is as follows:
  - 1. Condensate Returns (LPC) 125 psig and less:
    - a. 2 inches and Less: Screwed end, A gates, J globe or angles and S checks.
    - b. 2-1/2 inches and Up: Flanged end, C gates, K globe or angles and V checks.
  - 2. Steam (LPS) 125 psig and less:
    - a. 4 inches and Less: Screwed end, A or C gates, J globe or angles and S checks.
    - b. 5 inches and Up: Flanged end, C gates, K globe or angles and V checks.

END OF SECTION 230523

## SECTION 230529 - PIPE HANGERS AND SUPPORTS

### PART 1 GENERAL

#### 1.1 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Companion high density filler pieces for installation over the top 180 degree surface of pipe or tubing, at points of support where a combination clevis hanger, insulation shield and high density insulating saddle are installed.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Piping Insulation: Section 230700.

#### 1.3 SUBMITTALS

- A. Shop Drawings:
  - 1. Details of trapeze hangers and upper hanger attachments for piping 4 inches in diameter and over. Include the number and size of pipe lines to be supported on each type of trapeze hanger.
  - 2. Details of pipe anchors.
- B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with the applicable requirements of the ASME B31 Piping Codes.
  - 2. Unless otherwise shown or specified, comply with the requirements of the Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS) Standards SP-58, and SP-69.

### PART 2 PRODUCTS

#### 2.1 PIPE HANGERS AND SUPPORTS

- A. Combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddle with companion high density filler piece.
  - 1. Insulating saddles and filler pieces shall be of the same thickness and materials as the adjoining pipe insulation. Saddles shall cover the lower 180 degrees of the pipe or tubing, and companion filler pieces shall cover the upper 180 degrees of the pipe or tubing. Physical sizes, gages, etc. of the components of insulated hangers shall be in accordance with the following schedule:



PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE	SADDLE LENGTH (Inches)	VAPOR BARRIER JACKET LENGTH (Inches)
Up to 2-1/2	4	16	6	10
3 to 6	4	14	6	10
8 to 14	10	12	12	16
16 and up	10	10	12	16

- B. Pipe Insulation Shields: Fabricated of steel, with a minimum arc of 180 degrees, unless otherwise indicated. Shields for use with hangers and supports, with the exception of combination clevis type hangers, shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE
Up to 2-1/2	8	18
3 to 8	10	16
10 to 14	12	12
16 and up	18	10

- C. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut.
- D. Adjustable Floor Rests and Base Flanges: Steel.
- E. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.

## 2.2 ANCHORS AND ATTACHMENTS

- A. Sleeve Anchors (Group II, Type 3, Class 3): Molly's Div./USM Corp. Parasleeve Series, Ramset's Dynabolt Series, or Red Head/Phillips AN, HN, or FS Series.
- B. Wedge Anchors (Zinc Plated, Group II, Type 4, Class 1): Hilti's Kwik Bolt Series, Molly's Div./USM Corp. Parabolt PB Series, Ramset's Trubolt T Series, or Red Head/Phillips WS Series.
- C. Self-Drilling Anchors (Group III, Type 1): Ramset's RD Series, or Red Head/Phillips S Series.
- D. Non-Drilling Anchors (Group VIII, Type 1): Ramset's Dynaset DS Series, Hilti's HDI Series, or Red Head/Phillips J Series.
- E. Beam Clamps: Forged steel beam clamp, with weldless eye nut (right hand thread), steel tie rod, nuts, and washers, Grinnell's Fig No. 292 (size for load, beam flange width, and rod size required).

2.3 FASTENERS

- A. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for high humidity locations, and treated wood; plain finish for other interior locations. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Do not hang or support one pipe from another or from ductwork.
  - 1. Do not bend threaded rod.
- B. Space hangers or supports for horizontal piping on maximum center distances as listed in the following hanger schedules, except as otherwise specified, or noted on the Drawings.
  - 1. For Steel, Alloy Steel and Threaded Brass Pipe.

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1 and under	8
1-1/4 and 1-1/2	9
2	10
2-1/2 and up	12

- 2. For Directional Changes: Install a hanger or support close to the point of change of direction of all pipe runs in either a horizontal or vertical plane.
    - 3. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed, at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support the concentrated loads.
    - 4. For Branch Piping Runs and Runouts Over 5 feet In Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.
    - 5. Parallel Piping Runs: Where several pipe lines run parallel in the same plane and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.
  - D. Size hanger rods in accordance with the following:

PIPE OR TUBING SIZE (Inches)	SINGLE ROD HANGER SIZE (Inches)		DOUBLE ROD HANGER SIZE (Inches)	
	PIPE	TUBING	PIPE	TUBING
1/2 to 2	3/8	1/4	3/8	1/4
2-1/2 and 3	1/2	3/8	3/8	1/4
4 and 5	5/8	1/2	1/2	3/8
6	3/4	1/2	5/8	1/2
8, 10 and 12	7/8	5/8	3/4	5/8

### 3.2 UPPER HANGER ATTACHMENTS

#### A. General:

1. Secure upper hanger attachments to overhead structural steel, steel bar joists, or other suitable structural members.
2. Do not attach hangers to steel decks that are not to receive concrete fill.
3. Do not attach hangers to precast concrete plank decks less than 2-3/4 inches thick.
4. Do not use flat bars or bent rods as upper hanger attachments.

#### B. Attachment to Existing Cast-In-Place Concrete:

1. For piping up to a maximum of 4 inches in size, secure hangers to overhead construction with self-drilling type expansion shields and machine bolts.
2. Secure hangers to wall or floor construction with single unit expansion shields or self-drilling type expansion shields and machine bolts.

PIPE SIZE (Inches)	LAG SCREW SIZE (Inches)	BOLT DIAMETER (Inches)
2 and under	3/8 diameter x 1-3/4	3/8
2-1/2 and 3	1/2 diameter x 2	1/2
4 and 5	Use Bolt	5/8

- a. Do not support piping larger than 3 inches with lag screws. Pre-drill holes for lag screws 1/8 inch in diameter less than the root diameter of the lag screw thread.
- b. The minimum width of the lower face of wood beams or joints in which lag screws of size as specified may be used is as follows:

LAG SCREW DIAMETER (Inches)	NOMINAL WIDTH OF BEAM FACE (Inches)
3/8	2
1/2	3

LAG SCREW DIAMETER (Inches)	NOMINAL WIDTH OF BEAM FACE (Inches)

- 4. Do not secure hanger attachment to the diagonals or vertical members of the trusses.

3.3 COMBINATION CLEVIS HANGER, PIPE INSULATION SHIELD AND VAPOR BARRIER JACKETED HIGH DENSITY INSULATING SADDLES

- A. Install a combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddles, at all points of support for piping or tubing to be insulated for cold service. Furnish companion high density vapor barrier jacketed saddle pieces, of the same material, thickness and length, for installation over the top 180 degree surface of pipe or tubing, at each point of support where an insulated clevis hanger is utilized.

3.4 PIPE INSULATION SHIELDS

- A. Unless otherwise specified, install a pipe insulation shield, at all points of support. Center shields on all hangers and supports outside of high density insulation insert, and install in such a manner so as not to cut, or puncture jacket.

3.5 PIPE COVERING PROTECTION SADDLES

- A. Install pipe covering protection saddles at all points of support, for steel piping 6 inches in size and larger, insulated with hot service insulation. Weld saddles to piping to insure movement with pipe.

END OF SECTION 230529

## SECTION 230553 - IDENTIFICATION FOR HVAC PIPING & EQUIPMENT

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Equipment labels.
  2. Warning signs and labels.
  3. Pipe labels.
  4. Valve tags.

#### 1.2 ACTION SUBMITTAL

- A. Product Data: For each type of product indicated.

### PART 2 - PRODUCTS

#### 2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
1. Material and Thickness: Aluminum, 0.032-inch or anodized aluminum, 0.032-inch 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.
  3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, 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.
  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 thick, and having predrilled holes for attachment hardware.
  2. Letter Color: Black.
  3. Background Color: White.
  4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
  5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
  6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering

for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

7. Fasteners: Stainless-steel.
8. 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 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 thick, and having predrilled holes for attachment hardware.

B. Letter Color: Red.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. 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 high.

## 2.4 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
  - 1. Tag Material: Brass, 0.032-inch 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 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.

## 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. 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 along each run. Reduce intervals to 25 feet 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. List tagged valves in a valve schedule.

END OF SECTION 230553



## SECTION 230700 - PIPING INSULATION

### PART 1 GENERAL

#### 1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Pipe Hangers and Supports: Section 230529.

#### 1.2 ABBREVIATIONS

- A. FS: Federal Specification.
- B. K: Thermal Conductivity, i.e., maximum Btu per inch thickness per hour per square foot.
- C. pcf: Pounds per cubic foot.
- D. PVC: Polyvinylchloride.

#### 1.3 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for the following:
  - 1. Insulation Materials.
  - 2. Jacket Materials.
- B. Quality Control Submittals:
  - 1. Installers Qualification Data:
    - a. Name of each person who will be performing the Work, and their employer's name, business address and telephone number.
    - b. Furnish names and addresses of the required number of similar projects that each person has worked on which meet the qualifications.

#### 1.4 QUALITY ASSURANCE

- A. Qualifications: The persons installing the Work of this Section and their Supervisor shall be personally experienced in mechanical insulation work and shall have been regularly employed by a company installing mechanical insulation for a minimum of 5 years.
- B. Regulatory Requirements:
  - 1. Insulation installed inside buildings, including laminated jackets, mastics, sealants and adhesives shall have a Fire Spread/Smoke Developed Rating of 25/50 or less based on ASTM E 84.

### PART 2 PRODUCTS

## 2.1 PIPING INSULATION

- A. Fibrous Glass (Mineral Fiber) Insulation: Composed principally of fibers manufactured from rock, slag, or glass, with or without binders, and asbestos free.
  - 1. Preformed Pipe Insulation: Minimum density 3 pcf; ASTM C 547:
    - a. Class 1 (Suitable for Temperatures Up to 450 degrees F): K of 0.26 at 75 degrees F.
  - 2. Premolded Fitting Insulation: Minimum density 4.0 pcf, K of 0.26 at 75 degrees F; ASTM C 547, Class 1.
  - 3. Insulation Inserts for PVC Fitting Jackets: Minimum density 1.5 pcf, K of 0.28 at 75 degrees F; ASTM C 553, Type III.
    - a. Suitable for temperatures up to 450 degrees F.
- B. High Density Jacketed Insulation Inserts for Hangers and Supports:
  - 1. For Use with Fibrous Glass Insulation:
    - a. Cold Service Piping:
      - 1) Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
    - b. Hot Service Piping:
      - 1) Calcium Silicate: Minimum density 15 pcf, K of 0.50 at 300 degrees F; ASTM C 533.
      - 2) Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.
- C. Cements:
  - 1. Fibrous Glass Thermal Insulating Cement: Asbestos free; ASTM C 195.
  - 2. Fibrous Glass Hydraulic Setting Thermal Insulating and Finishing Cement: ASTM C 449/C 449M.

## 2.2 ADHESIVES, MASTICS, AND SEALERS

- A. Lagging Adhesive (Canvas Jackets): Childers' CP-50AMV1, Epolux's Cadalag 336, Foster's 30-36.
- B. Vapor Lap Seal Adhesive (Fibrous Glass Insulation): Childers' CP-82, Epolux's Cadoprene 400, Foster's 85-60 or 85-20.
- C. Vapor Barrier Mastic (Fibrous Glass Insulation): Permeance shall be .03 perms or less at 45 mils dry per ASTM E 96. Childers' CP-34, Epolux's Cadalar 670, Foster's 30-65.
- H. Reinforcing Membrane: Childers' Chil Glas #10, Foster Mast a Fab, Pittsburgh Corning PC 79

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Perform the following before starting insulation Work:
  - 1. Install hangers, supports and appurtenances in their permanent locations.
  - 2. Complete testing of piping.
  - 3. Clean and dry surfaces to be insulated.

