NOVEMBER 2015

SPECIFICATIONS

FOR

OAKLAND ARTCC ADMIN WING BASEMENT RESTROOM MODIFICATIONS

ZOA ARTCC

FREMONT, CALIFORNIA

Prepared by: Federal Aviation Administration
ATO Enroute Engineering Services
Western Service Area (AJW-2W12C)

TABLE OF CONTENTS

SECTION 010000

SUMMARY OF WORK

PART 1 – GENERAL

1-1 PROJECT LOCATION

ZOA ARTCC (Oakland ARTCC)
5125 Central Ave.
Fremont, CA94536

1-1.1 Work Covered by Contract Documents – These specifications together with the referenced specifications, standards, and drawings specified in the contact documents cover the requirements for all work associated with the ZOA ARTCC Administration Building Basement Restrooms Renovation of the ZOA ARTCC facility. All work must be coordinated in order to allow continued operations in the facility. The total contract duration for all work shall be **60 calendar days**. Prospective offerors are required to perform a site visit to assess the actual conditions. The site visit is not mandatory, but **HIGHLY ENCOURAGED** so that the offeror can get an accurate estimate and get a firm grasp of the specifics of the project.

1-2 SCOPE OF WORK

1-2.2 ARTCC Buildings -. These specifications, together with the referenced specifications, standards, design data, and drawings specified in the contract documents, cover the requirements for all work associated with the renovation of the Admin Building Restooms for Mens and Womens in the basement. It shall meet the ABA/ADA (American Barriers Act and American Disabilities Act).

This project will renovate the existing Rooms B105 and B106 (Mens Restroom) to meet the ABA/ADA requirements for Federal facilities at the ZOA ARTCC facility. In addition, there is work in the Janitor's Closet (Room B132). The existing rooms B105 and B106 have some asbestos and lead materials which are outlined in the project drawings. Work includes:

1. Removal and disposal of the portions of the concrete wall, doors and frames, janitors sink, portions of the concrete floor slab, plumbing and waste fixtures and piping, plaster ceiling for both B105, B106, lights, floor tiles, wall boards, tiles, portions of the exhaust/HVAC system and ACM materials for floor tile, baseboard mastic, and TSI fittings, as well as lead-based paint.

2. Installation of new portions of the concrete floor that will be removed, CMU wall to seal the gap between both rooms, new Metal doors, new ceiling, bathroom fixtures and accessories, piping, new janitor's service sink, janitor's floor tile, ABA/ADA signages, metal plank over the ceiling to facilitate service of valves and other above the ceiling items in the air plenum.

3. Contractor shall take all measures to ensure that existing Restrooms 1024 (Big Blue) and 1024A (Big Pink) remained operational throughout with minor outages during the

disconnection to the main sewer and vent lines as well as reconnection. Other than these two short periods of time the two major restrooms must be open since they have a major effect on operations of the facility.

4. Contractor shall ensure that the functions of the Janitor's Closet (B-132) are fully operational throughout the project. All functions shall be temporarily provided during the closure of the Closet until the renovation of the Closet is complete.

All work must be coordinated in order to maintain an operational facility. The total contract duration for completion of all work shall be **60 calendar days**, excluding the following FAA Holiday Moratorium.

FAA Holiday Moratorium: No work shall be scheduled or take place during the week of and the weekend preceding the following: the Thanksgiving, Christmas and New Year's Holidays. Only emergency work to restore critical services to the facility will be considered and a moratorium waiver must be submitted and approved. The moratorium period will not be counted against the contract construction duration for the project.

1-3 INTENT OF SPECIFICATIONS

A. This specification identifies all labor and equipment to perform the work required to construct the facility. All work performed and all materials and equipment used shall be approved by the Contracting Officer (CO) and/or the Contractors Officer's Representative (COR). This shall include, but not be limited to inspection, scheduling, reporting, and submittals.

A. Title - Titles to division and sections of the specifications and notes and titles on drawings referring to subcontractors, division of work by trade, or type of work, are introduced merely for convenience in reading the specifications and drawings and do not imply any separate contractual arrangements of work assignments. Such separations into titled divisions and sections shall not operate to make the Government an arbiter to establish subcontract limits between the contractor and subcontractors, or between the subcontractors themselves.

1-4 CONTRACT DOCUMENTS

A. The construction of this facility shall be in accordance with the lines and grades shown on the drawings. The contractor shall not use dimensions scaled from drawings. All dimensions shown on the drawings shall be verified by the contractor by actual measurements in the field. Any discrepancies between the drawings and specifications and the existing conditions shall be referred to the CO for adjustment before any work affected is performed.
Contractor shall field verify all project and contract items prior to any work, ordering of materials, and installation work.

1-6 CONTRACTING OFFICER

A. The term "Contracting Officer" (CO) as used herein denotes the person designated to act on behalf of the Government in the performance of this contract. Where reference is made to "Federal Aviation Administration" (FAA), "Contracting Officer's

Representative" (COR), or the like, this shall mean the Contracting Officer or his/her authorized representative.

1.10 KNOWN ACCEPTABLE SOURCES

The use of the term "Known Acceptable Sources" and "Brand Name or Equal" in referencing a specific product or manufacturer is not intended to indicate a preference for the products mentioned, but indicates the quality and characteristics of products that will meet the Governments requirements. Should the contractor decide to use a product other than that identified as a "Known Acceptable Source" or "Brand Name or Equal", the Contractor shall provide a submittal for this product. This does not relieve the Contractor from providing submittals for products or materials required in other sections of this specification.

1.12 FACILITY SHUTDOWN AND CUTOVERS

Not Applicable.

1.13 AS-BUILT DRAWINGS

The Contractor shall maintain at the job site two sets of full-size contract drawings marked to show any deviations which have been made from the contract drawings, including buried and concealed construction and utility features revealed during the course of construction. These drawings shall be available for review by the Contracting Officer at all times. Upon completion of the work, deliver the marked sets of prints to the Contracting Officer. Requests for partial payments will not be approved if the marked prints are not current, and request for final payment will not be approved until the marked prints are delivered to the Contracting Officer.

1.14 PROJECT SAFETY PLAN

A. Safety Plan: The contractor must submit to the Contracting Officer fifteen **(15)** days after award of contract an Accident Prevention/Safety Plan. The plan shall be accepted by the Contracting Officer prior to start of work. The plan shall be **project site specific** and contain as a minimum the following major elements:

   a. Management commitment and employee involvement,
   b. Work site analysis
   c. Hazard prevention and control
   d. Fall protection
   e. Safety and health training
   f. Construction safety checklist
   g. Emergency preparedness and procedures
   h. Accident investigation forms.

B. Hazcom Plan: The Contractor shall provide a project site specific HAZCOM Plan to the COR prior to commencing site work. The HAZCOM plan shall be prepared in accordance with 29 CFR, Part 1910.1200 - Federal Hazard Communications [HAZCOM] Standard. As a minimum, the plan shall contain the following:

   1. Provide a name for the responsible HAZCOM person.
   2. Provide the name of the person responsible for updating the MSDS's.

3. Provide the name of the person responsible for "LABELING" all material on site.
4. Provide the name of the person responsible for training employees.
5. Provide the name of the person responsible for the Contingency Plan.
6. Provide the name of the person responsible of disseminating information to the FAA HAZCOM Point of Contact within 24 hours.
7. Provide the training and records of employees trained in HAZCOM.
8. Provide an MSDS for each and all chemicals brought on site.
9. Written procedures for the introduction of unanticipated chemicals at the job site.

C. Pre-Construction Safety Meeting and Checklist: Prior to start of work on the project, the Contractor shall meet with the COR and representatives from the facility to review safety procedures, project hazards and risk analysis, and safety and health requirements. **FAA Form 3900-18, FAA Pre-Construction and Maintenance Project Safety and Health Checklist (See Appendix 1)**, will be filled out, and all parties shall sign the form to document discussion of the items on the form.

D. Ventilation: Furnish, install, and maintain temporary ventilation and other controls as required to prevent hazardous or objectionable accumulations of dust, fumes, mists, vapors, or gases in areas occupied during construction.

Pre-Construction
Environmental and Occupational Safety and Health Checklist

INSTRUCTIONS FOR COMPLETING FAA FORM 3900-18

Section A. Purpose. FAA Form 3900-18, Pre-Construction Environmental and Occupational Safety and Health (EOSH) Checklist, is intended to be used to review construction, installation, and maintenance activities involving construction prior to commencement of work that potentially has EOSH impacts on NAS operations and employees. The organization that directly manages the construction project is responsible for completing the checklist. They shall coordinate with the appropriate District Office prior to commencement of the project. Actual work on the project (i.e., construction) may not be initiated prior to completion and review of the checklist. The form must be used, as appropriate, during critical phases of the work (e.g., during a mandatory pre-construction meeting). Emphasis should be placed on using this checklist as a tool to assess as well as reassess hazards as the work progresses.

1. Responsibilities: Responsibility for submitting the checklist may fall on several individuals depending on the work being performed.

a. For example, the District Office Manager will be responsible for District Office projects.

b. The engineer for Engineering Services projects.

c. The FMP manager for Field Maintenance Program (FMP) projects.

d. For turnkey projects managed by Headquarters organizations, the Headquarters program office will be responsible for submitting the checklist.

Section B. Work Summary Information. The individual/organization initiating the checklist will complete this portion of the checklist.

1. District Office: Name of the District Office.

2. Work Location: City, State, Airport, building, room within building.

3. Facility: Facility type, associated runway, facility ID.

4. Work Description: Provide a concise statement as to the nature of the work to be accomplished. Example: Asbestos abatement of the control room attic.

5. Originator of Work: This is the individual/organization responsible for initiating the work (e.g., project engineer, senior engineer, technical support office).

6. Planned Start Date: Provide the expected start date of the work.

7. Expected Completion Date: Provide the expected completion date of the work.

8. Contractor Contact: Provide the name and telephone/pager number for a contractor representative who has the authority to make decisions and implement stop work/change orders. If the work is being accomplished by an FAA employee(s) or FAA contract employee(s), provide the name, organization, and telephone/pager number of the on-site lead (e.g., work order carrier, etc.).

9. Project/Design Representative: Provide the name for the designer of the work (e.g., Engineering Services project engineer, District Office engineer, Headquarters program manager for turnkey projects).

10. COTR/Specialist: Provide the name, organization, and telephone/pager number of the on-site lead (e.g., COTR, work order carrier).

11. District Office EOSH Contact: Provide the name and telephone/pager number of the person responsible for the occupational safety and health/environmental program for the District Office (e.g., SECM, District Office OSH Professional).

12. Facility Representative: Provide the name and telephone number for an ATO representative at the facility who has the authority to make decisions for facility management.

Section C. Evaluation: The District Office Manager or designee will determine whether the work will have a potential EOSH impact to NAS operations. The District Office Manager or designee must sign and date this section. If there is an impact (yes), complete the checklist. If there is no impact, proceed to Section I, Distribution of Copies, for distribution only.

Section D. Facility Procedures: The individuals/organization performing the work, and their contractors, along with the facility POC, must review all applicable facility specific procedures and plans.

1. Asbestos Contingency Plan: Determine the responsibilities of the personnel doing the work in the event of an incident that requires implementation of the asbestos contingency plan.

2. Hazard Communications: The personnel performing the work must be made familiar with the facility hazard communication program. Information such as material safety data sheets (MSDS) must be shared between the facility and the personnel performing the work.

3. Lockout/Tagout (LOTO): The work must be performed in accordance with the facility LOTO program. Determine if the facility LOTO procedures require equipment to be locked out/tagged out by an FAA technician, or if the personnel performing the work will be allowed to LOTO the equipment.

4. Energized Work Permits: Applicable FAA facility, District Office, or regional energized work permits must be submitted by the individuals/organization performing the work, signed and posted at the work site. General note: All work permits should be included in this document (e.g., hot work permit, welding, cutting, brazing).

5. Emergency Plans: Describe the responsibilities, including the points of contact, in the event of an incident that requires implementation of the facility Occupant Emergency Plan.

6. Impacts to Fire Alarm and Suppression Systems: Identify the Fire Alarm and Suppression System and instructions to avoid unintentional impact to it. If the work involves intentional impact to the Fire Alarm and Suppression System, determine what coordination has to be done to ensure no disruption of the NAS. Determine what interim life safety measures will be required during the project.

7. Confined Space Entry: Describe the facility procedures used in and around confined spaces. In addition, describe specific procedures for permit-required confined space in and around where the work will take place.

8. Work at Heights: Describe procedures for working at elevated surfaces (catwalks, towers, roofs) that may require fall protection procedures or equipment.

9. Restricted Areas Due to OSH Concerns: Describe those areas of the facility that have restricted access due to safety and health hazards (e.g., asbestos regulated areas, noise).