### 3.2 INSTALLATION, GENERAL

- A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions unless otherwise specified.

### 3.3 INSTALLATION AT HANGERS AND SUPPORTS

- A. Reset and realign hangers and supports if they are displaced while installing insulation.
- B. Install high density jacketed insulation inserts at hangers and supports for insulated piping.
- C. Insulation Inserts For Use with Fibrous Glass Insulation:
  - 1. Where clevis hangers are used, install insulation shields and high density jacketed insulation inserts between shield and pipe.
    - a. Where insulation is subject to compression at points over 180 degrees apart, e.g. riser clamps, U-bolts, trapezes, etc.; fully encircle pipe with 2 protection shields and 2 high density jacketed fibrous glass insulation inserts within supporting members.
      - 1) Exception: Locations where pipe covering protection saddles are specified for hot service piping, 6 inch and larger.

### 3.4 INSTALLATION OF FIBROUS GLASS HOT SERVICE INSULATION

- A. Install insulation materials with field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket unless otherwise specified.
- B. Piping:
  - 1. Butt insulation joints together, continuously seal minimum 1-1/2 inch wide self-sealing longitudinal jacket laps and 3-inch wide adhesive backed butt strips.
    - a. Substitution: 3 inch wide pressure sensitive sealing tape, of same material as the jacket, may be used in lieu of butt strips.
  - 2. Fill voids in insulation at hanger with insulating cement.
  - 3. Exceptions:

- a. Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Spaces and Concealed Piping: Butt insulation joints together and secure minimum 1-1/2 inch wide longitudinal jacket laps and 3 inch wide butt strips of same material as jacket, with outward clinching staples on maximum 4 inch centers. Fill voids in insulation at hangers with insulating cement.
- C. Fittings, Valves, Flanges and Irregular Surfaces:
  - 1. Insulate with mitre cut or premolded fitting insulation of same material and thickness as insulation.
  - 2. Secure in place with 16-gage wire, with ends twisted and turned down into insulation.
  - 3. Butt fitting, valve and flange insulation against pipe insulation, and fill voids with insulating cement.
  - 4. Insulate valves up to and including bonnets, without interfering with packing nuts.
  - 5. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
  - 6. After insulating cement has dried, coat insulated surface with lagging adhesive, and apply 4 oz or 6 oz canvas jacket as required by pipe size.
    - a. Lap canvas jacket on itself and adjoining pipe insulation at least 2 inches.
    - b. Size entire canvas jacket with lagging adhesive.
  - 7. Exceptions:
    - a. In Types E, F, and G Service Piping Systems: Valves, fittings and flanges may be insulated with premolded PVC fitting jackets, with fibrous glass insulation inserts.
    - b. In Types E, F, and G Service Piping Systems: Insulate fittings, valves, and irregular surfaces 3 inch size and smaller with insulating cement covered with 4 oz or 6 oz canvas jacket as required by pipe size.
      - 1) Terminate pipe insulation adjacent to flanges and unions with insulating cement, trowelled down to pipe on a bevel.
    - c. Fittings, Valves, Flanges, and Irregular Surfaces In Concealed Piping, Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Rooms, Unfinished Spaces, and Tunnels: Sizing of canvas surface is not required.

### 3.5 PIPING INSULATION SCHEDULE

- A. Insulate all piping, and appurtenances except where otherwise specified.

### 3.6 HOT SERVICE INSULATION MATERIAL SCHEDULE

	<b>SERVICE AND TEMPERATURES</b>	<b>INSULATION MATERIAL</b>	<b>PIPE SIZES (INCHES)</b>	<b>MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)</b>
E	Water and other fluids 105 F to 140 F.	Fibrous Glass	1-1/4 & Less	1
			1-1/2 & Over	2
F	Water and other fluids 141 F to 200 F.	Fibrous Glass	6 & Less	2
			8 & Up	2-1/2
F	Steam (LPS) to 15 psig	Fibrous Glass	Less than 4	2-1/2
			4 & Up	3

END OF SECTION 230700

## SECTION 230713 - DUCT INSULATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes insulating the following duct services:
  - 1. Indoor, concealed make up air.
  - 2. Indoor, exposed make up air.
  - 3. Indoor, concealed exhaust air, 10'-0" from penetration.
  - 4. Outdoor, exposed make up air.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- 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 insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
  - 3. Detail application of field-applied jackets.
  - 4. Detail application at linkages of control devices.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

#### 1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E84, 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.

## 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 C871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. For operating temperatures higher than 250 deg F (121 deg C), use blanket insulation in first paragraph below. Retain ASTM C1290 types as follows: Type I for insulation without jackets, Type II for insulation with vinyl jackets, and Type III for insulation with FSK or FSP jackets.
- G. 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 III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
  - 1. Products: Subject to compliance with requirements, 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.
- H. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corp.; Commercial Board.
    - b. Fibrex Insulations Inc.; FBX.
    - c. Johns Manville; 800 Series Spin-Glas.
    - d. Knauf Insulation; Insulation Board.
    - e. Manson Insulation Inc.; AK Board.
    - f. Owens Corning; Fiberglas 700 Series.

- I. Mineral-Fiber Board Insulation: mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type 1A or Type 1B. Provide with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article."
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corp.; Commercial Board.
    - b. Fibrex Insulations Inc.; FBX.
    - c. Johns Manville; 800 Series Spin-Glas.
    - d. Knauf Insulation; Insulation Board.
    - e. Manson Insulation Inc.; AK Board.
    - f. Owens Corning; Fiberglas 700 Series.

## 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.
    - 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 80 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."
- 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.
    - d. Mon-Eco Industries, Inc.; 22-25.
  - 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 AND COATINGS

- A. Materials shall be compatible with insulation materials, jackets, and substrates.
  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-Retarder Mastic: Water based; suitable for indoor use on below ambient services.
  1. Products: Subject to compliance with requirements, provide one of 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: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
  3. Service Temperature Range: Minus 20 to plus 180 deg F.
  4. Comply with MIL-PRF-19565C, Type II, for permeance requirements.
  5. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
  1. Products: Subject to compliance with requirements, provide one of the following:
  2. Water-Vapor Permeance: ASTM E96, greater than 1.0 perm at manufacturer's recommended dry film thickness.
  3. Service Temperature Range: Minus 20 to plus 180 deg F.
  4. Color: White.

## 2.4 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
  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-76.
    - b. Eagle Bridges - Marathon Industries; 405.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
    - d. Mon-Eco Industries, Inc.; 44-05.
  2. Materials shall be compatible with insulation materials, jackets, and substrates.
  3. Fire- and water-resistant, flexible, elastomeric sealant.
  4. Service Temperature Range: Minus 40 to plus 250 deg F.

5. Color: Aluminum.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

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-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants 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 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 C1136, Type I.
2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.

## 2.6 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.

1. Products: Subject to compliance with requirements, provide one of 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.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C1136.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. ABI, Ideal Tape Division; 491 AWF FSK.
    - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
    - c. Compac Corporation; 110 and 111.
    - d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.
  - 2. Width: 3 inches.
  - 3. Thickness: 6.5 mils.
  - 4. Adhesion: 90 ounces force/inch in width.
  - 5. Elongation: 2 percent.
  - 6. Tensile Strength: 40 lbf/inch in width.
  - 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

## 2.7 SECUREMENTS

- A. Aluminum Bands: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal.
- B. Insulation Pins and Hangers:
  - 1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
    - a. Products: Subject to compliance with requirements, provide one of the following:
      - 1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
      - 2) GEMCO; Perforated Base.
      - 3) Midwest Fasteners, Inc.; Spindle.
    - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
    - c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
    - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

## 2.8 CORNER ANGLES

- A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

- B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

### 3.2 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-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches 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 beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

### 3.3 PENETRATIONS

- A. 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.
  4. Seal jacket to wall flashing with flashing sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. 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.
1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

### 3.4 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 and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches 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 from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch 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 at 18-foot 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.
  5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches 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-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches 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 and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
  - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches 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 from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch 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 at 18-foot 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.
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-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

### 3.5 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 laps at longitudinal seams and 3-inch-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 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 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 o.c. and at end joints.

### 3.6 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."

### 3.7 FINISHES

- A. None.

### 3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
  1. Inspect ductwork, 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 one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

### 3.9 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:



1. Indoor, concealed make up air.
2. Indoor, exposed make up air.
3. Indoor, concealed exhaust air, 10'-0" from penetration.
4. Outdoor, exposed make up air.

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 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, Make Up Air Duct, Exhaust Air Duct and Plenum Insulation: Mineral-fiber blanket, 2 inches thick and 1.5-lb/cu. ft. nominal density. (Minimum R-6.)
- B. Exposed, Make Up Air Duct Exhaust Air Duct and Plenum Insulation: Mineral-fiber board, 2 inches thick and 1.5-lb/cu. ft. nominal density. (Minimum R-6)

3.11 ABOVE GROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Exposed, rectangular, make up air duct insulation shall be the following.
  1. Mineral-Fiber Board: 3 inches thick and 3-lb/cu. Ft nominal density. (Minimum R-12)

3.12 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. None.

3.13 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field applied jacket over the factory-applied jacket.
- B. Ducts and plenum, exposed: Aluminum, smooth, 0.20 inch thick.

END OF SECTION 230713

## SECTION 232001 - STRAINERS

### PART 1 GENERAL

#### 1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Valves: Section 230523.
- B. HVAC Piping: Section 232000.
- C. Steam Traps: Section 232202.

#### 1.2 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions for each type strainer.

### PART 2 PRODUCTS

#### 2.1 STRAINERS

- A. Body:
  - 1. Type:
    - a. Y.
  - 2. Materials: Any of the following:
    - a. ASTM A 126 Grade B cast iron.
    - b. ASTM A 216 WCB cast steel.
    - c. ASTM B 62 cast bronze may be used in systems operating at a maximum of 125 psig steam or 175 psig water.
- B. Pressure Ratings:
  - 1. 125 psig WSP, 175 psig WOG.
- C. End Connections:
  - 1. Threaded ends for use in threaded piping 3 inch size and smaller.
  - 2. Flanged ends in piping 4 inch size and larger.
  - 3. Solder ends or threaded ends with solder adapters in copper tubing.
- D. Screens: Fabricate from 18-8 stainless steel or monel metal.
  - 1. Perforation Sizes:
    - a. Steam Piping:
      - 1) 6 inch and Smaller: 1/32 inch perforations.
      - 2) Over 6 inch: 3/64 inch perforations.
    - b. Water Piping:
      - 1) 3 inch and Smaller: 1/16 inch perforations.
      - 2) Over 3 inch: 1/8 inch perforations.

2. Minimum Free Screen Area: Double the internal cross sectional area of the inlet pipe.
- E. Caps and Covers:
1. Strainers 3 inch size and Smaller: Any of the following:
    - a. Faced and gasketed screen retaining cap.
    - b. Straight thread bushing with a blow-out proof gasket.
    - c. Internally milled tapered gasketed bushing.
  2. Strainers 4 inch size and Larger: Bolted gasketed screen cover.
  3. Gasket Material: Graphited non-asbestos mineral or ceramic fiber.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Strainers in Steam Piping (2 inch size and larger): Provide with a blow-off valve.
1. Blow-Off Valve:
    - a. Steam Pressure 125 psi and Less: Type A gate valve, full size of blow-off outlet.
    - b. Install a short nipple and pipe cap on down stream end of valve.
- B. Strainers in Water Piping (1-1/2 inch size and larger): Provide with a full size drain valve with integral hose bibb connection, and chained cap, rated for 450 degrees F.
- C. Install a short nipple and pipe cap in the blow-off outlets of strainers not specified or shown to have a blow-off valve or drain.
- D. Install strainers, indicated or specified to be installed in the suction or discharge piping connections to pumps as shown on the drawings.

END OF SECTION 232001

## SECTION 232213 - STEAM AND CONDENSATE HEATING 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 pipe and fittings for LP steam and condensate piping:

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Welding certificates.

#### 1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding: Qualify procedures and operators according to the following:
  - 1. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
  - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

### PART 2 - PRODUCTS

#### 2.1 STEEL PIPE AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, plain ends, welded and seamless, Grade B, and Schedule as indicated in piping applications articles.
- B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125, 150, and 300 as indicated in piping applications articles.
- C. Malleable-Iron Threaded Fittings: ASME B16.3; Classes 150 and 300 as indicated in piping applications articles.

- D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in piping applications articles.
- E. Cast-Iron Threaded Flanges and Flanged Fittings: ASME B16.1, Classes 125 and 250 as indicated in piping applications articles; raised ground face, and bolt holes spot faced.
- F. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.
- G. Wrought-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
  - 1. Material Group: 1.1.
  - 2. End Connections: Butt welding.
  - 3. Facings: Raised face.
- H. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, black steel of same Type, Grade, and Schedule as pipe in which installed.

## 2.2 JOINING MATERIALS

- A. 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 maximum thickness unless otherwise 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.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. 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.
- D. Welding Materials: Comply with Section II, Part C, of ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.

## PART 3 - EXECUTION

### 3.1 LP STEAM PIPING APPLICATIONS

- A. LP Steam Piping, NPS 2 and Smaller Schedule 40, Type S, Grade B, steel pipe; Class 125 cast-iron fittings; and threaded joints.
- B. LP Steam Piping, NPS 2-1/2 through NPS 12 Schedule 40 Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.

- C. Condensate piping above grade, NPS 2 and smaller, Schedule 80, Type S, Grade B, steel pipe; Class 125 cast-iron fittings; and threaded joints.

### 3.2 PIPING INSTALLATION

- A. 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 otherwise indicated.
- B. Install piping to permit valve servicing.
- C. Install piping free of sags and bends.
- D. Install fittings for changes in direction and branch connections.
- E. Install piping to allow application of insulation.
- F. Select system components with pressure rating equal to or greater than system operating pressure.
- G. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- H. Install drains, consisting of a tee fitting, NPS 3/4 full port-ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- I. Install steam supply piping at a minimum uniform grade of 0.2 percent downward in direction of steam flow.
- J. Install condensate return piping at a minimum uniform grade of 0.4 percent downward in direction of condensate flow.
- K. Reduce pipe sizes using eccentric reducer fitting installed with level side down.
- L. Install branch connections to mains using mechanically formed tee fittings in main pipe, with the branch connected to top of main pipe.
- M. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
- N. Install drip legs at low points and natural drainage points such as ends of mains, bottoms of risers, and ahead of control valves.

### 3.3 HANGERS AND SUPPORTS

- A. Install the following pipe attachments:
  - 1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
- B. Install hangers for steel steam supply piping with the following maximum spacing:

1. NPS 3/4: Maximum span, 9 feet.
2. NPS 1: Maximum span, 9 feet.
3. NPS 1-1/2: Maximum span, 12 feet.
4. NPS 2: Maximum span, 13 feet.
5. NPS 2-1/2: Maximum span, 14 feet.
6. NPS 3 and Larger: Maximum span, 15 feet.

C. Install hangers for steel steam condensate piping with the following maximum spacing:

1. NPS 3/4: Maximum span, 7 feet.
2. NPS 1: Maximum span, 7 feet.
3. NPS 1-1/2: Maximum span, 9 feet.
4. NPS 2: Maximum span, 10 feet.
5. NPS 2-1/2: Maximum span, 11 feet.
6. NPS 3 and Larger: Maximum span, 12 feet.

### 3.4 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe 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 unless dry seal threading is specified.
  2. 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: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

### 3.5 TERMINAL EQUIPMENT CONNECTIONS

- A. Size for supply and return piping connections shall be the same as or larger than equipment connections.
- B. Install traps and control valves in accessible locations close to connected equipment.
- C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.
- D. Install vacuum breakers downstream from control valve, close to coil inlet connection.

END OF SECTION 232213

## SECTION 232216 - STEAM AND CONDENSATE 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 the following piping specialties for low pressure steam and condensate piping:
  - 1. Steam traps.
  - 2. Radiator Control Valves
  - 3. Blowdown Separators

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of the following:
  - 1. Steam trap.
  - 2. Radiator Control valves
  - 3. Blowdown Separator.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For valves, safety valves, steam traps and blowdown separators.

#### 1.5 QUALITY ASSURANCE

- A. Pipe Welding: Qualify procedures and operators according to the following:
  - 1. ASME Compliance: Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp flash tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.



## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressures and temperatures unless otherwise indicated:
1. LP Steam Piping: 15 psig.
  2. Condensate Piping: 15 psig.
  3. Blowdown-Drain Piping: Equal to pressure of the piping system to which it is attached.

### 2.2 STEAM TRAPS

- A. Float and Thermostatic Traps:
1. Body and Bolted Cap: ASTM A 126, cast iron.
  2. End Connections: Threaded.
  3. Float Mechanism: Replaceable, stainless steel.
  4. Head and Seat: Hardened stainless steel.
  5. Trap Type: Balanced pressure.
  6. Thermostatic Bellows: Stainless steel or monel.
  7. Thermostatic air vent capable of withstanding 45 deg F of superheat and resisting water hammer without sustaining damage.
  8. Vacuum Breaker: Thermostatic with phosphor bronze bellows, and stainless-steel cage, valve, and seat.
  9. Maximum Operating Pressure: 125 psig.

### 2.3 STEAM BLOWDOWN SEPARATOR

- A. Steam Blowdown Separator:
1. Manufacturer equal to Bryan Model BDS-1630-D34.
  2. ASME Section VIII, Div. 1 vessel.
  3. Wall Thickness: 0.375 inches minimum.
  4. Striker Plate: 16 gauge stainless steel.
  5. Wall Baffles: 11 gauge stainless steel.
  6. Floor Stand: 2"x 2" angle iron legs and a 3"x 3" leg pad welded to each leg. Leg pad shall have a 9/16" diameter hole for bolt-down installation.
  7. Aftercooler with automatic temperature regulating valve.
  8. Capacities:
    - a. Operating Pressure: 0 to 40 psi.
    - b. Boiler Blow Down Size (Inlet Size): 1-1/4"
    - c. Tank Diameter: 16"
    - d. Tank Height: 30"
    - e. Stand Height: 30"
    - f. Vent Size: 4"
    - g. Drain Size: 3"

## PART 3 - EXECUTION

### 3.1 STEAM-TRAP INSTALLATION

- A. Install steam traps in accessible locations as close as possible to connected equipment.
- B. F&T Traps: Install full-port ball valve, strainer, and union upstream from trap; install union, check valve, and full-port ball valve downstream from trap unless otherwise indicated.

END OF SECTION 232216

## SECTION 233113 - METAL DUCTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Rectangular ducts and fittings.
2. Sheet metal materials.
3. Sealants and gaskets.
4. Hangers and supports.

##### B. Related Sections:

1. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

#### 1.2 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 shall withstand the effects of gravity and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

#### 1.3 SUBMITTALS

##### A. Product Data: For each type of product indicated.

##### B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.

9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

C. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.
5. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports.

D. Welding certificates.

#### 1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  1. 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 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. Applicable sealing requirements shall conform to Mechanical Code of New York State section 603.9 and the energy Conservation Code of New York State section 803.2.8.
- 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, 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 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.
  - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- D. 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.
- E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

## 2.4 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. 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, 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.

C. 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, use sealant that has 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."

D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

## 2.6 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, "Rectangular Duct Hangers Minimum Size,".
- 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.

## 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 ducts with fewest possible joints.
- D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- I. 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.
- J. 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 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, Make Up Air Ducts: Seal Class A.
  - 3. Conditioned Space, Make Up Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
  - 4. Conditioned Space, Make Up Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.

### 3.3 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 thick.
  - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches 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, "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 of each elbow and within 48 inches 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.
- 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.

### 3.4 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

### 3.5 DUCT CLEANING

### 3.6 START UP

- A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

### 3.7 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise noted:
- B. Make Up Ducts:
  - a. Pressure Class: Positive 4-inch wg.
  - b. Minimum SMACNA Seal Class: A.



- c. SMACNA Leakage Class for Rectangular: 6.
- C. Toilet Exhaust Ducts (Aluminum):
  - a. Pressure Class: Positive or negative 3-inch wg.
  - b. Minimum SMACNA Seal Class: A.
  - c. SMACNA Leakage Class for Rectangular: 6.
- D. Elbow Configuration:
  - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
    - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
    - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
    - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

END OF SECTION 233113

## SECTION 233300 - AIR DUCT ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Automatic air dampers.
  - 2. Flange connectors.
  - 3. Turning vanes.
  - 4. Duct-mounted access doors.
  - 5. Flexible connectors.
  - 6. Duct accessory hardware.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
  - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
    - a. Special fittings.
    - b. Manual volume damper installations.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

#### 1.4 QUALITY ASSURANCE

- 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 AMCA 500-D testing for damper rating.

## 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. 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: G90.
  - 2. Exposed-Surface Finish: Mill phosphatized.
- C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and No. 4 finish for exposed ducts.
- D. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

### 2.3 AUTOMATIC AIR DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Air Balance Inc.; a division of Mestek, Inc.
  - 2. Greenheck Fan Corporation.
  - 3. Nailor Industries Inc.
  - 4. Ruskin Company.

- B. Description: Line voltage, motorized actuator.
- C. Maximum Air Velocity: 1000 fpm.
- D. Maximum System Pressure: 2-inch wg.
- E. Frame: Hat-shaped, 0.094-inch- thick, galvanized sheet steel, with welded corners or mechanically attached and mounting flange.
- F. Blades: Multiple single-piece blades, center pivoted, maximum 6-inch width, 0.025-inch- thick, roll-formed aluminum with sealed edges.
- G. Blade Action: Parallel.
- H. Blade Seals: Neoprene, mechanically locked.
- I. Blade Axles:
  - 1. Material: Nonferrous metal or Stainless steel.
  - 2. Diameter: 0.20 inch.
- J. Tie Bars and Brackets: Galvanized steel.
- K. Bearings: Synthetic pivot bushings.
- L. Accessories:
  - 1. End switch. Associated fan shall not operate until damper is proved open.