10. Bloodborne Pathogens: Describe the facility procedures for dealing with emergency first aid situations and other trauma situations.

11. Other: The personnel performing the work should be made familiar with other facility programs, procedures, and requirements.

Section E. Activity Hazard: The individuals/organization performing the work, and their contractors, along with the facility POC, must identify potential OSH hazards that may be encountered during the accomplishment of the work. Determine the possibility of causing disruption of NAS operations.

Pre-Construction
Environmental and Occupational Safety and Health Checklist

1. Asbestos: Determine if known or assumed asbestos containing material will be impacted by this work.

2. Chemical, Gas, Fumes, Dust, Radiation: Determine if any products or methods will be used that may cause odors or vapors (from chemicals volatizing or biological agents), fumes (from welding or burning), excessive dust (e.g., sanding, grinding), or radiation (e.g., heat sources, light sources such as lasers, ionizing radiation sources such as X-ray equipment).

3. Storage of Hazardous Materials: Determine if substances that exist at the facility may be impacted and what substances may be brought into the facility, which may have an impact on the facility and/or occupants.

4. Impact on HVAC System: Determine whether the environmental control elements of the facility may be impacted by the accomplishment of the work.

5. Equipment Removal/Installations: Determine if work activities will cause disturbance of excessive dust, e.g. disturbance of equipment, which has been in place for a long time.

6. Fire Protection: Determine if work activities will impact fire protection systems and procedures at the facility (e.g., blocking egress, removing fire stopping, impacting fire rated barriers).

7. Impact to Integrity of Fire Alarm/Suppression System: Identify the Fire Alarm and Suppression System and instructions to avoid unintentional impact to it. If the work involves intentional impact to the Fire Alarm and Suppression System, determine what coordination has to be done to ensure no disruption of the NAS. Determine what interim life safety measures will be required during the project.

8. Lead Exposure: Determine if activities will expose FAA/contract employees to lead dust, lead fumes or other exposure to lead from known or assumed lead containing material during the construction project.

9. Electrical Safety: Determine if work activities will expose FAA employees to electrical safety hazards (e.g., open electrical panel doors, exposed energized conductors, energized work).

10. Noise: Determine if work activities will expose FAA employees to excessive noise.

11. Walking Working Surfaces: Determine if work activities will expose FAA employees to tripping, slip and fall hazards, e.g. open panels in a raised floor, uneven floors, raised or loose carpeting, stairs, wet floors, etc.

12. Work Above Equipment/People: Determine if work activities will expose FAA employees to objects dropped from above.

13. Water Quality/Sanitation: Determine if work activities may cut off or contaminate the facility's potable water system.

14. Cranes/Rigging/Hoisting: Determine if work activities will expose FAA employees to hazards associated with rigging, hoisting and cranes.

15. Lighting: Determine if work activities will create insufficient lighting for FAA employees.

16. Machinery and Mechanized Equipment: Determine if work activities may expose FAA employees to hazards such as being struck by, caught in, or injured by machinery and mechanized equipment.

17. Excavation: Determine if work activities performed near facilities may cause catastrophic failure of a NAS facility.

18. Other: Other work activities that may impact NAS operations and employees.

Section F. Site Safety and Health - Controls. Ensure that measures and controls to address applicable site safety and health risks (e.g., through discussions, available site safety plans, or other applicable documents)

have been identified. If a hazard has been identified in Section E, Activity Hazard, briefly describe the controls to be used.

1. Identify issues/hazards in Section E, Activity Hazard.

2. "Has this been addressed in the site safety plan?" – The purpose of this column is to review the site safety plan for the work with regard to any hazards identified in Section E, Activity Hazard.

3. "Description of Controls" – The purpose of this column is to very briefly describe the controls in place for addressing each hazard.

Section G. Site Walk-Through: Following review of all applicable facility procedures, activity hazards and applicable control measures, the personnel performing the work must participate in a walk-through of the area of the facility where the work will be accomplished, led by a facility representative. The purpose of the walk-through is to allow the personnel performing the work to be introduced to the facility and the potential hazards as referenced in Sections E and F. It also allows the personnel performing the work to become familiar with the facility with respect to the work being done and awareness of the method of implementation of the various emergency plans. The time, date, and personnel present for the walk-through must be recorded in Section G.

Section H. Review Information. This form should be reviewed by those individuals identified below, as appropriate, during design of the project, during pre-bid conferences, prior to the beginning of work (preferably at or prior to the pre-construction conference) and periodically throughout the completion of the project.

1. Originator: This is the individual/organization responsible for initiating the work (e.g., project engineer, senior engineer, technical support office) or the organization directly managing the day-to-day activities in the construction project.

2. Contractor/Installation Crew Lead/Specialist: These are the individuals performing the work who have the authority to make decisions and implement stop work/change orders. If the work is being accomplished by an FAA employee or an FAA contract employee, the employee should sign the form and provide a routing symbol and platform title.

3. District Office Manager or designee: This person must be the District Office Manager or designee. The designee may be the Contracting Officer's Technical Representative, SSC Manager, or other party.

Section I. Distribution of Copies: The form must be signed and copies forwarded to the individuals identified below.

1. District Office Manager.

2. SECM (Safety and Environmental Compliance Manager) or District Office EOSH Professional.

3. Engineering Services EOSH (Environmental and Occupational Safety and Health) Coordinator.

4. Engineering Services Manager.

5. Engineering Services Project Engineer.

6. Contracting Officer.

Pre-Construction
Environmental and Occupational Safety and Health Checklist

Section A. Purpose

This checklist is intended to review construction, installation and non-routine maintenance activities, prior to commencement, that potentially have occupational safety and health related impacts on NAS operations and employees. This tool must be used, as appropriate, during critical phases of the work (e.g., the pre-construction meeting, prior to commencement of work, etc.). Emphasis should be placed on using this checklist as a tool to assess as well as reassess hazards as the work progresses.

Section B. Work Summary Information

The purpose of this section is to provide a brief description of the construction project and/or specific maintenance tasks, and identify key personnel responsible for project completion. Fill in the requested site-specific information. Indicate if this work will occur in or adjacent to an occupied space (e.g., equipment room, ATCT cab, etc.). Note: Provide further explanation of activities on additional sheets if necessary.

1. District Office: _____
2. Work Location: _____
3. Facility: _____
4. Work Description: _____

   _____

   _____
5. Planned Start Date: _____
6. Expected Completion Date: _____
7. Contractor Contact: Name: _____ Phone: _____
8. Project/Design Representative: Name: _____ Phone: _____
9. COTR/Specialist: Name: _____ Phone: _____
10. District Office OSH Contact: Name: _____ Phone: _____
11. Facility Representative: Name: _____ Phone: _____

Section C. Evaluation

The purpose of this section is for the District Office Manager or designee (e.g., SSC Manager or other frontline manager) to determine if there is a potential safety and health impact to NAS operations from the construction and/or specific maintenance project based on the information provided in Section B. The sections below describing potential impacts to NAS operations are to be completed by the organization managing the construction project or large-scale maintenance task. The District Office Manager or designee must sign and date below. If there is no impact, proceed to Section I.

Is there a potential safety and health hazard that will impact NAS operations?

☐ Yes

☐ No

(Checklist to be returned to the organization managing the construction project for completion.)

_____
Name (typed or printed)

_____
Signature

_____
Date

Section D. Facility Procedures

Review site-specific FAA procedures and considerations with the contractor/installer/specialist. For example, discuss when or how during the work, emergency plans will be required and/or used .

Facility Procedures	Reviewed?		Notes
	Yes	N/A	
1. Asbestos Contingency Plan	☐	☐	
2. Hazard Communications (e.g. MSDSs)	☐	☐	
3. Lockout/Tagout	☐	☐	
4. Work Permits (e.g., Asbestos, Lead, Hot Work)	☐	☐	
5. Emergency Plans (e.g., Occupant Emergency Plan)	☐	☐	
6. Impacts to Fire Alarm and Suppression Systems	☐	☐	
7. Confined Space Entry	☐	☐	
8. Work at Heights	☐	☐	
9. Restricted Areas Due to OSH Concerns	☐	☐	
10. First Aid/Bloodborne Pathogens	☐	☐	
11. Other	☐	☐	

NOTE: Think about your work and its potential hazards. Consider sensitive NAS operations and all facility personnel that may be impacted by your work. As an example, construction activities with potential for impacting asbestos materials in or near sensitive operations could result in incidents that may disrupt NAS operations.

Section E. Activity Hazard

Note: Provide further explanation of potential hazards, locations, etc. below and attach additional sheets if necessary.

Potential Hazardous Exposures and/or Activities ***Consider Sensitive NAS Operations:***	Potential for Exposure/Release/ Incident		Description of Hazard
	Yes	No	
1. Asbestos (e.g., tiles & insulation)	☐	☐	
2. Chemical, Gases, Fumes, Vapors, Mist, Dust, Radiation	☐	☐	
a. Painting/Solvent/Adhesive/Sealant	☐	☐	
b. Grinding/Sanding/Cutting/Welding/Soldering	☐	☐	
c. Indoor Air Quality Control (e.g., biological agents, mold, odors, CO_2)	☐	☐	
3. Storage of Hazardous Materials (e.g., flammables, compressed gas)	☐	☐	
4. Impact on HVAC System	☐	☐	
5. Equipment Removal/Installation	☐	☐	
6. Fire Protection (e.g. blocked egress, fire barrier penetration)	☐	☐	
7. Impact to Integrity of Fire Alarm/Suppression System(s)	☐	☐	
8. Lead Exposure (e.g., lead-based paint)	☐	☐	
9. Electrical Safety	☐	☐	
a. Work on Live Electrical Systems	☐	☐	
b. Temporary Wiring	☐	☐	
10. Noise	☐	☐	
11. Walking/Working Surfaces (e.g., tripping hazards, work at heights)	☐	☐	
12. Work Above Equipment/People	☐	☐	
13. Water Quality/Sanitation	☐	☐	
14. Cranes/Rigging/Hoisting	☐	☐	
15. Lighting	☐	☐	
16. Machinery and Mechanized Equipment (e.g., operator training and certification and equipment certification)	☐	☐	
17. Excavation	☐	☐	
18. Other	☐	☐	

Pre-Construction
Environmental and Occupational Safety and Health Checklist

Section F. Site Safety and Health - Controls

After reviewing the potential hazards in Section E, ensure that measures and controls to address applicable site safety and health risks (e.g., through discussions, available site safety plans, or other applicable documents) have been identified. If a hazard has been identified in Section E, briefly describe the controls to be used.

Note: Provide further explanation of controls below and attach additional sheets if necessary.

Potential Hazardous Exposures and/or Activities	Identified as a hazard in Section E?	Has this been addressed in site safety plan?	Description of Controls
1. Asbestos (e.g. tiles & insulation)	☐	No	
2. Chemical, Gases, Fumes, Vapors, Mist, Dust, Radiation	☐	No	
a. Painting/Solvent/Adhesive/Sealant	☐	No	
b. Grinding/Sanding/Cutting/Welding/Soldering	☐	No	
c. Indoor Air Quality Control (e.g., biological agents, odors, CO_2)	☐	No	
3. Storage of Hazardous Materials (e.g., flammables, compressed gas)	☐	No	
4. Impact on HVAC System	☐	No	
5. Equipment Removal/Installation	☐	No	
6. Fire Protection (e.g., blocked egress, fire barrier penetration)	☐	No	
7. Impact to Integrity of Fire Alarm/Suppression System(s)	☐	No	
8. Lead Exposure (e.g., lead-based paint)	☐	No	
9. Electrical Safety	☐	No	
a. Work on Live Electrical Systems	☐	No	
b. Temporary Wiring	☐	No	
10. Noise	☐	No	
11. Walking/Working Surfaces (e.g., work at heights, tripping hazards)	☐	No	
12. Work Above Equipment/People	☐	No	
13. Water Quality/Sanitation	☐	No	
14. Cranes/Rigging/Hoisting	☐	No	
15. Lighting	☐	No	
16. Machinery and Mechanized Equipment (e.g., operator training and certification and equipment certification)	☐	No	
17. Excavation	☐	No	
18. Other	☐	No	

Section G. Site Safety Walk-Through

Time/date of site walk-through with appropriate personnel (e.g., System Support Center Manager, SECM, District Office representative, contractor, COTR).

_____ _____
Time Date

Personnel

_____ _____
Name Organization

_____ _____
Name Organization

_____ _____
Name Organization

Pre-Construction
Environmental and Occupational Safety and Health Checklist

Section H. Review Information

The appropriate FAA point of contact and the contractor/installation crew lead/specialist sign below to document discussion of the items on this form.

Completed By:	**Date**
1. **Originator (Project Engineer or Resident Engineer):**	
_____	_____
2. **Contractor/Installation Crew Lead/Specialist, and company name:**	
_____	_____
Reviewed By:	**Date**
1. **District Office Manager or Designee:**	
_____	_____

Section I. Distribution of Copies

This form must be forwarded to the following:	**Name/Routing Symbol**
1. District Office Manager	
2. SECM/District Office OSH Professional	
3. Engineering Services EOSH Coordinator	
4. Engineering Services Manager	
5. Engineering Services Project Engineer	
6. Contracting Officer (if contractor resources perform the construction work)	

SECTION 010200

SITE ACCESS, CONSTRUCTION LIMITS, USE OF FACILITIES AND WORK HOURS

PART 1 – GENERAL

1.1 EXISTING FACILITY OPERATIONS. "**PRECAUTIONS"**

The ARTCC is a 24 hour, 7 day per week operating facility occupied by Air Traffic and Airway Facilities personnel. The Contractor shall perform all work in a manner which does not conflict with or adversely affect the air traffic operational environment or functions of the ARTCC. In the event of any actual or potential conflict, air traffic control activities shall have priority over all Contractor activities. The Contractor shall plan and schedule for all construction activity and coordinate with the Contracting Office's Representative (COR) and provide services in such a manner and at such times that will not disrupt facility operations, and shall conform to those procedures considered essential by the FAA for ensuring air traffic safety.

1.2 CONSTRUCTION LIMITS AND ACCESS

Access for the Contractor, Sub-contractors, employees, deliveries, etc., will be designated by the COR. NO CONTRACTOR OR CONTRACTOR DELIVERIES WILL BE ALLOWED TO OCCUR IN THE ABSENCE OF THE RE OR THE COR'S DESIGNATED REPRESENTATIVE ON SITE. The Contractor's presence on site and all contractor deliveries must be pre-arranged with the COR. No deliveries arriving outside of normal working hours and/or the presence of the contractor on site will be allowed unless as pre-arranged through the COR. The following requirements MUST be followed in order to obtain access to the facility site:

A. All persons entering or delivering to this federal facility must have valid government issued identification.

1. Valid issued government identification is:
   a) ID issued by the federal, state, county, or city government or by the military.
   b) Must have the persons legal name.
   c) Must have a unique ID number.
   d) Must have an expiration date.
   e) Must have a picture of the individual.
   f) Must have the name of the agency issuing it.
   (examples: state issued drivers license or IDs, passports, or military ID.)

B. CONTRACTORS MUST HAVE SUBMITTED, TO THE FAA, WORKERS OR OTHER COMPANY EMPLOYEES NAMES AND INFORMATION WHO THEY ARE REQUESTING ACCESS TO THE FACILITY AT LEAST 24 HOURS PRIOR TO ENTRY

C. Persons entering on to federal property are prohibited from having on their person or in their vehicle to include all visitor lots:

1. Weapons of any kind to include but not limited to:

a) Guns
b) Knifes with blades over 3 inches except for valid tools.
c) Projection devices, bow & arrows, paint ball weapons, blow guns etc.
d) Clubs, batons, collapsible batons, or saps.
e) Stun guns or tazers.
f) Chemical agents, mace, or pepper sprays.
g) Marshal arts weapons of any kind.

2. No alcohol containers permitted sealed or not.
3. No Federally illegal drugs, contraband or paraphernalia permitted.
4. No combination of disassembled items that look or appear that if assembled could make an incendiary explosive device.
5. All animals with the exception of a verified service animal is prohibited on the facility and will never be left in a vehicle on the facility.
6. All persons, vehicles, and property are subject to search at all times.
7. Family members, friends, children or minors not listed on the work contract will not be granted access.
8. Any person suspected of drinking alcohol or otherwise impaired prior to entering facility may be refused entrance at security guards discretion.

D. The contractor shall confine operations, activities, storage of materials and employee parking within the area, as designated by the COR. Additional space the contractor deems necessary shall be obtained off site, at no additional cost to the Government.

E. Access to the construction site shall be kept unobstructed. If temporary access obstruction is unavoidable, the contractor shall advise the COR immediately.

F. Temporary roadways and/or other access may be authorized only by the facility, via the COR.

G. Vehicles transporting materials shall not be loaded beyond the capacity prescribed by Federal, State or Local law.

H. Vehicles delivering materials shall not have any other project material loaded into/onto the vehicle except for the materials that will be left at the ARTCC job site.

I. No deliveries will be accepted or permitted on site from anyone who does not meet the required Government issued identification requirements listed in this specification section.

J. Obstruction of existing roadways, driveways, etc., to the ARTCC is strictly prohibited. Access to the loading dock and ramp shall be maintained.

K. Damage caused by the contractor's activities to existing paving, lawns, curbs, sidewalks, interior/exterior of the ARTCC Building shall be repaired. All costs of repairs shall be paid by the contractor. After notice to proceed and prior to the commencement of construction, the contractor and COR shall conduct joint inspections of the existing areas affected by the construction. Existing damage/defects shall be noted and will be used as the basis for determination of damages caused by the contractor's operations.

1.3 CONTRACTOR'S USE OF PREMISES

A. Contractor shall assume full responsibility for the protection and safekeeping of products stored on the site.

B. The contractor and his subcontractors shall maintain the job site in a neat and orderly condition. This includes the daily removal of rubbish, waste and tools, equipment and materials not required for the work in progress.

C. Concessionaires shall not be allowed on the grounds of the facility.

D. Use of Facilities:

All necessary water and power will be available at the site. The contractor shall conserve all utilities as much as practical. No contractor's welding or plasma cutting equipment may be powered using the FAA Facility Power Grid. Contractor shall provide temporary chemical toilets for use by construction personnel.
Storage: The contractor is responsible for storage of his materials. No storage facilities are available withing the building. The contractor may provide a temporary trailer and/or fencing at his option. He will need the permission of the FAA Facility Staff to do this.
Telephone Use: The contractor will be required to furnish his own telephone for job site use. FAA and airport telephones are unavaible except in an emergency.

E. Cleaning: The project work area, the lay down area and other adjacent surfaces used by the contractor shall be kept in clean, neat manner. Daily cleaning (or more if necessary) shall take place to prevent the accumulation of waste materials, rubbish, wind-blown debris, dust and odors resulting from contractor's operations. Contractor shall conduct cleaning and disposal operations to comply with local, state and federal codes, ordinances, regulations and anti-pollution laws.

1.4 GOVERNMENT USE AND ACCESS TO PREMISES

A. The Government reserves the right to enter the premises during the term of the contract for periodic work inspections and for maintenance of existing equipment. The Contractor shall allow the CO and COR complete access to all portions of the work.

1.5 WORK HOURS

A. Work shall be performed during normal working hours (7:00 a.m. to 3:30 p.m.), Monday through Friday

B. Construction noise within the facility must be minimized **during peak hours of air traffic**. No work shall be scheduled or take place during the week of and the weekend preceding and following the Thanksgiving, Christmas and New Years Holidays. Only emergency work to restore critical services to the facility will be considered and a moratorium waiver must be submitted and approved. The moratorium period will not be counted against the contract construction duration for the project.

1.6 SECURITY REQUIREMENTS

A. Personnel List – Contractor shall provide the CO prior to Notice-To-Proceed (NTP) with a list of the Contractor's and Sub-contractor's personnel who will require access to the ARTCC premises. The list shall be kept current during project work and includes the following:

Full Name, including middle initial
Social Security Number
Date of Birth
Place of Birth

No contractor/sub-contractor employees, associates, or other representatives shall be permitted access to the ARTCC grounds until that person's name and information has been provided and the appropriate security investigation has been completed by an FAA security officer for approval of access to the site with specified restrictions, if any. The FAA security officer may refuse access to the site to any employee, associate or other representative at any time for any reason. Once security clearances are granted, the contractor must schedule dates and times with the COR for appropriate escort badging

See Attachment at the end of this Section Badging Process Outline.

B. Finger Print – Contractor and sub-contractor personnel may be subject to a security investigation by the FAA. Contractor shall provide the CO at the NTP a completed finger print card administered by any local police or county sheriff to all **contractors' personnel working on site for more than 180 calendar days.** CO will provide finger prints card.

C. For this project the **on-site project superintendent** must get approval for a PIV badge. This badge requires forms to be filled out and an approval process that will take 30 days or longer. Once approved a blue photo ID badge will be issued and the PIV badged on-site superintendent will need to escort sub-contractors and deliveries. The PIV badged on-site superintendent shall retain this badge until the end of the project or the badge expiration date (whichever is sooner). At that time the badge MUST be returned to the COR.

D. Escort Badging – Contractor/foreman and sub-contractor/foreman shall obtain escort badging. The escort badged contractor/foreman and sub-contractor/foreman will be required to follow facility security requirements for escorting.

1. The contractor/foreman will be responsible for escorting all workers.
2. The escort must maintain visual control at all times for all workers on site.
3. If any escort required workers are found without their escort that worker and escort who signed him/her on, will no longer be allowed on the premises.

E. The escort badged contractor/foreman shall provide the COR with a list of the contractors and sub-contractors **personnel working on site for less than 180 calendar days,** at least 1 week prior to them coming on site. This list shall be kept current daily for the duration of the project and will require the following:

1. Workers name
2. Company name

Once the worker arrives at the front security gate they will be required to present 1 (one) photo identification (eg. Drivers License, etc.,) to obtain an FAA visitor/escort required worker badge. These worker badges shall be self-expiring and will be issued on a daily basis to that worker.

F. Security Guard - Contractor's and sub-contractor's personnel shall report to the FAA Security Guard at the front security gate and submit proper identification to obtain a FAA badge which will be worn on an outside garment at all times while on the ARTCC premises. The badge is a "clip-on" type, this badge shall be returned daily to the security guard when such personnel leave the ARTCC premises. This badge MUST be worn at all times.

G. Classified Areas - Work shall be arranged so that contractor's and sub-contractor's personnel can be escorted when required by the FAA, in certain areas which are considered to be restricted. No Contractor and sub-contractor employee, associate, or other representative shall have any visual, audible, or physical access to any area marked as a "closed area". Any persons gaining access to any "closed area" shall report the access to the CO who will coordinate with the FAA security office for a debriefing. Contractor's personnel shall not violate any security regulations pertaining to the ARTCC facility. Violators may be removed from the premises with the right to re-enter revocable. Contractor's day-to-day work schedules in the restricted areas shall be so arranged to allow for minimum escort.

H. Current procedures at FAA facilities include the "right to search". Access to the site constitutes consent to search. If in the judgment of the FAA Security Guard a cause to search a vehicle or the person of personnel exists, such search will be made.

I. During construction, any doors or access to either the exterior of the building or classified area that must remain undescured for any reason shall not be left unattended by the Contractor.

PART 2 – MATERIAL

NOT USED

PART 3 – EXECUTION

NOT USED

Badging Process Outline

Phase 1

- Contracting Officer (CO) provides the award letter to the contractor. This letter provides further instruction and requirement to the contractor, prior to work on FAA site.

    - In addition, the award letter also instructs to the contractor to pursuant to contract clause 3.14-2, Contractor Personnel Suitability Requirements, if performance of the contract work requires his/her personnel to obtain site-access clearance/security badging, to contact FAA Security Office Representative as soon as possible to begin the clearance process. The appropriate Security Office Representative's name and contact phone number/email address will be provided.

    - If the contractor does not have access or have trouble accessing the VAP System, is to contact the Security Office Representative stated in the award letter.

    - A list of SSE POC's is provided to the CO, to include the appropriate SSE to the award letter (see Attachment 1). The "VAP User Directions" is also attached to this "Badging Process Outline" for info only (see Attachment 2).

    - Contracting Officer and/or designate (Project Engineer, COR) provides contract documentation with the Period of Performance to the Site POC (for the purpose of allowing the site Sponsor to verify/approve the on-line badge application request).

- Once the contractor has enter his/her personnel, requiring badges, into the VAP System, the SSE will provide further instructions to the contractor to have their personnel complete/submit the OF-306 (Employment Eligibility Verification) and Fingerprint Chart. Note: The contractor should also indicate the type of badge requested, in the VAP system (under Remarks field).

    - The OF-306 is provided by the SSE; Fingerprint Chart is provided by the police station, or the FAA PIV facility, if available. Fingerprinting is accomplished by the contractor at the police station, or at the FAA PIV facility, if equipment is available.

    - Note:
        - ❖ If more than 180-day duration, the contractor is also instructed to have their personnel complete the eQIP Application.

        - ❖ If less than 180-day duration <u>and</u> the contractor is requesting one of their personnel "escort duties needed" (i.e., to escort a sub-contractor or anyone with an "escort required" badge), is also instructed to complete the eQIP Application.