#### 2.4 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Ductmate Industries, Inc.
  - 2. Nexus PDQ; Division of Shilco Holdings Inc.
  - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

#### 2.5 TURNING VANES

- 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. Ductmate Industries, Inc.
  2. Duro Dyne Inc.
  3. METALAIRE, Inc.
  4. SEMCO Incorporated.
  5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. 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.
- C. 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."
- D. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

## 2.6 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Warming and Ventilating; a division of Mestek, Inc.
  2. Cesco Products; a division of Mestek, Inc.
  3. Ductmate Industries, Inc.
  4. Flexmaster U.S.A., Inc.
  5. Greenheck Fan Corporation.
  6. McGill AirFlow LLC.
  7. Nailor Industries Inc.
  8. Pottorff; a division of PCI Industries, Inc.
  9. Ventfabrics, Inc.
  10. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "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. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
    - d. Fabricate doors airtight and suitable for duct pressure class.
    - e. Seal: Neoprene or foam rubber.
  2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
  3. Number of Hinges and Locks:

- a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
- b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
- c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.
- d. Access Doors Larger than 24 by 48 Inches: Four hinges and two compression latches with outside and inside handles.

## 2.7 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. Ductmate Industries, Inc.
  2. Duro Dyne Inc.
  3. Ventfabrics, Inc.
  4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to 2 strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
  1. Minimum Weight: 26 oz./sq. yd.
  2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
  3. Service Temperature: Minus 40 to plus 200 deg F.

## 2.8 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 pilot 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 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.
- D. Set dampers to fully open position before testing, adjusting, and balancing.
- E. Install test holes at fan inlets and outlets and elsewhere as indicated.
- F. 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. At outdoor-air intakes, return, & mixed-air plenums.
  - 3. Downstream from control dampers, backdraft dampers, and equipment.
  - 4. Adjacent to and close enough to fire dampers, to reset or reinstall fusible links. Access doors for access to fire 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.
  - 5. At each change in direction and at maximum 50-foot spacing.
  - 6. Upstream from turning vanes.
  - 7. Control devices requiring inspection.
  - 8. Elsewhere as indicated.
- G. Install access doors with swing against duct static pressure.
- H. Access Door Sizes:
  - 1. One-Hand or Inspection Access: 8 by 5 inches.
  - 2. Two-Hand Access: 12 by 6 inches.
  - 3. Head and Hand Access: 18 by 10 inches.
  - 4. Head and Shoulders Access: 21 by 14 inches.
  - 5. Body Access: 25 by 14 inches.
  - 6. Body plus Ladder Access: 25 by 17 inches.

- I. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- J. Install flexible connectors to connect ducts to equipment.
- K. Connect flexible ducts to metal ducts with draw bands and adhesive plus sheet metal screws.
- L. Install duct test holes where required for testing and balancing purposes.

### 3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
  - 1. Operate Inspect locations of access doors and verify that purpose of access door can be performed.
  - 2. Inspect turning vanes for proper and secure installation.

END OF SECTION 233300



## SECTION 233423 - HVAC POWER VENTILATORS

### 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. Ceiling-mounted ventilators.
  - 2. Centrifugal sidewall ventilators.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include diagrams for power, signal, and control wiring.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, or BIM model, drawn to scale and coordinated with all building trades.
- B. Field quality-control reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Unusual Service Conditions:
  - 1. Base fan-performance ratings on the following:
    - a. Discharge Temperature: 105 deg F.
    - b. Altitude: 2000 feet.
- B. Capacities and Characteristics: See schedule.

### 2.2 CEILING-MOUNTED VENTILATORS

- A. Manufacturer: Loren Cook Company or equal.
- B. Housing: Steel, lined with acoustical insulation.
- C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel removable for service.
- D. Back-draft damper: Integral.
- E. Grille: Aluminum louvered grille intake, flush with ACT ceiling. Coordinate color with architect.
- F. Accessories:
  - 1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
  - 2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
  - 3. Time-Delay Switch: Assembly with single-pole rocker switch, timer, and cover plate.
  - 4. Motion Sensor: Motion detector with adjustable shutoff timer.
  - 5. Filter: Washable aluminum to fit between fan and grille.
  - 6. Isolation: Rubber-in-shear vibration isolators.

### 2.3 CENTRIFUGAL SIDEWALL VENTILATORS

- A. Manufacturer: Loren Cook Company or approved equal.
- B. Configuration: Centrifugal sidewall ventilator.
- C. Housing: Removable Galvanized steel mushroom dome top, one-piece aluminum base with venturi inlet cone.
  - 1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.
  - 2. Provide grease collector.

- D. Fan Wheels: Aluminum hub and wheel with backward-inclined blades, spark proof construction.
- E. Direct Drive:
  - 1. Resiliently mounted to housing.
  - 2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
  - 3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
  - 4. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
  - 5. Motor Pulleys: Adjustable pitch for use with motors through 5 hp. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions. Provide fixed pitch for use with motors larger than 5 hp.
  - 6. Fan and motor isolated from exhaust airstream.
- F. Accessories:
  - 1. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
  - 2. Spark-resistant, all-aluminum wheel construction.
  - 3. Mounting Pedestal: Galvanized steel with removable access panel.
  - 4. Wall Mount Adapter: Attach wall-mounted fan to wall.
- G. Standards: UL 762 listed for grease-laden air exhaust.

## 2.4 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, 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.

## 2.5 SOURCE QUALITY CONTROL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- B. AMCA Certification: Fans shall comply with AMCA 11 and bear the AMCA-Certified Ratings Seal.
- C. Fan Sound Ratings: Comply with AMCA 311, and label fans with the AMCA-Certified Ratings Seal. Sound ratings shall comply with AMCA 301. The fans shall be tested according to AMCA 300.
- D. Fan Performance Ratings: Comply with AMCA 211 and label fans with AMCA-Certified Rating Seal. The fans shall be tested for air performance - flow rate, fan pressure, power, fan

efficiency, air density, speed of rotation, and fan efficiency - according to AMCA 210/ASHRAE 51.

- E. Operating Limits: Classify according to AMCA 99.
- F. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF HVAC POWER VENTILATORS

- A. Install power ventilators level and plumb.
- B. Ceiling Units: Suspend units from structure; use steel wire or metal straps.
- C. Install units with clearances for service and maintenance.
- D. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

### 3.2 DUCTWORK CONNECTIONS

- A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

### 3.3 ELECTRICAL CONNECTIONS

- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.
  - 1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
  - 2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

### 3.4 CONTROL CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.

- B. Connect control wiring according to Section 260523 "Control-Voltage Electrical Power Cables."

### 3.5 FIELD QUALITY CONTROL

#### A. Tests and Inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that there is adequate maintenance and access space.
4. Verify that cleaning and adjusting are complete.
5. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
6. Adjust belt tension.
7. Adjust damper linkages for proper damper operation.
8. Verify lubrication for bearings and other moving parts.
9. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
10. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
11. Shut unit down and reconnect automatic temperature-control operators.
12. Remove and replace malfunctioning units and retest as specified above.

- B. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.

### 3.6 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.
- D. Replace fan and motor pulleys as required to achieve design airflow.
- E. Lubricate bearings.

END OF SECTION 233423

## SECTION 233533 - LISTED KITCHEN VENTILATION SYSTEM EXHAUST DUCTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Listed grease ducts.
2. Access doors.

#### 1.2 ACTION SUBMITTALS

##### A. Product Data: For each type of product.

##### B. Shop Drawings: For listed grease ducts.

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Detail fabrication and assembly of hangers and seismic restraints.

#### 1.3 INFORMATIONAL SUBMITTALS

##### A. Welding certificates.

#### 1.4 QUALITY ASSURANCE

##### A. 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 D9.1/D9.1M, "Sheet Metal Welding Code," for shop and field welding of joints and seams in listed grease ducts and field-fabricated grease ducts.

### PART 2 - PRODUCTS

#### 2.1 LISTED GREASE DUCTS

##### A. Manufacturer: Van-Packer Company, Inc. or approved equal.

##### B. Description: Factory-fabricated, -listed, and -labeled, double-wall ducts tested according to UL 1978 and rated for 500 deg F continuously, or 2000 deg F for 30 minutes; with positive or negative duct pressure and complying with NFPA 211.

- C. Construction: Inner shell and outer jacket separated by at least a 1 inch annular space filled with high-temperature, ceramic-fiber insulation.
  - 1. Inner Shell: ASTM A666, Type 316 stainless steel.
  - 2. Outer Jacket: Stainless steel where concealed. Stainless steel where exposed.
- D. Gaskets and Flanges: Ensure that gaskets and sealing materials are rated at 1500 deg F minimum.
- E. Hood Connectors: Constructed from same material as grease duct with internal or external continuously welded or brazed joints.
- F. Accessories: Tees, elbows, increasers, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly. Include unique components required to comply with NFPA 96 including cleanouts, transitions, adapters, and drain fittings.
- G. Grease Duct Supports: Construct duct bracing and supports from non-combustible material.
  - 1. Design bracing and supports to carry static and seismic loads within stress limitations of the International Building Code.
  - 2. Ensure that bolts, screws, rivets and other mechanical fasteners do not penetrate duct walls.
- H. Comply with ASTM E2336.
- I. Factory Tests: Test and inspect fire resistance of grease duct system according to ASTM E2336.
  - 1. Allow consultant two days' minimum notification before test is performed.

## 2.2 ACCESS DOORS

- A. Manufacturer: Ductmate Industries, Inc. or approved equal.
- B. Description: Factory-fabricated, listed, and labeled, double-wall access doors tested according to UL 1978 and rated for 500 deg F continuously, or 2000 deg F for 30 minutes; with positive or negative duct pressure and complying with NFPA 211.
  - 1. Construction: ASTM A666, Type 316 stainless-steel inner shell stainless steel outer cover with two handles.
  - 2. Fasteners: Stainless-steel bolts and wing nuts.
    - a. Ensure that bolts do not penetrate interior of duct space.
  - 3. Maintenance Access Door Dimensions: 8 x 8
  - 4. Personnel Access Door Dimensions: 8 x 8
  - 5. Door Label: Mark door with uppercase lettering as follows: "ACCESS PANEL. DO NOT OBSTRUCT."

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Coordinate connections to kitchen exhaust hoods.
- B. Coordinate connections to exhaust fans with requirements in Section 233423 "HVAC Power Ventilators" for centrifugal sidewall exhaust fans.
- C. Coordinate firestopping where grease ducts penetrate fire separations.
- D. Comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211 and UL 2221, whichever is most stringent.
- E. Install airtight access doors where indicated.
- F. Seal between sections of grease exhaust ducts according to manufacturer's written installation instructions, using sealants recommended by manufacturer.
- G. Connections: Make grease duct connections according to the International Mechanical Code.
  - 1. Grease duct to exhaust fan connections: Connect grease ducts to inlet side of fan using flanges, gaskets, and bolts.
  - 2. Grease duct to hood connections:
    - a. Make grease duct to hood joints connections using internal or external continuously welded or brazed joints.
    - b. Make watertight grease duct to hood joints connections using flanges, gaskets, and bolts.
- H. Support ducts at intervals recommended by manufacturer to support weight of ducts and accessories, without applying loading on kitchen hoods.
  - 1. Securely attach supports and bracing to structure.
- I. Grease Duct Enclosures: Comply with requirements of the International Building Code and ASTM E2336.
- J. Coordinate fire-rated enclosure construction with Section 092116.23 "Gypsum Board Shaft Wall Assemblies."
- K. Repair damage to adjacent materials caused by listed kitchen ventilation system exhaust ducts installation.

### 3.2 FIELD QUALITY CONTROL

- A. Perform air leakage test before concealment of any portion of the grease duct system.
  - 1. Notify Owner a minimum of 2 days before test is performed.