- The contractor will identify their POC and provide a list of names requiring a badge to the site POC, ES (or COR), and/or SSE. In turn, the site POC will begin keeping track of the contractor personnel's badge status and provide an update to the appropriate personnel.

Badging Process Outline

Phase 2

- SSE processes applications, etc. and approves the badge request::

    - Less than 180-day: SSE send an approval email notification to the site POC (Tina Harada, ZOA Trusted Agent), as well as, the CO and POC that entered the contractor into the VAP system. The site POC then begins the process of the Yellow ID Badge.

    - More than 180-day: SSE issues Interim Suitability Determination (ISD). A letter of ISD is usually sent to the site POC, as well as, the CO and POC that entered the contractor into the VAP system. The site POC starts the process for the PIV Card.

Phase 3

- Site POC provides instructions to the contractor on the badge processing steps:

    - Step 1: Completing the on-line Application (for a Yellow ID Badge or PIV Card)
      [this is equivalent to the DOT F 1681 Form]

      The site POC will provide the contractor the link to the on-line application (has access "behind FAA firewall") or the DOT F 1681 to complete and return to the site POC, via email (does not have access "behind FAA firewall"). If the contractor's personnel are completing the DOT F 1681, the site POC will complete Step 1 and provide further instruction, via email.

      Note 1: Some PIV Site location will have the contractor's personnel, that does not have access "behind FAA firewall," to come into their site to complete the on-line application themself. Therefore, the contractor's personnel will need to arrange an appointment with the site POC at that location.

      Note 2: Each employee must have their own email address to complete the application (work or personal); no duplicate email address. In addition, the employee must know their Sponsor's Name and Region.

      Once the on-line application is submitted, it will be routed to the Sponsor (Peter Grimes for ZOA). The Sponsor will receive an email notification that an application is pending for his/her approval.

    - Step 2: Completing the Enrollment Process (on-line photo/fingerprinting)
      [this is also equivalent to the I-9 Form]

      Once the on-line application has been approved by the Sponsor/SSE, the employee will receive an email notification stating that he/she "can now complete the enrollment process." At this point, the employee will contact the site POC to arrange an appointment. When the appointment has been confirmed, the site POC will provide further instruction prior to their arrival.

      The employee must bring 2 valid identification documents; 1 must be a photo ID; and expired documents are not acceptable, during their arrival appointment.

Badging Process Outline

- Step 3: Badge Arrival

  The site POC will notify the contractor and/or employee that their badge has arrived and to arrange an appointment for pickup.

- Step 4: Complete the SAVI Training Course

  The site POC will provide the link (http://ashsavi.faa.gov/) or the "read & sign" version-PowerPoint document (does not have access 'behind FAA firewall') to the POC contractor.

  After the completion of the SAVI Training Course, the employee will provide a copy of their "Certificate of Completion" or the "Sign-in Sheet" to their POC contractor, to provide to the site POC or site ES (or COR).

  Note:
  - ❖ Employees issued a PIV Card will need to complete the SAVI Training Course.
  - ❖ Employees issued a Yellow ID Badge and requires access into FAA building and/or FAA resources, will need to complete the SAVI Training Course.

Western-Pacific Regional Office
Security Division - Work Assignments

Donna Robinson
310-725-3713 Mon, Weds and Fri
909-605-0052 Tues & Thurs
donna.robinson@faa.gov

Employees: A-H
Contractors: All contractor employees in Southern California (Los Angeles to San Diego); includes National Contracts.

Michelle Jackson
310-725-3721
michelle.jackson@faa.gov

Employees: I-N
Contractors: All contractor employees in Northern California (Fremont to Sacramento); includes National Contracts, all guards

Annamarie Olivarez
310-725-3958 Mon, Tues and Thurs
310-750-5368 Weds & Fri
annamarie.olivarez@faa.gov

Employees: O-Z
Contractors: All contractor employees in the Pacific Islands and Child care facilities; includes National Contractors.

Loto Luuga
310-725-3747 / loto.luuga@faa.gov
All Contractors for Nevada
PSS Support - Donna Robinson

Mario Nocon
310-725-3736 / mario.nocon@faa.gov
All Contractors for Arizona
PSS support - Annamarie Olivarez & Michelle Jackson

Sonya Taylor
310-725-3724 / sonya.ctr.taylor@faa.gov
PIV cards
HSPD-12 Program Support Specialist

Effective: August 2012

VAP USER DIRECTIONS

INFORMATION NECESSARY TO ENROLL IN VAP:

Access to the Vender Application Process (VAP) will be granted to contract companies by the FAA, Personnel Security Division. Companies will be required to provide a minimum of two people to become VAP Points of Contact (POC's) (maximum of 5 per company). A request from a company must contain the following information for each VAP POC:

1. **Full Legal Name**
2. **Phone Number (with extension if applicable)**
3. **E-Mail Address**
4. **Company Name**

Requests for VAP access must be sent to the proper area of responsibility for the contract (i.e., either to FAA Headquarters or one of the Regions). See attached list for all FAA VAP Administrators.

ONCE ENROLLED:

When access is granted to a company the VAP POC will be issued a WebID and Password through their submitted e-mail. The POC can then proceed to the website and use the online service.

When using the system, the POC will first need to log in to the system using their WebID and Password. The URL for the site is: **https://vap.faa.gov**. Once logged in successfully, the POC will have the ability to:

1. Request to add new contractor to a specific contract.
2. Request to remove an active contractor from a specific contract.
3. Request to obtain a report (a list of former and current contractors on a specific contract. Reports can be used for reconciliation.)

PLEASE NOTE: THE VAP SYSTEM IS ***NOT*** USED FOR OBTAINING ID BADGES OR FOR PROCESSING BADGE RENEWALS.

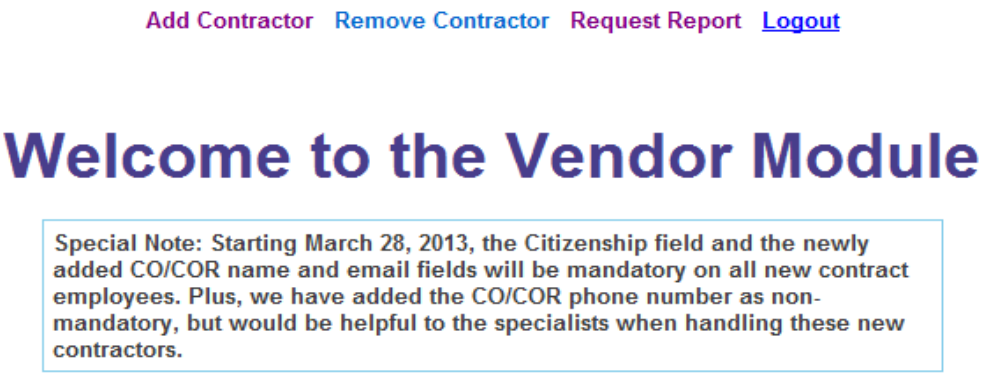
*****UPDATED AS OF MARCH 28.2013*****

New MANDATORY FIELDS:	**OPTIONAL FIELD:**
Citizenship	COR Telephone number
CO/COR Name**	
COR Email Address	

*****The name should be the FAA CO/COR who tracks the individuals on the contract and will be approving PIV ID badge requests.***

We have added these fields in an attempt to facilitate a faster response from our office when sending out Interim and Final suitability determinations.

WELCOME SCREEN:



ADD CONTRACTOR MODULE:

The **Add Contractor** module has several fields to fill in on the Add option screen. Most fields are mandatory.

Since the VAP system now automatically creates records in our database, it is critical that the Social Security Number (SSN) is entered correctly. In addition, all email addresses and other contact information needs to be accurate as well so that eQIP notifications are received by the applicant and the VAP POC.

Once all the data is entered, click the Submit button to prepare data to be sent to our Investigative Tracking System (ITS).

NOTE: The Add contractor module can also be used for Name Changes or adding contract numbers. Even though the individual may already be "added" and cleared, you would still use this module to make changes and updates.

Remove Contractor Request Report Logout

Vendor Entry

Preliminary Approval Request Form

Company Name: FAA

Contract Number*: - - - -
(Ex. DTFAWA-08-X-00001)

CO/COR (FAA Rep)*:

CO/COR Email Address*:

CO/COR Phone: - -

First Name*:

Middle Name:

Last Name*:

Suffix:

SSN*: - -

Date of Birth*: / / (MM/DD/YYYY Format)

Place of Birth - Country*: UNITED STATES

Place of Birth - City*:

Place of Birth - State*: (Select)

Citizenship*: (Select)

Email Address*:
(If applicant has no personal e-mail address, enter company e-mail address)

Position*:

Duty City:

Duty State*: (Select)

Processing FAA Region*: [Select Region]

Remarks:

Has the company initiated e-Qip?*: Yes No

Is ID Required?*: Yes No

Is this person leaving a previous FAA contract?*: Yes No

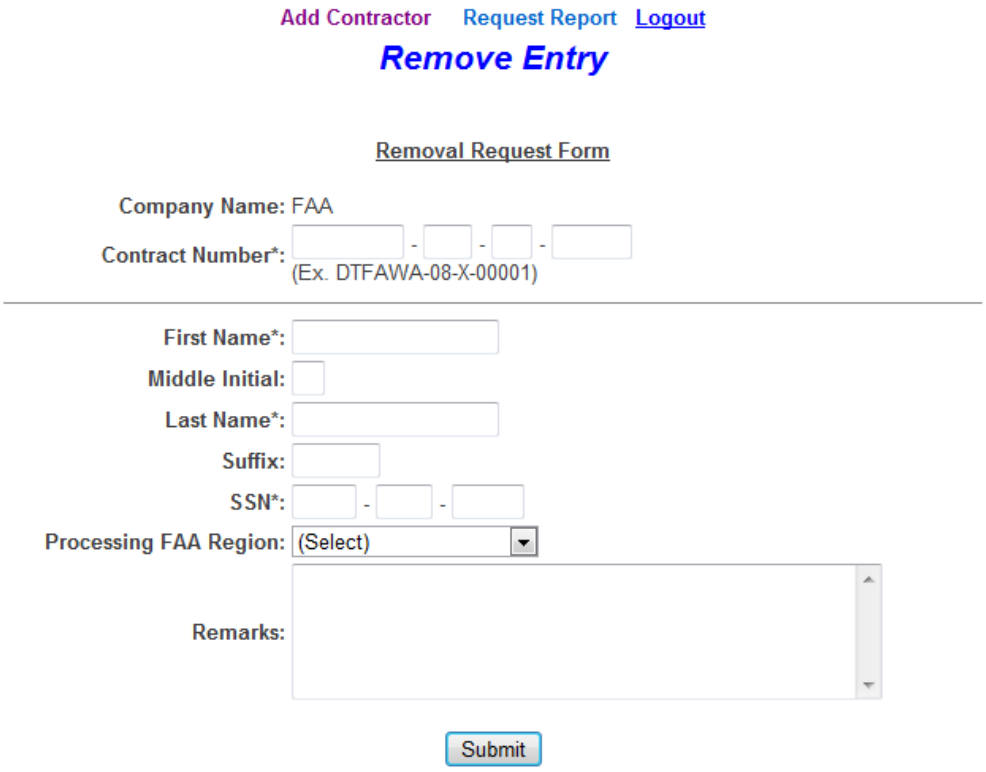
Submit

Note: * Indicates Mandatory Fields

NOTE: If the contractor is "SHORT TERM-Yellow Badge needed"; "ESCORT duties needed- PIV Card needed"; "less than 180-day, but ESCORT duties needed-PIV Card needed", etc., it is vitally important to put in the remarks section of VAP.

REMOVE CONTRACTOR MODULE:

The **Remove Contractor** module is the required way for the POC to inform the PSS of those contractors no longer working for the company, or no longer supporting a specific FAA contract. The removal request form is simple to fill in, again with most fields mandatory. It is crucial that the contract number and the SSN fields are entered correctly. **NOTE: It is important to use the Remarks button especially if the contractor has been terminated under derogatory circumstances.**



REQUEST REPORT MODULE:

The **Request Report** module is the easiest function of this application. The POC just needs to enter the contract number and a report will be e-mailed to the vendor. The purpose is that the VAP POC's can reconcile their list of employees with this report. NOTE: Any contractors submitted into the VAP will NOT show up on a report until they have been received and processed by the FAA. The report will show you ALL personnel both Former and Current.

To **Logout** of the VAP system, choose the Logout option. Then you will be prompted to choose the Close Window Button to successfully closeout the screen.

NOTE: The VAP system is meant for ***ADDING*** NEW contractors, ***REMOVING*** contractors, and ***REQUESTING*** reports.