END OF SECTION 233533

## SECTION 235113 - DRAFT CONTROL DEVICES

### PART 1 - GENERAL

#### 1.1 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Operation and maintenance data.

### PART 2 - PRODUCTS

#### 2.1 BAROMETRIC DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Babco Inc.
  - 2. FAMCO.
  - 3. Tec-Air Inc.
  - 4. Tjernlund Products, Inc.
  - 5. Tutco, Inc.; Subsidiary of Smiths Industries.
  - 6. Wing Draft Inducers; Subsidiary of Smiths Industries.
- B. Damper Construction: High-temperature-enamel-painted steel damper and housing with galvanized-steel breeching connection. Adjustable counterweight with lock. Include knife-edge bearings that do not require lubrication.
- C. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of barometric dampers that fail in materials or workmanship within a specified warranty period.
  - 1. Failures include failure of damper due to corrosion.
  - 2. Warranty Period: Two years from date of Substantial Completion.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install listed components in a manner complying with the listing.
- B. Secure barometric dampers to breechings with hardware compatible with connected materials.
- C. Locate barometric dampers as close to draft hood collar as possible.

- D. Secure barometric dampers to appliances, breechings, or chimneys with hardware compatible with connected materials.

END OF SECTION 235113

## SECTION 235116 - FABRICATED BREECHINGS AND 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. Field-fabricated metal breechings.

- B. Related Requirements:

- 1. Section 235113 "Draft Control Devices" for barometric dampers.

#### 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 product.

- B. Shop Drawings: For breechings.

- 1. Include plans, elevations, sections, and attachment details.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

#### 1.5 QUALITY ASSURANCE

- A. 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 D9.1/D9.1M, "Sheet Metal Welding Code," for shop and field welding of joints and seams in breechings.

## 1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of venting system that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, structural failures caused by expansion and contraction.
  - 2. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 FIELD-FABRICATED METAL BREECHINGS

- A. Fabricate breechings from ASTM A1011/A1011M hot-rolled steel with continuously welded joints, complying with NFPA 211 for minimum metal thickness.
  - 1. Equal to or Less Than 1.069 Sq. Ft. or 14 Inches in Diameter: 0.053 inch.
  - 2. Up to 1.396 Sq. Ft. or 16 Inches in Diameter: 0.067 inch.
  - 3. Up to 1.764 Sq. Ft. or 18 Inches in Diameter: 0.093 inch.
  - 4. Larger Than 1.764 Sq. Ft. or 18 Inches in Diameter: 0.123 inch.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLICATION

- A. Field-Fabricated Metal Breechings: Dual-fuel boilers, oven vents, water heaters, exhaust for engines, fireplaces, and other solid-fuel-burning appliances.

### 3.3 INSTALLATION OF UNLISTED, FIELD-FABRICATED BREECHINGS

- A. Suspend breechings independent of their appliance connections.
- B. Align breechings at connections, with smooth internal surface and a maximum 1/8-inch misalignment tolerance.
- C. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest drain.
- D. Lap joints in direction of flow.

- E. Support breechings from building structure with bolts, concrete inserts, steel expansion anchors, welded studs, C clamps, or beam clamps according to manufacturer's written instructions.

#### 3.4 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes.
- B. Clean breechings internally, during and after installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth and apply touchup finish to match factory or shop finish.
- C. Provide temporary closures at ends of breechings that are not completed or connected to equipment.

END OF SECTION 235116

## SECTION 235223 - CAST-IRON BOILERS

### 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 cast-iron boilers, trim, and accessories for generating steam.

#### 1.3 ACTION SUBMITTALS

- A. Shop Drawings: For boiler, boiler trim, and accessories.
  - 1. Include plans, elevations, sections, and mounting details.
  - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include diagrams for power, signal, and control wiring.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For boilers, components, and accessories to include in emergency, operation, and maintenance manuals.

#### 1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace controls and heat exchangers of boilers that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period for Controls: two years from date of Substantial Completion.
  - 2. Warranty Period for Heat Exchangers: five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- 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. ASME Compliance: Fabricate and label boilers to comply with 2010 ASME Boiler and Pressure Vessel Code.
- C. ASHRAE/IES 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."
- D. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N.
- E. I=B=R Compliance: Boilers shall be tested and rated according to AHRI's "Rating Procedure for Heating Boilers" and "Testing Standard for Commercial Boilers," with I=B=R emblem on a nameplate affixed to boiler.
- F. CSA Compliance: Test boilers for compliance with CSA B51.
- G. Mounting Frame: Steel rails used to mount assembled boiler package on concrete base.
  - 1. Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC" when mounting base is anchored to building structure.

### 2.2 MANUFACTURERS

- A. Manufacturer: Smith or equivalent.

### 2.3 MANUFACTURED UNITS

- A. Description: Factory fabricated and field assembled.
  - 1. Cast-iron sections shall be sealed pressure tight and held together with tie rods set on insulated steel base, including insulated jacket and flue-gas vent connection.
  - 2. Ship cast-iron sections disassembled with all materials and equipment, including seals, tie rods, and insulated jacket and flue-gas vent connection for field assembly.
- B. Cast-Iron Section Design:
  - 1. Configuration: Wet base.
  - 2. Drain and blowdown tappings.
  - 3. Return injection tube to equalize water flow to all sections.
  - 4. Crown inspection tappings with brass plugs.
  - 5. Built-in air separator.



- C. Combustion Chamber: Equipped with flame observation ports, front and back.
- D. Casing:
  - 1. Jacket: Galvanized sheet metal, with snap-in or interlocking closures with protective finish.
  - 2. Insulation: Mineral-fiber insulation surrounding the heat exchanger.
  - 3. Combustion Chamber Access: Refractory lined, hinged, front.
  - 4. Access: For cleaning between cast-iron sections.
  - 5. Draft Hood: Flue canopy and rear flue connection shall be constructed of aluminized steel containing adjustable outlet damper assembly.
  - 6. Insulated base constructed of aluminized steel to permit boiler to be installed on combustible floor.
  - 7. Control Cabinet: Sheet metal casing shall cover all controls, gas train, and burner.
- E. Draft Diverter: Steel assembly integral with boiler casing.

## 2.4 OIL BURNER

- A. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for fuel oil.
- B. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor, with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
  - 1. Motors: Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
    - a. 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.
- C. Oil Supply: Control devices and low-high-low control sequence shall comply with requirements in ASME CSD-1.
  - 1. Oil Pump: Two-stage, gear-type oil pump integral to and directly driven by blower shall be capable of producing 300-psig discharge pressure and 15-inch Hg vacuum.
  - 2. Oil Piping Specialties:
    - a. Suction-line, manual gate valve.
    - b. Removable-mesh oil strainer.
    - c. 0- to 30-inch Hg vacuum; 0- to 30-psig vacuum-pressure gage.
    - d. 0- to 300-psig oil-nozzle pressure gage.
    - e. Nozzle-line, solenoid-safety-shutoff oil valve.

## 2.5 TRIM FOR STEAM BOILERS

- A. Include devices sized to comply with ASME B31.9.
- B. Pressure Controllers: Operating firing rate and high limit.

- C. Safety Relief Valve:
  - 1. Size and Capacity: As required for equipment according to 2010 ASME Boiler and Pressure Vessel Code.
  - 2. Description: Fully enclosed steel spring with adjustable pressure range and positive shutoff; factory set and sealed.
- D. Pressure Gage: Minimum 3-1/2-inch diameter. Gage shall have normal operating pressure about 50 percent of full range.
- E. Water Column: Minimum 12-inch glass gage with shutoff cocks.
- F. Drain Valves: Minimum NPS 3/4 or nozzle size with hose-end connection.
- G. Blowdown Valves: Factory-installed bottom and surface, slow-acting blowdown valves same size as boiler nozzle.
- H. Stop Valves: Boiler inlets and outlets, except safety relief valves or preheater inlet and outlet, shall be equipped with stop valve in an accessible location as near as practical to boiler nozzle and same size as or larger than nozzle. Valves larger than NPS 2 (DN 50) shall have rising stem.
- I. Stop-Check Valves: Factory-installed, stop-check valve and stop valve at boiler outlet with free-blow drain valve factory installed between the two valves and visible when operating stop-check valve.

## 2.6 CONTROLS

- A. Boiler operating controls shall include the following devices and features:
  - 1. Control transformer.
  - 2. Set-Point Adjust: Set points shall be adjustable.
  - 3. Operating Pressure Control: Factory wired and mounted to cycle burner.
  - 4. Low-Water Cutoff and Pump Control: Cycle feedwater pump(s) for makeup water control.
  - 5. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain a constant steam pressure. Maintain pressure set point plus or minus 10 percent.
    - a. Include automatic, alternating-firing sequence for multiple boilers to provide equal runtime for boilers.
- B. Safety Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
  - 1. High Cutoff: Manual reset stops burner if operating conditions rise above maximum boiler design pressure.
  - 2. Low-Water Cutoff Switch: Float and electronic probe shall prevent burner operation on low water. Cutoff switch shall be manual-reset type.
  - 3. Blocked Vent Safety Switch: Manual-reset switch factory mounted on draft diverter.
  - 4. Rollout Safety Switch: Factory mounted on boiler combustion chamber.

5. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.

## 2.7 ELECTRICAL POWER

- A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in electrical Sections.
- B. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.

## 2.8 CAPACITIES AND CHARACTERISTICS

- A. See schedules on drawings.

## 2.9 SOURCE QUALITY CONTROL

- A. Test and inspect factory-assembled boilers, before shipping, according to 2010 ASME Boiler and Pressure Vessel Code.
- B. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.
- C. Allow Owner access to source quality-control testing of boilers. Notify Architect 14 days in advance of testing.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting performance of the Work.
  1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
- B. Examine mechanical spaces for suitable conditions where boilers will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 BOILER INSTALLATION

- A. Equipment Mounting:

1. Install boiler on existing equipment pad.
- B. Assemble boiler sections in sequence and seal between each section.
- C. Assemble and install boiler trim.
- D. Install electrical devices furnished with boiler but not specified to be factory mounted.
- E. Install control wiring to field-mounted electrical devices.

### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in Section 232213 "Steam and Condensate Heating Piping. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to boiler to allow service and maintenance.
- C. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas-train connection. Provide a reducer if required.
- D. Connect steam and condensate piping to supply-, return-, and blowdown-boiler tappings with shutoff valve and union or flange at each connection.
- E. Install piping from safety relief valves to nearest floor drain.
- F. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
- G. Connect breeching full size to boiler outlet. Comply with requirements in Section 235116 "Fabricated Breechings and Accessories" for venting materials.

### 3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  1. Perform installation and startup checks according to manufacturer's written instructions.
  2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
  3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
  4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
    - a. Burner Test: Adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency.

- b. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and steam pressure.
  - c. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Performance Tests:
  - 1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
  - 2. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
  - 3. Perform field performance tests to determine capacity and efficiency of boilers.
    - a. Test for full capacity.
  - 4. Repeat tests until results comply with requirements indicated.
  - 5. Provide analysis equipment required to determine performance.
  - 6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are inadequate.
  - 7. Notify Architect in advance of test dates.
  - 8. Document test results in a report and submit to Architect.
- E. Boiler will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION 235223

## SECTION 237423.13 - PACKAGED, DIRECT-FIRED, OUTDOOR, HEATING-ONLY MAKEUP-AIR UNITS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes outdoor, direct, gas-fired heating-only, makeup air units, including the following components:
  - 1. Casings.
  - 2. Outdoor-air intake hood.
  - 3. Fans, drives, and motors.
  - 4. Air filtration.
  - 5. Dampers.
  - 6. Direct, gas-fired burners.
  - 7. Unit control panel.
  - 8. Controls.
  - 9. Accessories.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each outdoor, direct, gas-fired heating-only, makeup air unit.
- B. Shop Drawings: For each outdoor, direct, gas-fired, heating-only, makeup air unit.
  - 1. Include plans, elevations, sections, and mounting details.
  - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Detail fabrication and assembly of gas-fired heating and ventilating units, as well as procedures and diagrams.
  - 4. Include diagrams for power, signal, and control wiring.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans and other details, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.
- B. Sample Warranty: For manufacturer's warranty.
- C. Startup service reports.
- D. Field quality-control reports.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For direct, gas-fired, heating-only, makeup air units to include in emergency, operation, and maintenance manuals.