The VAP system is NOT to be used for ID badge renewal requests.

SECTION 010300
CONTRACTOR QUALITY CONTROL, COORDINATION, PERMITS, TESTING

PART 1 – GENERAL

1.1 CONTRACTOR QUALITY CONTROL

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause entitled "Inspection of Construction."

1.2 QUALITY CONTROL /ASSURANCE

The Contractor shall monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality and to comply fully with manufacturers' instructions. The Contractor shall identify a single person to ensure quality control/assurance. The contractor shall have at least 3 years minimum experience in renovating restrooms. A Quality Control/Assurance officer is necessary.

PART 2 – MATERIAL

NOT USED

PART 3 – EXECUTION

3.1 QUALITY REVIEWS

A. Control - Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The controls shall be adequate to cover all construction operations, including both on-site and off-site fabrication. The controls shall include at least three phases of controls for all definable features of work, as follows:

B. Preparatory Phase - This phase shall be performed prior to beginning work.

1. A review of each paragraph of applicable specifications.
2. A review of the contract plans.
3. A check to assure that all materials and drawings have been submitted and approved.
4. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawing or submitted data, and are properly stored. A thorough verification of all site conditions, locations, etc.
5. The Government shall be notified of any of the required action of the preparatory phase. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

C. Initial Phase - This phase shall be accomplished at the beginning of work. The following shall be accomplished:

1. A check of preliminary work to ensure that it is in compliance with contract requirements and submittals.
2. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with sample panels as appropriate.
3. Review application of roof system or repair procedure.
4. The Government shall be notified at least 48 hours in advance of beginning the initial phase.

D. Follow-up Phase - Daily checks with the COR shall be performed to assure continuing compliance with contract requirements. The Contractor shall not build upon or conceal non-conforming work.

E. Additional Preparatory and Initial Phases - Additional preparatory and initial phases may be conducted as determined by the Government if the quality of on-going work is unacceptable; or if work is resumed after a substantial period of inactivity, or if other problems develop.

3.2 CONTRACTOR REQUEST FOR INFORMATION (RFI)

In accordance with Contract Clause "Specifications, Drawings, and Material Submittals", in case of discrepancy either in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the COR and cc the CO on the request, who shall promptly respond in writing. Submit a written request to COR and allow at least 3 working days for Government response and cc the CO on the Request. Include the date of the request, the date response is needed, a description of the problem, identification of work on hold, impact of delay in Government response, scope changes deemed necessary and recommended solutions, and any other information pertinent. The Government reserves the right to charge the contractor for administrative costs associated with responding to an RFI, which does not involve discrepancies in the specifications and drawings. CO shall be cc’d on all RFIs.

3.3 TESTING PROCEDURE

The Contractor shall perform tests required to verify that control measures are adequate to provide a product which conforms to contract requirements.

3.4 COMPLETION INSPECTION

At the completion of all work or any increment, the contractor with the COR shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved plans and specifications.

3.5 DOCUMENTATION

A. The Contractor shall maintain current records of quality control operations, activities, and tests performed, including the work of subcontractors and suppliers. These records shall include but not be limited to the following:

1. Contractor/subcontractor and their area of responsibility.
2. Work performed today, giving location, description, and by whom.
3. Material received.
4. Identify submittals reviewed, with contract reference, by whom, and action taken.
5. List instructions given/received and conflicts in plans and/or specifications.
6. Contractor's verification statement.
7. These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. One report shall be prepared and submitted for every seven days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. Reports shall be signed and dated by the Contractor.

3.6 SAMPLE FORMS

A. Sample Contractor Quality Control Report forms are enclosed at the end of this section. The contractor shall choose one form or submit another one for approval.

1. Sample of typical Contractor's daily report

3.7 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor at the site of the work, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

3.8 COORDINATION, LOCAL PERMITS AND TESTING

A. Project Coordination

1. It shall be the duty of the Contractor to prepare a detailed schedule of work and work layout to resolve conflicts and to assure coordination of the work by different trades.
2. It shall be the duty of the Contractor to resolve all coordination conflicts that arise among his subcontractors. If, in the opinion of the COR, a potential or actual conflict exists, the COR will notify the CO, who shall instruct the contractor to take immediate steps to coordinate the work and resolve any conflicts.

3.9 LOCAL PERMITS

A. A building permit is not required.

B. This project is designed in accordance with the International Building Code, the International Plumbing Code, and the National Electric Code. The Contractor shall perform all work in compliance with the latest edition of these codes.

PART 4 – QUALITY ASSURANCE

4.1 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

A. Procedures for processing shop drawings, samples, certificates, and other submittals shall be developed and submitted for approval as part of the Contractor's Quality Control Plan. The procedures shall include the establishment of responsibilities to assure at each level adequate review and approval; timely delivery, including verification procedures; and proper storage.

B. Quality control records

4.2 CERTIFICATION

The Contractor shall certify that, the submittals comply with contract requirements. Submittals shall be as specified in Section 01300 SUBMITTALS.

4.3 GOVERNMENT APPROVED SUBMITTALS

Submittals requiring Government approval will be identified as having received Contractor approval by being so stamped and dated. Delays in the approval process shall not be the basis for consideration of a time extension when such delay is the result of the Contractor's failure to make proper and timely submittal or make corrections in accordance with the specifications or the Contracting Officer's comments or is the result of a resubmittal which is required because of an unsatisfactory original submittal. Approval action will not relieve the Contractor of his responsibility for compliance with the contract but will indicate only that the general method of construction and detailing is satisfactory.

4.4 DEVIATIONS

All proposed deviations from contract requirements shall be clearly indicated and submitted in writing for approval.

SECTION 010400

CUTTING AND PATCHING

PART 1 – GENERAL

1.1 SCOPE

Requirements included - Contractor shall be responsible for all cutting, fitting and patching, required to complete the work or to:

A. Remove and replace defective work.

B. Remove and replace work not conforming to requirements.

PART 2 – MATERIAL

2.1 MATERIALS

Comply with specifications and standards for each specific product involved

PART 3 – EXECUTION

3.1 INSPECTION

A. Inspect existing conditions of project.

B. After uncovering work, inspect conditions affecting installation of products, or performance of work.

C. Report unsatisfactory or questionable conditions to the COR in writing; do not proceed with work until the COR has provided further instructions.

3.2 PREPARATION

A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.

B. Provide devices and methods to protect other portions of project from damage.

C. Provide protection from elements for that portion of the project which may be exposed by cutting and patching work.

3.3 PERFORMANCE

A. Execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.

B. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerance and finishes.

PART 4 – QUALITY ASSURANCE

4.1 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

A. Submit a written Request for Information (RFI) to the COR a minimum of 2 days in advance of executing any cutting or alteration which may affect:

1. Work of the Government or any separate contractor.
2. Structural integrity of any element of the Project.
3. Integrity of weather-exposed or moisture- resistant elements or systems.
4. Efficiency, operational life, maintenance or safety of operational elements.
5. Visual qualities of sight-exposed elements.

B. Request shall include:

1. Identification of the Project.
2. Description of affected work.
3. The necessity for cutting, alteration, or excavation.
4. Effect on work of Government or other work, or on structural or weather-proof integrity of the affected element.

C. Description of proposed work:

1. Scope of cutting, patching, alteration, or excavation.
2. Trades who will execute the work.
3. Products proposed to be used.
4. Extent of refinishing to be done.
5. Alternatives to cutting and patching.
6. Cost proposal, when applicable
7. Written concurrence of any separate contractor whose work will be affected.

D. Should conditions of work or the schedule indicate a change of products from original installation, contractor shall submit request for substitution as specified in Section 01090, "Materials and Equipment."

E. Submit written notice to the COR designating the date and time the work will be uncovered.

SECTION 010900

MATERIALS AND EQUIPMENT

PART 1 – GENERAL

1.1 SCOPE

A. Material and equipment incorporated into the work:

1. Conform to applicable specifications and standards.
2. Comply with size, make, type and quality specified, or as specifically approved in writing by the CO.
3. Manufactured and Fabricated Products: Design, fabricate and assemble in accordance with the best engineering and shop practices.
4. Do not use material or equipment for any purpose other than for which it is designed or is specified.

1.2 APPLICABLE DOCUMENTS

A. Part I, Section E, F, G.

B. Section 01300: Submittals

C. Occupational Safety and Health Standards for Construction (29 CFR PART 1926) Subpart H - Materials Handling, Storage, Use and Disposal.

1.3 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

A. Manufacturer’s Instructions

1.4 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents requires that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to the COR.

B. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements.

1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with the COR for further instructions.
2. Do not proceed with work without clear instructions.

C. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.5 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site.

1. Deliver products in undamaged condition, in manufacturer's original containers or packing, with identifying labels intact and legible.
2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packing.

1.6 STORAGE

A. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.

1. Store products subject to damage by the elements in weather tight enclosures.
2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

B. Arrange storage in a manner to provide easy access for inspection

PART 2 – MATERIAL

NOT USED

PART 3 – EXECUTION

NOT USED

PART 4 – QUALITY ASSURANCE

NOT USED

SECTION 013000

SUBMITTALS

PART 1 – GENERAL

Applicable provisions of this Section and other provisions and requirements of the Contract Documents apply to all sections.

1.1 SUMMARY

A. Submit Shop Drawings, product data, samples, warranties, certificates, test reports, operations/maintenance instructions, and parts lists as required by the contract documents.

1.2 RELATED REQUIREMENTS

A. Section 01030: Contractor Quality Control, Coordination, Permits and Testing

B. Section 01090: Materials and Equipment

C. Section 01770: Closeout Procedures

D. Section 01730: OSHA Safety Requirements

1.3 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

A. Submittal schedule

B. Construction progress schedule

C. Submittal log

D. Site Specific Accident Prevention and Safety Plan

E. Site Specific Hazcom Plan

1.4 SUBMISSION REQUIREMENTS

A. Number of Copies - Submit prepaid and in ample time for approval before installation. Unless otherwise noted, submit four (4) copies of documents to the Contracting Officers Representative (COR). If additional copies are required, provide the quantity and submit additional copies to meet this requirement.

B. Time for Approval - Receive submittal approvals prior to starting the work. Time necessary for government approval or disapproval of samples, certificates, test reports, and shop drawings will not be more than fourteen (14) calendar days after receipt of a

submittal. All materials installed in the work shall match the approved submittals. After a submittal has been approved, no substitutions will be permitted without written approval by the COR. No extension of Contract Time will be authorized because of failure to transmit to the COR sufficiently in advance of the Work to permit processing.

The Contractor shall note priorities, if any, desired in the review of submittals; otherwise, submittals will be reviewed in the order received.

C. Submittal Approval - The checking, marking or approval of the submittal by the FAA shall not be construed as a complete check, but will indicate only that the product or method of construction and detailing is satisfactory. Approval will not relieve the contractor of the responsibility for compliance with the specifications or for any error which may exist. The Contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work. Possible approval actions taken by the FAA include:

1. Approved as submitted - If "approved as submitted" is marked by the COR, each copy of the submittal will be identified as having received such approval by being stamped and dated. After submittal has been approved, no substitutions will be permitted without written approval by the COR.
2. Approved as noted - If "approved as noted" is marked by the COR, the submittal is satisfactory contingent upon Contractor acceptance of corrections, notations, or both, and if accepted, does not require resubmittal.
3. Not approved - If "not approved" is marked by the COR, the submittal data does not meet job requirements and the Contractor must resubmit. If the submittal is disapproved, the Contractor shall resubmit the corrected material in the same quantity as specified for the original submittal. Correct disapproved submittals and resubmit for approval by the COR. Approval of resubmittals require an additional fourteen (14) calendar days.
4. Submittal Schedule - Identify within the Contractor's Construction Schedule a schedule of submittals for shop drawings, material approval, etc., showing the dates when submittals will be submitted for the project.

    a) Contents - On the schedule indicate the following information:

        1) Schedule date for submittal

        2) Related Section number.

        3) Submittal category (Shop Drawings, Product Data, or Samples).

        4) Name of the subcontractor (if applicable)

        5) Description of the part of the Work covered.

5. Distribution - Following response to the initial submittal, print and distribute copies to the COR, Government, subcontractors, and other parties required to comply with submittal dates indicated. When revisions are made, distribute to the same parties. Delete parties from distribution when they have completed

their assigned portion of the Work and are no longer involved in construction activities.

6. Schedule Updates - Revise the schedule after each meeting or activity where revisions have been recognized or made.

D. Construction Progress Schedule – The progress chart to be prepared by the Contractor pursuant to the Contract Clause entitled "SCHEDULES FOR CONSTRUCTION CONTRACTS" shall consist of network analysis system, or pertchart (barchart). The contractor shall be required to complete the work under the contract within **60 (Sixty) calendar days** after receipt of **Notice to Proceed** excluding the FAA holiday moratorium as specified in section 01000.

1. The diagram shall show a continuous activity flow from left to right. The diagram shall show the sequence in which the work is to be accomplished as planned by the Contractor.
2. Dates shall be shown on the diagram for start of the project, any milestones required by the contract, and contract completion.
3. The critical path shall be clearly identified.
4. Network activities shown shall include submittal and review of shop drawings and samples and procurement of materials and construction activities.
5. Government activities that affect progress shall be shown. These include but are not limited to: Notice-to-Proceed, approvals, and inspections.

NO PHYSICAL CONSTRUCTION WORK AT THE SITE MAY TAKE PLACE UNTIL THE CONTRACTOR SUBMITS AND THE GOVERNMENT APPROVES THE SCHEDULE. Government review of schedule submittal(s) will not exceed 7 calendar days. Resubmittal, if necessary shall not exceed 4 calendar days.

E. Two-week "Look Ahead" schedule - This schedule may be of the contractor's choosing, either bar chart or CPM form. Only activities scheduled to be occurring during the forecasted two week time periods are to be shown. Schedules shall be submitted weekly. Early and Late Start and Finish dates, and subcontractors involved are data to be included in the schedule.

F. Submittals - Submit shop drawings, material and equipment lists, and all other data required under various headings of these specifications necessary to permit commencement of work. COR will return the submittals within 14 calendar days after receipt, indicating approval or disapproval.

G. Submittal Preparation - Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Transmittals - All submittals shall be accompanied by transmittal letters identifying the contents of the submittal. It shall be clearly indicated on the transmittal letter with a statement and signature of the Contractor that the submittal item was verified for compliance with the contract requirements and approved by the Contractor. Transmittal letters shall consist of one original.

2. Contents - Submittals shall be complete and detailed and assembled into sets. Lack of completeness or clarity or inadequate description will be justification for disapproval. Submittals shall bear the following information:

   a) Name of project or facility and contract number;
   b) Date of submission;
   c) Contract drawing number and latest revision;
   d) Specification page and paragraph number;
   e) Name of contractor and subcontractor or supplier/manufacturer;
   f) Clearly identified contents and location of work;
   g) Any proposed variances to specification requirements;
   h) Contractor's approval certifying he checked and coordinated the work of other trades.

H. Ordering of Equipment and/or Fabricated Materials – The Contractor shall not order equipment or fabricated materials until the submittals affecting these materials and/or equipment have been approved. Where the Government must redesign or change materials or equipment specifications because of unforeseen problems, the Government shall not be responsible for restock or refabrication costs of equipment and/or materials ordered by the Contractor prior to receiving approved submittals.

I. Coordination – It shall be the Contractor's responsibility to utilize submittals to coordinate the work of different trades. Where conflicts, such as clearance problems, interferences, incompatibility with new or existing work, etc. occur, the Contractor shall notify the COR in writing immediately. Furthermore, the Contractor shall resolve all conflicts between trades with regard to Contractor's designed work or locating of work, assuring that the work complies with contract documents.

1.5 SHOP DRAWINGS

A. Applicable Documents -

B. Presentation - Present drawings in a clear and thorough manner. Identify details by reference to sheet and detail, building wing and section shown on contract drawings.

1. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
2. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings.

C. Contents - Provide the following information on each submittal:

1. Submittal number (paragraph 2.1 of this Section) and identify as "Part A" or "Part B" item
2. Date of submission
3. Name of project and facility (full name)

4. Name of Contractor or Subcontractor
5. Reference to drawing number (with revision, if applicable) and/or specification section.
6. Clearly identify contents and location of work.
7. Contractor's approval certifying he checked and coordinated the work of other trades.
8. Dimensions.
9. Identification of products and materials included by sheet and detail number.
10. Compliance with specified standards.
11. Notation of coordination requirements.
12. Notation of dimensions established by field measurement.
13. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 36 by 48 inches.

D. Submittal - Submit blue- or black-line prints for the COR's review. Submit the number of copies the Contractor requires, plus three which will be retained by the COR.

1. One of the prints returned shall be marked up and maintained as a "Record Document."
2. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

E. Details and Connections: Unless otherwise specified, all connections necessary to properly complete the work under these drawings and specifications shall be detailed and completed in a satisfactory manner by the Contractor. This shall apply with equal force to details not shown or specified, but necessary to make indicated or specified additions to any existing work and connection for any future additions indicated on the drawings or specified. All parts detailed by the Contractor shall be strong enough to withstand, without excessive deflection, any loads or pressures to which they are likely to be subjected and to develop the strength of the members connected. In no case shall the construction be inferior in any way to that shown on the contract drawings.

F. Equipment Clearances: The Contractor shall not proceed with any construction that may be affected in any manner by machinery and equipment until the Contractor has submitted and obtained approval of shop and erection drawings, schedules, and equipment layouts showing all components with dimensions and necessary clearances. The Contractor is responsible to ensure that all items installed have proper clearances.

G. Related Work: In indicating or describing the work and materials for related work in the submittals, the term "by others" will not be acceptable. The specific Contractors and trades to furnish and install such related work shall be clearly noted by name or description; where such name or description is missing, it shall be understood and agreed that the General Contractor is to furnish and install such related work. Certification by the Contractor that the submittals have been checked by him shall include checking of all related work.

1.6 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, Material Safety Data Sheets (MSDS), standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

B. Preparation

1. Clearly mark or highlight each copy to identify pertinent site specific products or models the Contractor intends to use
2. Highlight/clearly indicate all performance characteristics and capacities
3. Highlight/clearly indicate all dimensions and clearances required

C. Manufacturer's Standard Schematic Drawings and Diagrams.

(a) Modify drawings and diagrams to delete information which is not applicable to the work.
(b) Supplement standard information to provide information specifically applicable to the work.

D. Drawings. Catalog data submittal shall not be construed as relieving the Contractor of the responsibility for submitting complete drawings and schedules; however, standard machinery and equipment need not be detailed, but all sizes, supports, connections, and clearances shall be indicated and detailed.

E. Manufacturer’s Instructions. Where installation of work is required in accordance with the product manufacturer’s directions, the Contractor shall obtain and distribute copies to his field personnel and at least four (4) copies to the COR.

Note: If the submittal is not clearly marked, regarding the above pertinent data, the submittal will be returned marked "DISAPPROVED".

1.7 SAMPLES

A. Submit three (3) of each sample approved for installation. Submittals include all components of the materials to be used for the roofing system.

B. Display - For each sample include the following:

1. Generic description of the Sample.
2. Sample source.
3. Product name or name and address of the manufacturer.
4. Catalog number
5. Project title,
6. Contractor’s name
7. Availability and delivery time.

C. Records - Maintain sets of Samples at the Project Site, for quality comparisons throughout the course of construction.

1. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
2. Sample sets may be used to obtain final acceptance of the construction associated with each set.

D. Color, patterns and textures. For items required to be of selected and approved colors, patterns, textures, or other finish requirements, obtain instructions from the COR and submit suffiecient samples to show the range of shades, tones, values, patterns textures, or other features corresponding to the instructions. Submit color samples of field-applied paint materials.

D. Approved Samples. Approved samples may be incorporated in the job where applicable.

1.8 WARRANTIES/GUARANTIES

A. Assemble two (2) copies with original signatures of warranties executed by each of the respective manufacturers, suppliers, and subcontractors into a warranty book and prepare a Table of Contents.

B. Additional Data - Provide complete information for each item, include the following:

1. Product or work team
2. Firm, with name of principal, address, and telephone
3. Scope
4. Effective dates of warranty based on Final Acceptance of the item.
5. Information for owner's personnel on proper procedures to evoke the warranty in case of failure and instances which might affect the validity of warranty

C. Warranties - Effective after project completion and acceptance by the FAA.

1.9 CERTIFICATES

Assemble certificates executed by each of the respective manufacturers, suppliers, and subcontractors.

A. Additional Data - Provide complete information for each item to certify compliance with contract documents.

1. Product or work item
2. Firm, with name of principal
3. Scope of compliance
4. Signature by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

1.10 TEST REPORTS

Promptly submit written report of each test and inspection. Each report shall include:

(a) Date issued.
(b) Project title and number.
(c) Testing laboratory name, address, and telephone number.
(d) Name and signature of laboratory inspector.
(e) Date and time of sampling or inspection.
(f) Record of temperature and weather conditions.
(g) Date of test.
(h) Identification of product and specifications.
(i) Location of sample or test in the project.
(j) Type of inspection or test.
(k) Results of tests and compliance with Contract Documents.
(l) Interpretation of tests results, when requested by Contracting Officer Representative.

PART 2 – MATERIAL

NOT USED

PART 3 – EXECUTION

3.1 GENERAL

Submittals are required for the items listed in the specifications or on the drawings. The following is a partial list of submittals required: Schedules, Manufacturer's Literature, Shop Drawings, Samples, Test Reports, Warranties, Certificates, Design Calculations, MSDS, and Installation Instructions. It should not be construed as a complete list of all submittals required.

Submittal dates shall comply with this specification unless a more stringent date is specified. Substitutions and all requested changes will require a submittal.

3.2 SCHEDULE

For the following particular submittals under Division 1, the submittals must be approved prior to any work on site.

PART 4 – QUALITY ASSURANCE

4.1 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

A. Submittal schedule

B. Construction progress schedule

C. Submittal log

D. Site Specific Accident Prevention and Safety Plan

E. Site Specific Hazcom Plan

SECTION 07300

SAFETY AND HEALTH REQUIREMENTS

PART 1 – GENERAL

1.1 Objectives and Responsibilities

The objectives of the safety and health requirements are to eliminate contractor generated facility shutdowns, interruptions, injuries, illnesses, and incidents. When the Contractor is notified by the Contracting Officers Representative (COR) of non-compliance with the safety or health provisions of the Contract, the Contractor shall immediately, unless otherwise instructed, correct the unsafe act or unsafe condition.

It is the contractor's responsibility to understand the work to be performed, perform the work in a professional manner and to protect his workforce and FAA from incidents.

1.2 Communication

A. All contractor tasks must be communicated to FAA prior to the tasks being performed.

A1. Preconstruction Safety Meeting

The FAA will schedule a preconstruction meeting after the Notice to Proceed. The agenda will include:

1. The FAA will identify the Contracting Officer Representative (COR) and Contracting Officers Represenative (COR). The contractor will identify his site management.
2. The FAA will review the chain of authority.
3. The FAA will review the procedure to process field decisions and change orders.
4. The FAA will review the facility safety procedures, and safety and health requirements.
5. The FAA will discuss schedules, shop drawings, product data and samples, manufacturer's certifications of products, manpower reports, equipment deliveries and priorities schedules, procedures for maintaining record documents, use of FAA facilities by contractor (access, parking, office area, and storage area), safety and first aid procedures, security procedures and housekeeping procedures.

A2. Monthly Project Schedule

A detailed schedule must be submitted to FAA monthly. The date the schedule is due will be identified during the preconstruction safety meeting.

A3. Two Week Look-Ahead Schedule

A detailed two-week look-ahead schedule must be submitted to FAA weekly. The date the schedule is due will be identified during the preconstruction safety meeting.

A4. Daily Project Scope and Schedule

A detailed daily project scope and schedule must be submitted to the FAA daily. Usually the daily scope and schedule meeting is held early morning with the FAA COR. Hot work permits, and electrical/pneumatic/water and steam lockouts are issued daily.

All safety related schedules should be coordinated with the over all work scheduled required in the specifications.

1.3 Task Specific Safety and Health Plans

All tasks are to be planned and scheduled. All plans must be written and submitted for FAA approval before tasks are performed. The safety and health plan must be compliant with federal safety and health standards (29 CFR 1910 General Industry, 29 CFR 1926 Construction Industry, applicable state safety and health regulations and FAA Orders including Order 3900.19B, Occupational Safety and Health Program. Asbestos containing materials, lead containing coatings, polychlorinated biphenyls, noise and odors are to be controlled.