#### 1.5 WARRANTY

- A. Warranty: Manufacturer agrees to repair or replace components of direct-fired heating and ventilating units that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period for Entire Unit: Manufacturer's standard, but not less than 2 year from date of Substantial Completion.
  - 2. Warranty Period for Burners: Manufacturer's standard, but not less than 5 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of units and components.
- C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

#### 2.2 CAPACITIES AND CHARACTERISTICS

- A. See schedules

#### 2.3 MANUFACTURERS

Manufacturer: Rupp Air or equivalent.

#### 2.4 UNIT CASINGS

- A. General Fabrication Requirements for Casings:
  - 1. Forming: Form walls, roofs, and floors with at least two breaks at each joint.
  - 2. Casing Joints: Sheet metal screws or pop rivets, factory sealed with water-resistant sealant.

3. Makeup Air Unit Mounting Frame: Formed galvanized-steel channel or structural channel supports, designed for low deflection, welded with integral lifting lugs.
- B. Configuration: Horizontal unit with side discharge for concrete base installation.
- C. Double-Wall Construction:
1. Outside Casing Wall: Galvanized steel, minimum 18 gauge thick, with manufacture standard finish.
  2. Inside Casing Wall:
    - a. Inside Casing, Burner Section: Galvanized steel, solid, minimum 14 gauge thick steel.
    - b. Inside Casing, All Other Sections: Galvanized steel.
  3. Floor Plate: Galvanized steel, minimum 18 gauge minimum thick.
  4. Casing Insulation:
    - a. Materials: Glass-fiber blanket or board insulation, Type I or Type II ASTM C1071.
    - b. Insulation Thickness: 1 inch minimum.
    - c. Thermal Break: Provide continuity of insulation with no through-casing metal in casing walls, floors, or roof of unit.
  5. Airstream Surfaces: Surfaces in contact with airstream shall comply with requirements in ASHRAE 62.1.
- D. Panels and Doors:
1. Panels:
    - a. Fabrication: Formed and reinforced, with same materials and insulation thickness as casing.
    - b. Fasteners: Two or more camlock type for panel lift-out operation. Arrangement shall allow panels to be opened against airflow.
    - c. Gasket: Neoprene, applied around entire perimeters of panel frames.
    - d. Size: Large enough to allow unobstructed access for inspection and maintenance of unit's internal components.
  2. Doors:
    - a. Fabrication: Formed and reinforced with same materials and insulation thickness as casing.
    - b. Hinges: A minimum of two ball-bearing hinges or stainless steel piano hinge and two wedge-lever-type latches, operable from inside and outside. Arrange doors to be opened against airflow. Provide safety latch retainers on doors so that doors do not open uncontrollably.
    - c. Gasket: Neoprene, applied around entire perimeters of panel frames.
    - d. Size: Large enough to allow unobstructed access for inspection and maintenance of unit's internal components.
  3. Locations and Applications:



- a. Fan Section: Access door.
- b. Propane-Fired Burner Section: Access door

## 2.5 OUTDOOR-AIR INTAKE HOOD

- A. Type: Manufacturer's standard hood or louver.
- B. Materials: Match cabinet.
- C. Bird Screen: Comply with requirements in ASHRAE 62.1.
- D. Filter: Aluminum, 1inch thick replaceable.
- E. Configuration: Designed to inhibit wind-driven rain and snow from entering unit.

## 2.6 FANS, DRIVES, AND MOTORS

- A. Fan and Drive Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum-rated fan speed and motor horsepower.
- B. Fans: Centrifugal, rated according to AMCA 210; galvanized steel; mounted on solid-steel shaft.
  - 1. Shafts: With field-adjustable alignment.
  - 2. Shaft Bearings: Heavy-duty permanently lubricated.
  - 3. Housings: Formed- and reinforced-steel panels to form curved scroll housings with shaped cutoff and spun-metal inlet bell.
  - 4. Mounting: For internal vibration and Factory-mount fans with manufacturer's standard vibration isolation mounting.
  - 5. Shaft Lubrication Lines: Extended to a location outside the casing.
  - 6. Flexible Connector: Factory fabricated with a fabric strip minimum 3-1/2 inches (89 mm) wide, attached to two strips of minimum 2-3/4-inch- (70-mm-) wide by 0.028-inch- (0.7-mm-) thick, galvanized-steel sheet.
    - a. Flexible Connector Fabric: Glass fabric, double coated with neoprene. Fabrics, coatings, and adhesives shall comply with UL 181, Class 1.
- C. Motors:
  - 1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
  - 2. Motor Sizes: Maximum sizes as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

## 2.7 AIR FILTRATION

- A. Particulate air filtration is specified in Section 234100 "Particulate Air Filtration."

B. Panel Filters:

1. Description: Flat or pleated factory-fabricated, self-supported, disposable air filters with holding frames.
2. Filter Unit Class: UL 900.

2.8 DAMPERS

- A. Damper: Provide integral backdraft damper.

2.9 DIRECT-FIRED GAS BURNER

- A. Description: Factory assembled, piped, and wired; and complying with ANSI Z21.47 and with NFPA 54.

- B. CSA Approval: Designed and certified by and bearing label of CSA.

- C. Burners: Stainless steel.

1. Rated Minimum Turndown Ratio: 10 to 1.
2. Fuel: Propane gas.
3. Ignition: Electronically controlled electric spark with flame sensor.
4. Gas Control Valve: Modulating.
5. Gas Train: Regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, electronic-modulating temperature control valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff all in one body.

- D. Safety Controls:

1. Gas Manifold: Safety switches and controls complying with ANSI standards.
2. Vent Flow Verification: Differential pressure switch to verify open vent.
3. High Limit: Thermal switch or fuse to stop burner.
4. Purge-period timer shall automatically delay burner ignition and bypass low-limit control.
5. Airflow Proving Switch: Differential pressure switch senses correct airflow before energizing pilot.
6. Automatic-Reset, High-Limit Control Device: Stops burner and closes main gas valve if high-limit temperature is exceeded.
7. Safety Lockout Switch: Locks out ignition sequence if burner fails to light after three tries. Controls are reset manually by turning the unit off and on.
8. Control Transformer: 24 V ac.

2.10 UNIT CONTROL PANEL

- A. Factory-wired, fuse-protected control transformer, connection for power supply and field-wired unit to remote control panel.

- B. Control Panel: Surface-mounted remote panel, with engraved plastic cover and the following lights and switches:

1. On-Off-Auto fan switch.
2. Heat-vent-off switch.
3. Supply-fan operation indicating light.
4. Heating operation indicating light.
5. Discharge temperature set point.
6. Damper position potentiometer.
7. Dirty-filter indicating light operated by unit-mounted differential pressure switch.
8. Safety-lockout indicating light.
9. Enclosure: NEMA 250, Type 1.

## 2.11 CONTROLS

### A. Control Devices:

1. Integral discharge temperature sensor: Sensor with suitable range for expected discharge temperature.
2. Static-Pressure Transmitter: Non-directional sensor with suitable range for expected input, and temperature compensated.
3. Fire-Protection Thermostats: Fixed or adjustable settings to operate at not less than 75 deg F above normal maximum operating temperature.
4. Ionization-Type Smoke Detectors:
  - a. 24-V dc, nominal.
  - b. Self-restoring.
  - c. Plug-in arrangement.
  - d. Integral visual-indicating light.
  - e. Sensitivity that can be tested and adjusted in place after installation.
  - f. Integral addressable module.
  - g. Remote controllability.
  - h. Responsive to both visible and invisible products of combustion.
  - i. Self-compensating for changes in environmental conditions.

### B. Fan Control, Interlocked: Fan to start with exhaust fan EF-1.

### C. Temperature Control:

1. Operates gas valve to maintain discharge-air temperature with factory-mounted sensor in blower outlet.
2. Timer shall select remote setback thermostat to maintain space temperature at 75 deg F.
3. Burner Control, Stepped: Two or four steps of control using one or two burner sections in series.
4. Burner Control, Modulating: 20 to 100 percent modulation of the firing rate. 10 to 100 percent with dual burner units.
5. Hardwired Points:
  - a. Room temperature.
  - b. Discharge-air temperature.
  - c. Burner operating.

## 2.12 ACCESSORIES

- A. Duplex, 115-V, ground-fault-interrupter outlet with 15-A overcurrent protection. Include transformer if required.
- B. Filter differential pressure switch with sensor tubing on either side of filter. Set for final filter pressure loss.
- C. Coil guards of painted, galvanized-steel wire.
- D. Hail guards of galvanized steel, painted to match casing.

## 2.13 MATERIALS

- A. Steel:
  - 1. ASTM A36/A36M for carbon structural steel.
  - 2. ASTM A568/A568M for steel sheet.
- B. Stainless Steel:
  - 1. Manufacturer's standard grade for casing.
  - 2. Manufacturer's standard type, ASTM A240/A240M for bare steel exposed to airstream or moisture.
- C. Galvanized Steel: ASTM A653/A653M.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Examine roughing-in for piping, ducts, and electrical systems to verify actual locations of piping and electrical connections before equipment installation.
- B. Unit Support: Install unit level on structural curb. Coordinate roof penetrations and flashing with roof construction. Secure units to structural curb with anchor bolts. Coordinate sizes and locations of curbs with actual equipment provided.
  - 1. Comply with requirements for vibration isolation and seismic-control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
  - 2. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."
- C. Install gas-fired units according to NFPA 54, "National Fuel Gas Code."
- D. Install controls and equipment shipped by manufacturer for field installation with direct-fired heating and ventilating units.

### 3.2 PIPING CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
  - 1. Gas Piping: Connect gas piping with shutoff valve and union, and with sufficient clearance for burner removal and service. Make final connections of gas piping to unit with corrugated, stainless-steel tubing flexible connectors complying with ANSI LC 1/CSA 6.26 equipment connections.
- B. Drain: Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for traps and accessories on piping connections to condensate drain pans under condensing heat exchangers.
- C. Where installing piping adjacent to heating and ventilating units, allow space for service and maintenance.

### 3.3 DUCT CONNECTIONS

- A. Duct Connections: Connect supply ducts to direct-fired heating and ventilating units with flexible duct connectors. Comply with requirements in Section 233300 "Air Duct Accessories" for flexible duct connectors.

### 3.4 ELECTRICAL CONNECTIONS

- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

### 3.5 CONTROL CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.
- B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections
- C. Perform tests and inspections.

- D. Units will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION 237423.13

## SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Metal-clad cable, Type MC, rated 600 V or less.
3. Connectors, splices, and terminations rated 600 V and less.

#### 1.2 ACTION SUBMITTALS

##### A. Product Data: For each type of product.

#### 1.3 INFORMATIONAL SUBMITTALS

##### A. Field quality-control reports.

### PART 2 - PRODUCTS

#### 2.1 COPPER BUILDING WIRE

##### A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

##### B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cerro Wire LLC.
2. General Cable Technologies Corporation.
3. Okonite Company (The).
4. Southwire Company.
5. WESCO.

##### C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

- D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- E. Conductor Insulation:
  - 1. Type THHN and Type THWN-2: Comply with UL 83.
  - 2. Type XHHW-2: Comply with UL 44.