Required elements of the safety and health plan must include:

1. Coordinate the Safety and Health Plan with the Project Work Plan.
2. Tasks are to be described in detail. All physical and chemical hazards identified, and engineering controls are to be incorporated to eliminate or reduce the hazard.
3. An Emergency Response Plan must be assembled including, where applicable, consideration for fire, explosion, toxic or oxygen deficient atmospheres, water leakage, electrical hazards, slips, trips and falls, confined spaces, heat/cold stress, noise, and odors.
4. Material Safety Data Sheets (MSDS) must be submitted to FAA for all chemicals brought on-site by the Contractor before the chemical is brought on-site.
5. The safety and health plan must include the personal protection equipment to be donned. Hard hats (ANSI Z89.1 or equivalent) must be worn at all times where overhead hazards exist regardless of the workers activities. Shirts with at least four-inch sleeves and appropriate pants shall be worn. Tank tops and shorts are not permitted. Loose or frayed clothing, loose or hanging long hair, ties, rings, body jewelry shall not be worn around moving machinery or other areas where they may become tangled. High visibility shirts, vests, or coats (ANSI/ISEA 107-2004) must be worn at all times while on the project site. Hearing protection must be worn when exposures exceed 85 dBA-TWA. Hard-toe footwear (ASTM F2413, or equivalent) must be worn by all workers when in the construction environment or in areas where there is a danger of foot injuries due to falling, rolling, or piercing objects. Safety glasses with rigid side shields (ANSI Z87.1, or equivalent) must be worn at all times when in the construction environment and in any area where eye hazards exist. Gloves, appropriate for the hazard, must be worn when hands are exposed to physical or chemical hazards.
6. There is a 100% Fall Protection Policy at FAA facilities. Anytime employees are working from an unprotected elevation of six feet or more, fall protection must be incorporated. Working means while traveling, stationary, or at anytime exposed to a fall

from a surface not protected by approved handrails, guardrails or some other approved fall prevention device. Workers in mechanical lifts, including scissor lifts, boom trucks, suspended or supported personnel baskets, articulating lifts, and other similar devices must use fall protection equipment at all times.

7. Equipment and tools must not be altered in any way to adapt it for a job for which the manufacturer does not intend it.
8. All hand-held power tools must be equipped with constant pressure switches that will automatically shut off power when the pressure (worker's hand) is removed. Hand-held power tools with on/off or lock-on switches are not permitted.
9. Ground Fault Circuit Interrupters must be used to protect all temporary electrical wiring and cord sets.
10. Lock-out/tag-out procedures must be followed to minimize the potential exposure of workers to hazardous energy. Only FAA will energize or deenergize facility electrical circuits. The contractor will connect to temporary power panels only unless specifically approved by FAA. Only FAA will turn on or turn off hot water, chilled water, and steam valves.

Job Hazard Analysis

At the beginning of each work shift, a Job Hazard Analysis/Activity Hazard Analysis or equivalent must be completed jointly by contractor management and craft employees before the work task is performed. Each employee must sign off that they understand the task to be performed, the hazards associated with the task, the controls and PPE required for the task. A copy of the signed off JHA must be transmitted to the FAA daily.

1.4 Orientation and Training

All contractor employees must complete a site and task specific orientation and test provided by the Contractor prior to tasks in FAA facilities.

Daily Safety Meetings or Tool Box Meetings are to occur before each work shift and include all contractor on-site employees.

1.5 Incident Investigation

All contractor incidents will be communicated immediately to the FAA Resident Engineer and investigated by the contractor. An incident report and Lesson Learned must be assembled for all incidents and transmitted to the FAA for review.

1.6 Auditing and Inspections

The contractor must conduct safety and health inspections by qualified and competent professionals at a frequency sufficient to identify and control task specific hazards.

SECTION 017500

PROTECTION OF EXISTING CONDITIONS AND INSTALLED WORK

PART 1 – GENERAL

1.1 SECTION INCLUDES

This section includes the basic care the Contractor shall use to prevent unnecessary damage to property in or near the Worksite during performance of the Work

1.2 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, AND FACILITIES

A. The Contractor shall take all precautions necessary to protect the existing facilities, equipment, buildings, and vegetation during construction. Any areas damaged must be repaired or replaced at no additional cost to the FAA. Repairs shall be approved by the COR. All repairs shall match the original finish and be made utilizing materials equal in quality to the existing.

B. The Contractor shall protect from damage all existing improvements and utilities at or near the Worksite and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor.

C. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this Subcontract or failure to exercise reasonable care in performing the Work. If the Contractor fails or refuses to repair the damage promptly, the FAA may have the necessary work performed and charge the cost to the Contractor.

1.3 PROPERTY PROTECTION

A. The Contractor shall construct and maintain such temporary fences, gates and other facilities as shall be necessary for preservation of crops, and protection of property. The Contractor shall immediately replace all fencing and gates that it cuts, removes, damages, or destroys with new materials to the original standard, with the exception that undamaged gates shall be reused.

B. The Contractor shall use all necessary precautions to avoid the destruction of surveying markers such as section corners, witness trees, property corners, mining claim markers, bench markers, triangulation stations, and the like. If any such marker must be destroyed, the Contractor shall first notify the agency responsible for the marker, as well as the COR, and assume all responsibility for replacing markers.

C. Unnecessary damage is that which can be avoided through efficient and careful performance of the work in a careful manner, taking into account the land rights which have been secured. If the Contractor damages any property, the Contractor shall at once notify the COR and may make or arrange to make prompt and full restitution.

D. Maps and specifications provided by the FAA may not give the location of all water supply, drainage, irrigation, and other underground facilities. Prior to entering a tract of land for subcontract purposes, the Contractor shall ascertain from the property owner or other reasonably available source the location of any irrigation system, domestic water system, source of water, and drainage system existing on the property, whether serving that property or other property. The Contrator shall report any findings to the COR. The Contractor shall avoid damaging or obstructing these facilities or polluting water supplies.

E. The Contractor shall hold the FAA harmless from any and all suits, actions, and claims for damages, including environmental impairment, to property arising from any act or omission of the Contractor, its Subcontractors, or any employee of the Contractor or Subcontractors, in any way related to the work or operations under this contract.

F. The Contractor shall indemnify and hold harmless the FAA lawfully in possession against all claims or liabilities asserted by third parties, including all governmental agencies, resulting directly or indirectly from the Contractor's wrongful or negligent acts or omissions.

G. The Contractor shall maintain all roads used by it, and upon completion of the job shall leave them in as good a condition as when first used. A road-grading machine, not a bulldozer, shall be used for maintenance and final grading, when necessary. In no event shall the Contractor interfere with the property owner's use of roads existing prior to the Contractor's entry.

1.4 PROTECTION OF INSTALLED WORK

A. Protect installed Work. Provide special protection where required in the Specifications and drawings or under manufacturer’s warranty.

B. Provide temporary and removable protection for installed Products. Control activities in immediate Work area to prevent damage.

C. Protect finished floors and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

D. Prohibit traffic or storage upon completed surfaces. Obtain protection instructions from the manufacturer if traffic or activity is necessary.

SECTION 017600

ORDERLY WORKSITE AND SITE CLEANUP

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. This section sets out the basic Contractor requirements for maintaining an orderly and clean worksite.

1.2 BASIC REQUIREMENTS

A. The worksite, including storage areas, shall be kept clean and orderly during progress of the work. The Contractor shall be personally responsible for the storage of tools and materials. The Contractor shall and shall require each subcontractor engaged upon the work to bear full responsibility for cleaning up during and immediately upon completion of their work.

B. The Contractor shall provide on-site containers for the collection of waste material, debris and rubbish and periodically remove as required or at the direction of the COR. Any spillage on access or haul routes shall be cleaned up immediately. All spoil, waste, or debris removed from the work site and not specified for reuse or identified as salvageable items, shall become the property of the Contractor and shall be disposed of off site in areas authorized by the applicable Territory and/or Local agencies and in accordance with current rules and regulations governing the disposal of such waste. Disposal fees and miscellaneous charges shall be paid by the Contractor.

C. Unless specifically set forth in the Contract, burning is not permitted for the disposal of refuse and debris. All rubbish, waste, tools, equipment, and other apparatus caused by or used in the execution of the work shall be removed. This shall in no way be construed to relieve the Contractor of its primary responsibility for maintaining the facilities and the site clean and free of debris, and leaving all work in a clean and proper condition acceptable to the COR.

D. Immediately after unpacking, all packing material, case lumber, wrappings, or other rubbish, flammable or otherwise, shall be collected and removed from the building and the premises.

PART 2 – MATERIAL

NOT USED

PART 3 – EXECUTION

3.1 PROGRESS CLEANING AND WASTE REMOVAL

A. Remove all rubbish, waste, tools, equipment, and appurtenances used from the worksite at the end of each day to maintain egress, safety, and sanitation.

B. Remove debris and rubbish from closed or remote spaces before enclosing the space. Collect and remove waste materials, debris, and rubbish from site, and dispose of off-site.

C. Sweep and vacuum clean interior areas before start of surface finishing and continue cleaning daily to eliminate dust.

3.2 OVERALL CLEANING

A. Immediately before the final inspection, the entire exterior and interior of any building and the surrounding areas shall be thoroughly cleaned by the Contractor, including but not limited to the following:

1. All construction facilities, debris, and rubbish shall be removed from any building and the site.
2. All finished surfaces within any building shall be swept, dusted, vacuumed, washed, or polished as required.
3. All tools, scaffolding, temporary utility connections or buildings, belonging to the Contractor, or used under his/her direction, shall be removed from the site.

3.3 FINAL CLEANING

A. Thoroughly clean entire worksite, exterior and interior of any building.

B. Remove debris and rubbish from any building and the worksite.

C. Finished surfaces within any building shall be swept, dusted, vacuumed, washed, or polished as required.

D. Remove all tools, scaffolding, temporary utility connections or buildings belonging to the Contractor or its lower tier subcontractors from the Site.

E. Reseed disturbed areas. Rake and restore all gravel surfaces.

PART 4 – QUALITY ASSURANCE

NOT USED

SECTION 017700

CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.1 SECTION INCLUDES

This section sets out the requirements for contract closeout at completion of the work.

1.2 FINAL SUBMITTAL REQUIREMENTS

Prior to final acceptance, the Contractor shall assemble all appropriate warranties, product information, certifications, equipment installation instructions, MSDS sheets, and the results of all tests.

1.3 COMPLETION CERTIFICATE

A. When the Contractor considers the work completed, they shall submit a signed certification, certifying the following:

1. Contract Documents have been reviewed and work inspected for compliance with the Contract, including Punchlist work, and accepted by the FAA.
2. All materials used in the project are asbestos and lead free.
3. Record Documents, As-Builts, final project photographs, damage or settlement survey, property survey, Record Drawings and similar final record information as required and acceptable to the CO have been submitted by the Contractor.
4. Equipment/systems have been tested in the presence of the COR and are operational.
5. Spare parts have been provided as required.
6. Warranties and guarantees have been prepared and found acceptable to CO.
7. Work is completed, premises cleaned and ready for inspection, temporary facilities and services have been removed, and pre-existing conditions have been restored.
8. All maintenance personnel have been properly instructed in the use of the facilities and all installed equipment as required by the Contract Documents.
9. Contractor has released all property installed in the performance of the contract.
10. Return of all ZOA ARTCC identification badges and keys.

1.4 CONTRACTOR ACCEPTANCE INSPECTION (CAI)

A. The Contractor shall coordinate with the COR the date to schedule the CAI. The Contractor shall notify the CO in writing seven days (or as otherwise agreed to) before an agreed upon CAI date.

B. The Contractor shall have the superintendent present at the CAI. The COR shall conduct an inspection of the facility to verify all contract conditions are met. Any additional required test results shall be submitted to the COR at this time. The COR reserves the right to have local FAA personnel conduct additional tests to verify that operational

requirements are met. The FAA reserves the right to have personnel present to document any concerns regarding final condition of the Site.

1.5 PUNCH LIST

A. When the Contractor feels the project is ready for punch list, the COR shall be notified. The Contractor and COR shall perform the initial punch lists independent of one another. This list shall include but not be limited to a list of discrepancies in the work, material, and equipment that is unacceptable as a final product. The two lists will then be combined by the Contractor. The Contractor shall correct all deficiencies, if any, noted on the punch list before final acceptance. Each item on the punch list that is completed will be initialed and dated by the COR. Work showing evidence of substandard performance will not be accepted and shall be corrected by the Contractor at its expense.

1.6 FINAL ACCEPTANCE OF WORK

A. The Contractor shall correct discrepancies noted on the punch list prior to the final acceptance. The premises shall be thoroughly clean prior to final acceptance. Contractor shall schedule final inspection and notify in writing the CO and COR seven days (or as otherwise agreed to) before the planned inspection date.

B. Contractor shall have the superintendent present at the final inspection. The COR shall conduct the final inspection of the facility to verify all contract conditions are met.

C. Upon acceptance by FAA, Contractor may submit Final Application for Payment

PART 2 – MATERIAL

NOT USED

PART 3 – EXECUTION

NOT USED

PART 4 – QUALITY ASSURANCE

NOT USED

SECTION 020700
SELECTIVE
DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of selected building elements.
   2. Demolition and removal of selected building service equipment.
   3. Patching and repairs.