## 2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems; a part of Atkore International.
  - 2. General Cable Technologies Corporation.
  - 3. Okonite Company (The).
  - 4. Southwire Company.
  - 5. WESCO.
- C. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. Comply with UL 1569.
  - 3. RoHS compliant.
  - 4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Circuits:
  - 1. Single circuit
- E. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- F. Ground Conductor: Insulated.
- G. Conductor Insulation:
  - 1. Type TFN/THHN/THWN-2: Comply with UL 83.
- H. Armor: Steel or Aluminum, interlocked.



## 2.3 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. 3M Electrical Products.
  - 2. Ideal Industries, Inc.
  - 3. ILSCO.
  - 4. O-Z/Gedney; a brand of Emerson Industrial Automation.
  - 5. Thomas & Betts Corporation; A Member of the ABB Group.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
  - 1. Material: Copper.
  - 2. Type: One hole with standard barrels.
  - 3. Termination: Compression.

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Branch Circuits in Basement: Metal-clad cable, Type MC
- B. Branch Circuits Concealed in Ceilings, Walls, Partitions, and Crawlspace: Metal-clad cable, Type MC
- C. Exposed Branch Circuits on First Floor: Type THHN/THWN-2, single conductors in raceway.
- D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Metal-clad cable, Type MC

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

### 3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

### 3.5 IDENTIFICATION

- A. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

### 3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

END OF SECTION 260519

## SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Steel slotted support systems.
2. Conduit and cable support devices.
3. Mounting, anchoring, and attachment components, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
4. Fabricated metal equipment support assemblies.

#### 1.2 ACTION SUBMITTALS

##### A. Product Data: For each type of product.

### PART 2 - PRODUCTS

#### 2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

##### A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
  - a. B-line, an Eaton business.
  - b. ERICO International Corporation.
  - c. Thomas & Betts Corporation; A Member of the ABB Group.
  - d. Unistrut; Part of Atkore International.
2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Material for Channel, Fittings, and Accessories: Galvanized steel.
4. Channel Width: Selected for applicable load criteria,
5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

##### B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

##### C. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
  - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) B-line, an Eaton business.
    - 2) Hilti, Inc.
    - 3) MKT Fastening, LLC.
2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
5. Toggle Bolts: Stainless-steel springhead type.
6. Hanger Rods: Threaded steel.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
  1. NECA 1.
  2. NECA 101
  3. NECA 105.
- B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25percent in future without exceeding specified design load limits.
  1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.
- E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

### 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT and RMC may be supported by openings through structure members, according to NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Expansion anchor fasteners.
  - 5. To Steel: [Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
  - 6. To Light Steel: Sheet metal screws.
  - 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

### 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

END OF SECTION 260529

## SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Metal conduits and fittings.
  2. Surface raceways.
  3. Boxes, enclosures, and cabinets.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

### PART 2 - PRODUCTS

#### 2.1 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AFC Cable Systems; a part of Atkore International.
    - b. Allied Tube & Conduit; a part of Atkore International.
    - c. O-Z/Gedney; a brand of Emerson Industrial Automation.
    - d. Thomas & Betts Corporation; A Member of the ABB Group.
    - e. Wheatland Tube Company.
  2. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  3. GRC: Comply with ANSI C80.1 and UL 6.
  4. EMT: Comply with ANSI C80.3 and UL 797.
  5. FMC: Comply with UL 1; zinc-coated steel or aluminum.
  6. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- B. Metal Fittings: Comply with NEMA FB 1 and UL 514B.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
  - a. AFC Cable Systems; a part of Atkore International.
  - b. Allied Tube & Conduit; a part of Atkore International.
  - c. O-Z/Gedney; a brand of Emerson Industrial Automation.
  - d. Thomas & Betts Corporation; A Member of the ABB Group.
  - e. Wheatland Tube Company.
  
2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Fittings, General: Listed and labeled for type of conduit, location, and use.
4. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
5. Fittings for EMT:
  - a. Material: Steel.
  - b. Type: compression.
  
- C. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.2 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Crouse-Hinds, an Eaton business.
  2. EGS/Appleton Electric.
  3. Hoffman; a brand of Pentair Equipment Protection.
  4. Hubbell Incorporated; Wiring Device-Kellems.
  5. O-Z/Gedney; a brand of Emerson Industrial Automation.
  6. RACO; Hubbell.
  7. Spring City Electrical Manufacturing Company.
  8. Thomas & Betts Corporation; A Member of the ABB Group.
  
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
  
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
  
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
  
- E. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- J. Gangable boxes are prohibited.

### 2.3 SURFACE RACEWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Panduit Corp.
  - 2. Wiremold / Legrand.
  - 3. Hubbell Incorporated; Wiring Device-Kellems; Hubbell Surface Metal Raceway
- B. Listing and Labeling: Surface raceways shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
  - 1. Exposed Conduit: GRC.
  - 2. Concealed Conduit, Aboveground: GRC.
  - 3. Underground Conduit: Refer to drawing details.
  - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated.
  - 1. Exposed, Not Subject to Physical Damage: MC.
  - 2. Concealed in Ceilings and Interior Walls and Partitions: MC.
  - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
  - 4. Damp or Wet Locations: GRC.
  - 5. Boxes and Enclosures: NEMA 250, Type 1.



- C. Minimum Raceway Size: 1/2-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
  - 1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  - 2. EMT: Use steel compression fittings. Comply with NEMA FB 2.10.
  - 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Install surface raceways only where indicated on Drawings.

### 3.2 INSTALLATION

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. Install no more than the equivalent of three 90-degree bends in any conduit run except for communication or control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- J. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

- M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- P. Surface Raceways:
  - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
  - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- Q. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where an underground service raceway enters a building or structure.
  - 3. Conduit extending from interior to exterior of building.
  - 4. Conduit extending into pressurized duct and equipment.
  - 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
  - 6. Where otherwise required by NFPA 70.
- R. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
  - 1. Use LFMC in damp or wet locations.
- S. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.
- T. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.
- U. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

- V. Locate boxes so that cover or plate will not span different building finishes.
- W. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- X. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- Y. SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS
- Z. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

### 3.3 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

## SECTION 260923 - LIGHTING CONTROL DEVICES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Indoor occupancy sensors.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data

### PART 2 - PRODUCTS

#### 2.1 INDOOR OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide product by one of the following:
  - 1. Bryant Electric; a Hubbell company.
  - 2. Cooper Industries, Inc.
  - 3. Hubbell Building Automation, Inc.
  - 4. Leviton Mfg. Company Inc.
  - 5. Lightolier Controls.
  - 6. Lithonia Lighting; Acuity Lighting Group, Inc.
  - 7. Lutron Electronics Co., Inc.
  - 8. NSi Industries LLC; TORK Products.
  - 9. RAB Lighting.
  - 10. Sensor Switch, Inc.
  - 11. Square D; a brand of Schneider Electric.
  - 12. Watt Stopper.
- B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
  3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
  4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
  5. Mounting:
    - a. Sensor: Suitable for mounting in any position on a standard outlet box.
    - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
    - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
  6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
  7. Bypass Switch: Override the "on" function in case of sensor failure.
  8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.
- C. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.
  2. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
  3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.

## 2.2 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide by one of the following:
1. Bryant Electric; a Hubbell company.
  2. Cooper Industries, Inc.
  3. Hubbell Building Automation, Inc.
  4. Leviton Mfg. Company Inc.
  5. Lightolier Controls.
  6. Lithonia Lighting; Acuity Lighting Group, Inc.
  7. Lutron Electronics Co., Inc.
  8. NSi Industries LLC; TORK Products.
  9. RAB Lighting.
  10. Sensor Switch, Inc.
  11. Square D; a brand of Schneider Electric.
  12. Watt Stopper.

- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
  - 3. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent.
  
- C. Wall-Switch Sensor Tag WS1:
  - 1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 2100 sq. ft .
  - 2. Sensing Technology: Dual technology - PIR and ultrasonic.
  - 3. Switch Type: SP, manual "on," automatic "off."
  - 4. Voltage: Match the circuit voltage; dual-technology type.
  - 5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
  - 6. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
  - 7. Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.
  - 8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

## 2.3 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.
  
- B. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
  - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
  
- C. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

- D. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

### 3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Lighting control devices will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 260923

## SECTION 262726 - WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Standard-grade receptacles, 125 V, 20 A.
2. GFCI receptacles, 125 V, 20 A.
3. Toggle switches, 120/277 V, 20 A.
4. Decorator-style devices, 20 A.
5. Wall plates.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: Upon request for architect, provide one for each type of device and wall plate specified, in each color specified.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

### PART 2 - PRODUCTS

#### 2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Comply with NFPA 70.
- C. RoHS compliant.
- D. Comply with NEMA WD 1.
- E. Device Color:
  1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
- F. Wall Plate Color: For plastic covers, match device color.



- G. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

## 2.2 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

### A. Duplex Receptacles, 125 V, 20 A :

1. Manufacturers: Subject to compliance with requirements, products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
  - d. Pass & Seymour/Legrand (Pass & Seymour).
2. Description: Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 and FS W-C-596.

## 2.3 GFCI RECEPTACLES, 125 V, 20 A

### A. Duplex GFCI Receptacles, 125 V, 20 A

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
  - d. Pass & Seymour/Legrand (Pass & Seymour).
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

## 2.4 TOGGLE SWITCHES, 120/277 V, 20 A

### A. Single-Pole Switches, 120/277 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
  - d. Pass & Seymour/Legrand (Pass & Seymour).
2. Standards: Comply with UL 20 and FS W-S-896.

### B. Three-Way Switches, 120/277 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
  - d. Pass & Seymour/Legrand (Pass & Seymour).
2. Comply with UL 20 and FS W-S-896.

## 2.5 WALL PLATES

- A. Single Source: Obtain wall plates from same manufacturer of wiring devices.
- B. Single and combination types shall match corresponding wiring devices.
  1. Plate-Securing Screws: Metal with head color to match plate finish.
  2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
  3. Material for Unfinished Spaces: Galvanized steel
- C. Wet-Location, Weatherproof, While-in-Use Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, thermoplastic] with lockable cover.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
  1. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  2. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  3. Install wiring devices after all wall preparation, including painting, is complete.
- C. Device Installation:
  1. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
  2. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- D. Receptacle Orientation:
  1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.

- E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

### 3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Test Instruments: Use instruments that comply with UL 1436.
  - 2. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Receptacles:
  - 1. Line Voltage: Acceptable range is 105 to 132 V.
- C. Wiring device will be considered defective if it does not pass tests and inspections.

END OF SECTION 262726

## SECTION 262816 - ENCLOSED SWITCHES

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

- A. Nonfusible switches.
- B. Enclosures.

#### 1.2 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
  - A. Enclosure types and details for types other than NEMA 250, Type 1.
  - B. Current and voltage ratings.
  - C. Short-circuit current ratings (interrupting and withstand, as appropriate).
  - D. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
- B. Shop Drawings: For enclosed switches and circuit breakers.
  - A. Include plans, elevations, sections, details, and attachments to other work.
  - B. Include wiring diagrams for power, signal, and control wiring.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Field quality-control reports.

## 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.
  - a. Manufacturer's written instructions for testing and adjusting enclosed switches

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
  - A. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

## 1.7 FIELD CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
  - A. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
  - B. Altitude: Not exceeding 6600 feet.

## 1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.
  - A. Warranty Period: One year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.

## 2.2 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - A. Eaton.
  - B. General Electric Company.
  - C. Siemens Industry, Inc., Energy Management Division.
  - D. Square D; by Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 30 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
  - A. Equipment Ground Kit: Internally mounted and labeled for copper ground conductors.

## 2.3 ENCLOSURES

- A. Enclosed Switches: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
- B. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1) and gray baked enamel paint, electrodeposited on cleaned, phosphatized galvanized steel (NEMA 250 Types 3R).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - A. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

### 3.2 PREPARATION

- A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
  - A. Notify Construction Manager no fewer than five working days in advance of proposed interruption of electric service.

- B. Indicate method of providing temporary electric service.
- C. Do not proceed with interruption of electric service without Construction Manager's written permission.
- D. Comply with NFPA 70E.

### 3.3 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
  - A. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
  - B. Outdoor Locations: NEMA 250, Type 3R.

### 3.4 INSTALLATION

- A. Coordinate layout and installation of switches, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Install individual wall-mounted switches with tops at uniform height unless otherwise indicated.
- C. Comply with NFPA 70 and NECA 1.

### 3.5 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
- B. Label each enclosure with engraved metal or laminated-plastic nameplate.

### 3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections with the assistance of a factory-authorized service representative.
- B. Tests and Inspections for Switches:
  - A. Visual and Mechanical Inspection:
    - a. Inspect physical and mechanical condition.
    - b. Inspect anchorage, alignment, grounding, and clearances.
    - c. Verify that the unit is clean.
    - d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
    - e. Verify that each fuse has adequate mechanical support and contact integrity.
    - f. Verify correct phase barrier installation.
    - g. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

- C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

### 3.7 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816



## SECTION 262913.03 - MANUAL AND MAGNETIC MOTOR CONTROLLERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Manual motor controllers.
  - 2. Enclosures.
  - 3. Identification.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

#### 1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
  - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- 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 use.
- B. UL Compliance: Fabricate and label magnetic motor controllers to comply with UL 508 and UL 60947-4-1.
- C. NEMA Compliance: Fabricate motor controllers to comply with ICS 2.

#### 2.2 MANUAL MOTOR CONTROLLERS

- A. Motor-Starting Switches (MSS): "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off or on.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton.
  - b. General Electric Company.
  - c. Siemens Industry, Inc., Energy Management Division.
  - d. Square D; by Schneider Electric.
2. Standard: Comply with NEMA ICS 2, general purpose, Class A.
3. Configuration: Nonreversing.
4. Surface mounting.

### 2.3 ENCLOSURES

- A. Comply with NEMA 250, type designations as indicated on Drawings, complying with environmental conditions at installed location.
- B. The construction of the enclosures shall comply with NEMA ICS 6.

### 2.4 IDENTIFICATION

- A. Controller Nameplates: Baked enamel signs for each compartment, mounted with corrosion-resistant screws.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Wall-Mounted Controllers: Install magnetic controllers on walls with tops at uniform height indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems" unless otherwise indicated.
- C. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.

### 3.2 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

B. Tests and Inspections:

1. Comply with the provisions of NFPA 70B, "Testing and Test Methods" Chapter.
  2. Visual and Mechanical Inspection:
    - a. Compare equipment nameplate data with drawings and specifications.
    - b. Inspect physical and mechanical condition.
    - c. Inspect anchorage, alignment, and grounding.
    - d. Verify the unit is clean.
    - e. Inspect contactors:
      - 1) Verify mechanical operation.
      - 2) Verify contact gap, wipe, alignment, and pressure are according to manufacturer's published data.
    - f. Motor-Running Protection:
      - 1) Verify overload element rating is correct for its application.
      - 2) If motor-running protection is provided by fuses, verify correct fuse rating.
- C. Motor controller will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 262913.03

## SECTION 265119 - LED INTERIOR LIGHTING

### PART 1 - 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. Interior solid-state luminaires that use LED technology.
  - 2. Lighting fixture supports.

#### 1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Arrange in order of luminaire designation.
  - 2. Include data on features, accessories, and finishes.
  - 3. Include physical description and dimensions of luminaires.
  - 4. Include emergency lighting units, including batteries and chargers.
  - 5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
  - 6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps and accessories identical to those indicated for the lighting fixture as applied in this Project. IES LM-79 and IES LM-80.

- a. **Manufacturers' Certified Data:** Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products. (Provide electronic IES photometric files if requested.)
  - b. **Testing Agency Certified Data:** For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
- B. **Shop Drawings:** For nonstandard or custom luminaires.
  - 1. Include plans, elevations, sections, and mounting and attachment details.
  - 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- C. **Samples:** If requested, for each luminaire and for each color and texture with standard factory-applied finish.
- D. **Product Schedule:** Use same designations indicated on Drawings.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. **Qualification Data:** For testing laboratory providing photometric data for luminaires.
- B. **Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.**
- C. **Product Certificates:** For each type of luminaire.
- D. **Product Test Reports:** For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.
- E. **Sample warranty.**

#### 1.6 CLOSEOUT SUBMITTALS

- A. **Operation and Maintenance Data:** For luminaires and lighting systems to include in operation and maintenance manuals.
  - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

#### 1.7 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. **Lamps:** Ten for every 100 of each type and rating installed. Furnish at least one of each type.

2. Diffusers and Lenses: Five for every 100 of each type and rating installed. Furnish at least one of each type.
3. Globes and Guards: Two for every 20 of each type and rating installed. Furnish at least one of each type.

#### 1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.
- C. Provide luminaires from a single manufacturer for each luminaire type.
- D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

#### 1.10 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five year(s) from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 LUMINAIRE REQUIREMENTS

- 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. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- D. Recessed Fixtures: Comply with NEMA LE 4.

- E. Bulb shape complying with ANSI C79.1.
- F. Lamp base complying with ANSI C81.61 or IEC 60061-1.
- G. CRI of 80. CCT of 4100 K.
- H. Rated lamp life of 50,000 hours.
- I. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- J. Internal driver.
- K. Nominal Operating Voltage: 120 V ac.
  - 1. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

## 2.2 MATERIALS

- A. Metal Parts:
  - 1. Free of burrs and sharp corners and edges.
  - 2. Sheet metal components shall be steel unless otherwise indicated.
  - 3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- C. Diffusers and Globes:
  - 1. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 2. Glass: Annealed crystal glass unless otherwise indicated.
  - 3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
- D. Housings:
  - 1. Extruded-aluminum or sheet metal housing as required for fixture type specified and heat sink.
  - 2. Anodized powder-coat finish.
- E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp characteristics:
    - a. "USE ONLY" and include specific lamp type.
    - b. Lamp diameter, shape, size, wattage, and coating.
    - c. CCT and CRI for all luminaires.

## 2.3 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

## 2.4 LUMINAIRE FIXTURE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).
- D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before fixture installation. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

### 3.3 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:



1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaire Support:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

G. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
3. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
4. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

I. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

### 3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

### 3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
  2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION 265119

## SECTION 265219 - EMERGENCY AND EXIT LIGHTING

### 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. Emergency lighting units.
  - 2. Exit signs.
  - 3. Luminaire supports.

#### 1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Emergency Lighting Unit: A lighting unit with internal or external emergency battery powered supply and the means for controlling and charging the battery and unit operation.
- D. Fixture: See "Luminaire" Paragraph.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of emergency lighting unit, exit sign, and emergency lighting support.
  - 1. Include data on features, accessories, and finishes.
  - 2. Include physical description of the unit and dimensions.
  - 3. Battery and charger for light units.
  - 4. Include life, output of luminaire (lumens, CCT, and CRI), and energy-efficiency data.
  - 5. Include photometric data and adjustment factors based on laboratory tests, complying with IES LM-45, for each luminaire type.

- a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Shop Drawings: For nonstandard or custom luminaires.
  - 1. Include plans, elevations, sections, and mounting and attachment details.
  - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule:
  - 1. For emergency lighting units. Use same designations indicated on Drawings.
  - 2. For exit signs. Use same designations indicated on Drawings.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of luminaire.
- B. Sample Warranty: For manufacturer's warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in emergency, operation, and maintenance manuals.
  - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

#### 1.7 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. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
  - 2. Luminaire-mounted, emergency battery pack: One for every 20 emergency lighting units. Furnish at least one of each type.
  - 3. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
  - 4. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

## 1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

## 1.10 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two year(s) from date of Substantial Completion.
- B. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period for Emergency Power Unit Batteries: Five years from date of Substantial Completion. Full warranty shall apply for the entire warranty period.
  - 2. Warranty Period for Self-Powered Exit Sign Batteries: Five years from date of Substantial Completion. Full warranty shall apply for the entire warranty period.

## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING

- 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. NRTL Compliance: Fabricate and label emergency lighting units, exit signs, and batteries to comply with UL 924.
- C. Comply with NFPA 70 and NFPA 101.
- D. Comply with NEMA LE 4 for recessed luminaires.

### 2.2 EMERGENCY LIGHTING

- A. General Requirements for Emergency Lighting Units: Self-contained units.
- B. Emergency Lighting Unit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Cooper Lighting, an Eaton business.
  - b. HE Williams.
  - c. Lithonia Lighting; Acuity Brands Lighting, Inc.
2. Emergency Lighting Unit: as indicated on Drawings.
3. Operating at nominal voltage of 120 V ac.
4. Wall with universal junction box adaptor.
5. UV stable thermoplastic housing.
6. Two LED lamp heads.
7. Internal emergency power unit.

## 2.3 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Cooper Lighting, an Eaton business.
    - b. HE Williams.
    - c. Lithonia Lighting; Acuity Brands Lighting, Inc.
  2. Operating at nominal voltage of 120 V ac.
  3. Lamps for AC Operation: LEDs; 50,000 hours minimum rated lamp life.
  4. Self-Powered Exit Signs (Battery Type): Internal emergency power unit.

## 2.4 MATERIALS

- A. Metal Parts:
  1. Free of burrs and sharp corners and edges.
  2. Sheet metal components shall be steel unless otherwise indicated.
  3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access:
  1. Smooth operating, free of light leakage under operating conditions.
  2. Designed to permit relamping without use of tools.
  3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- C. Diffusers and Globes:
  1. Prismatic acrylic.

2. Acrylic: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

D. Housings:

1. Extruded aluminum housing and heat sink.
2. Clear finish.

E. Conduit: Electrical metallic tubing, minimum 3/4 inch in diameter.

## 2.5 METAL FINISHES

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.6 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of luminaires.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Examine walls, floors, roofs, and ceilings for suitable conditions where emergency lighting luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Supports:
  1. Sized and rated for luminaire and emergency power unit weight.
  2. Able to maintain luminaire position when testing emergency power unit.

3. Provide support for luminaire and emergency power unit without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire and emergency power unit weight and vertical force of 400 percent of luminaire weight.

D. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls or attached using through bolts and backing plates on either side of wall.
2. Do not attach luminaires directly to gypsum board.

E. Ceiling Grid Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure emergency power unit using approved fasteners in a minimum of four locations, spaced near corners of emergency power unit.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

### 3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:

1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

- B. Luminaire will be considered defective if it does not pass operation tests and inspections.

- C. Prepare test and inspection reports.

### 3.5 STARTUP SERVICE

- A. Perform startup service:

1. Charge batteries minimum of one hour and depress switch to conduct short-duration test.
2. Charge batteries minimum of 24 hours and conduct one-hour discharge test.

### 3.6 ADJUSTING

- A. Adjustments: Within 12 months of date of Substantial Completion, provide on-site visit to do the following:



1. Inspect all luminaires. Replace lamps, batteries, signs, or luminaires that are defective.
  - a. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
2. Conduct short-duration tests on all emergency lighting.

END OF SECTION 265219