B. Related Sections include the following:
   A. Section 020800- Asbestos Abatement

1.2 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Government's property.

B. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Resident Engineer, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

1.3 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Government's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

1.4 SUBMITTALS

A. Proposed dust-control measures.

B. Proposed noise-control measures.

C. Schedule of selective demolition activities indicating the following:

   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
   2. Coordination for shutoff, capping, and continuation of utility services.
   3. Use of freight elevator and stairs.
   4. Detailed sequence of selective demolition and removal work to ensure uninterrupted progress of Government's on-site operations.
   5. Coordination of Government's continuing occupancy of portions of existing building and of Government's partial occupancy of completed Work.
   6. Locations of temporary partitions and means of egress.

D. Inventory of items to be removed and salvaged.

E. Contractor is advised that photographs or videotape, sufficiently detailed, showing existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations, can be used to document conditions. Videotaping and photography shall be coordinated and cleared with the Resident Engineer.

F. Record drawings at Project close-out: Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

G. Landfill records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

H. Description of proposed ventilation method for work areas during construction.

1.5 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed selective demolition Work similar to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.6 PROJECT CONDITIONS

A. Government will occupy portions of the building immediately adjacent to selective demolition area. Conduct selective demolition so that Government's operations will not be disrupted. Provide not less than 10 calendar days notice to Government of activities that will affect Government's operations.

B. Government assumes no responsibility for actual condition of buildings to be selectively demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Government as far as practical.

C. Hazardous Materials: Asbestos, lead-containing coatings, PCB's and other hazardous materials are present in the building areas to be selectively demolished.

1. Refer to Drawing ZOA-D-ARTCC-A176 for locations of asbestos removal.

2. Do not disturb asbestos or materials suspected of containing asbestos except under the procedures specified elsewhere in the Contract Documents.

D. Storage or sale of removed items or materials on-site will not be permitted.

E. SCHEDULING

F. Arrange selective demolition schedule so as not to interfere with Government's on-site operations.

1.7 WARRANTY

A. Existing Special Warranty: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

A. Use repair materials identical to existing materials.

1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
2. Use materials whose installed performance equals or surpasses that of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Resident Engineer.

D. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition.

E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

A. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by the Resident Engineer. Provide temporary services during interruptions to existing utilities, as acceptable to the Resident Engineer.

a. Provide not less than 10 calendar days notice to Government if shutdown of service is required during changeover.

B. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving building to be selectively demolished.

1. Government will arrange to shut off indicated utilities when requested by

Contractor.

2. Arrange to shut off indicated utilities with utility companies.

3. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.

4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the COR. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by the Resident Engineer.

2. Protect existing site improvements and appurtenances to remain.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain and are exposed during selective demolition operations.

D. Erect and maintain dustproof partitions to limit dust and dirt migration and to separate areas from fumes and noise.

1. Construct dustproof partitions of not less than nominal 2 x 4 fire retardant wood studs with 6 mil polyethylene sheet, with joints taped to form dustproof barrier.

2. Seal joints and perimeter. Equip partitions with gasketed or weather-stripped doors to maintain dustproof conditions.

3. Protect air-handling equipment.

4. Weather-strip openings.

E. Preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

F. Requirements for ventilation of work areas during asbestos abatement are provided in Section 02080.

3.4 POLLUTION CONTROLS

A. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

B. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

3.5 SELECTIVE DEMOLITION

A. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level.

2. Neatly cut openings and holes plumb, square, and true to dimensions required.

Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire- suppression devices during flame-cutting operations. Torch cutting or welding only permitted in staging area and other area designated by the Resident Engineer. Maintain one additional individual per torch/welder solely as a fire watchperson.

5. Maintain adequate ventilation when using cutting torches.

6. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

7. Dispose of demolished items and materials promptly.

8. Return elements of construction and surfaces to remain to condition

existing before start of selective demolition operations.

9. Noisy demolition shall be performed during the hours of 6 P.M and 5 A.M. Coordination shall be accomplished by the contractor a minimum of 7 calendar days prior to any “off hours” work.

B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.

3.6 PATCHING AND REPAIRS

A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.

B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

1. Completely fill holes and depressions in existing masonry surfaces to remain with an approved masonry patching material, applied according to manufacturer's printed recommendations.

C. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Government's property and legally dispose of them.

3.8 CLEANING

A. Sweep the building broom clean on completion of selective demolition operation.

B. Change filters on air-handling equipment on completion of selective demolition operations.

3.9 SELECTIVE DEMOLITION SCHEDULE

A. Remove the following to the extent shown on the Drawings:

1. Architectural Items:

a. Items shown on the drawings.

2. Mechanical and Plumbing Items:

a. Vent and drain piping.

b. Piping, supports, insulation and accessories - See Section 02080, “Asbestos Abatement.”

3. Electrical Items:

a. Items shown on drawings.

SECTION 020800
ASBESTOS
ABATEMENT

PART 1 – GENERAL

1.1 SUMMARY

Applicable provisions of Division 1 - General Requirements, Drawings, and other provisions and requirements of the Contract Documents apply to work of this Section.

A. This Section includes the removal, control and disposal of friable and nonfriable asbestos containing materials (ACM) which will be encountered during the work of the Restroom Renovation Project at the Oakland ARTCC, Freemont, CA. The work includes, but is not limited to: the construction of temporary enclosures to isolate the work area, the establishment of negative-air pressure within the isolated work area, the removal of ACM from the isolated work area, and the legal disposal of the removed ACM from FAA property. The scope of work would consist of:

The removal of the following asbestos-containing materials (ACM): Floor tile and mastic, TSI fittings, and base board mastic.

The work also includes the disposal of the generated ACM wastes. Specific operational procedures shall be outlined in the required Asbestos Abatement Plan called for elsewhere in this specification.

The work also includes attendance and participation in onsite meetings, such as the pre-bid and pre-construction meeting as required throughout the project.

The Contractor shall refer to the Contract Drawings for more details of areas to be abated.

A recommended abatement operation sequence is outlined in Section 3.8 ABATEMENT PROCEDURES. The contractor may submit a different operation sequence for approval as part of the overall process of submitting the Abatement Plan for approval.

1. Observe all existing conditions prior to submitting a bid. The Contractor is expected to have considered, and included in their bid, all aspects and liability of the existing conditions and their impact, particularly to cost and health and safety of workers and occupants, and proper function and operation of the facility. Additionally, the Contractor shall be aware of other work being performed. Failure to visit the site shall in no way relieve the Contractor from the necessity of furnishing materials or performing any work that may be required to complete the work in accordance with the Contract Documents without additional cost to the FAA. Additional site visits required by the Contractor, shall be scheduled with the FAA.

2. The quantities and locations of ACM and the extent of work indicated are only best estimates which are limited by the physical constraints imposed by occupancy of the facility. Accordingly, minor variations (plus or minus 15 percent) in quantities of ACM within the limits of containment for each abatement area are considered as having no impact on contract sum and contract time. Locations of ACM different than indicated on drawings but within the limits of

containment are considered as having no impact on contract sum and contract time. Where additional asbestos abatement work is required beyond the above variations, the contract sum and contract time will be adjusted under provisions of Division One of the Specifications.

Location/Material: See Project Drawing: ZOA-D-ARTCC-A176

1.2 REGULATORY REQUIREMENTS

The current issues of the following documents in effect on the date of Invitation for Bids form a part of this specification and are applicable to the extent specified herein. Work shall conform to applicable federal, state and local government regulations and to the requirements specified in these Contract Documents. These regulations are in addition to the State of California Department of Environmental Quality Regulations Title 8 Section 15.29. Whenever inconsistencies occur between the referenced materials, the more stringent shall apply. The intent of these documents is to verify the work is conducted at the highest level of safety.

A. American National Standards Institute (ANSI) -

1. Z9.2Fundamentals Governing the Design and Operation of Local Exhaust Systems.

B. American Society for Testing and Materials (ASTM) -

1. D2l03 - Polyethylene Film and Sheeting

2. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

C. Code of Federal Regulations (CFR) -

1. 29 CFR - Part 1910 Occupational Safety and Health Regulations

a) 1910.132 - Personal Protective Equipment

b) 1910.134- Respiratory Protection

c) 1910.141 - Sanitation

d) 1910.145 - Specifications for Accident Prevention Signs and Tags

e) 1910.1000 - Air Contaminants

f) 1910.1001 - Asbestos

g) 1910.1200 - Hazard Communication

2. Part 1926Safety and Health Regulations for Construction

a) Subpart D - Occupational Health and Environmental Controls

b) 1926.1101 – Asbestos Appendix F - Work Practices and Engineering Controls for Major Asbestos Removal, Renovation, and

Demolition Operations.

c) Appendix H - Substance Technical Information for Asbestos.

d) Appendix I - Medical Surveillance Guidelines for Asbestos.

3. 40 CFR, - Part 61 National Emission Standards for Hazardous Air Pollutants

a) Subpart A - General Provisions

b) Subpart M - National Emission Standard for Asbestos

4. Part 763 - Asbestos-Containing Materials in Schools; Final Rule and Notice (10/30/87).

D. National Institute for Occupational Safety and Health (NIOSH) Department of Health and Human Services

1. Method 7400 Fibers
2. Method 7402 Asbestos Fibers

E. National Fire Protection Association (NFPA)

701 - Standard Method of Fire Tests for Flame-Resistant Textiles and Films.

1.3 SUBMITTALS

A. Contractor Identification: The Asbestos Abatement Contractor shall be licensed by the State of California for the purpose of removal, encapsulation, enclosure, demolition, and maintenance of structures of components covered by or composed of asbestos containing materials.

1. Company name and address (street and mailing if different)

2. Name of individual supplying information

3. Name of parent company, if any

4. Address of office responsible for this project

5. Telephone number

B. Insurance:

1. Insurance carrier and coverage
2. Surety company
3. Special coverage specifically regarding asbestos
4. Names of full-time field supervisory personnel, and years of asbestos removal experience
5. Names of part-time field supervisory personnel, and years of asbestos removal experience
6. Number of full-time laborers

7. Number of part-time laborers
8. Name of employees union, if any
9. Usual ratio of supervisory to labor personnel used

D. Experience:

1. Briefly describe company history
2. Provide evidence verifying that the company has a minimum of three (3) years of successful abatement experience working in the State of California
3. Provide a representative list (at least three projects) of successful asbestos abatement projects working in occupied environments, such as in hospitals or computer centers. List project name, date, size, duration, removal cost, references and telephone numbers for each project.
4. State average yearly dollar volume of asbestos removal work over the past two years.

E. Regulatory:

1. List and explain warnings or citations received from Federal, State or Local Regulatory Agencies related to asbestos abatement activities. Include project name, date and resolution.
2. List assessed penalties, liquidated damages or schedule overruns and resolutions which occurred. Include contract terminations.
3. List projects where removal activities were halted by the owner, architect or consultant. State project name, date, reason for shut-down and resolutions.
4. List asbestos-related legal proceedings/claims in which the company (or employees scheduled to participate in this project) have participated or are currently involved. Include descriptions of role, issue and resolution to date.

F. Medical Requirements (29 CFR 1910.1001/1926.1101):

1. Provide a copy of the company's Medical Surveillance Program.
2. Provide documentation from a physician that employees or agents who may be exposed to airborne asbestos in excess of background levels have been provided with an opportunity to be medically monitored to determine whether they are physically capable of working while wearing the respirator required without suffering adverse health effects. In addition, the Contractor shall document that personnel have received medical monitoring as required in OSHA 29 CFR 1910.1001 (g) and 1926.1101. This documentation shall be submitted for each employee entering the regulated (removal) area.

G. Asbestos Training:

1. Provide a copy of the company's training program for supervisors and laborers.

   The program shall include, but is not limited to, how often training is conducted, who conducts the training, when it is conducted, what the duration of the program is and how documentation of training is accomplished.

2. The Contractor shall submit signed certificates for each employee stating that each employee has:

   a) Received training in the proper handling of materials that contain asbestos.

   b) Understands the health implications and risks involved (including the illnesses possible from exposure to airborne asbestos fibers).

   c) Understands the use and limits of the respiratory equipment to be used.

   d) Understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment.

H. Respiratory Protection: Provide a copy of the company's respiratory protection training program.

I. Health and Safety Program: Provide a copy of the company's health and safety program.

J. Project Personnel:

1. Provide number of full-time laborers that will be assigned to this project.

2. Provide number of crews and shifts for this project.

K. Asbestos Abatement Plan: Submit a detailed plan and schedule of the work procedures to be used in the removal of asbestos containing materials to the COR within ten (10) business days after the preconstruction meeting. The abatement plan shall be reviewed and approved by the contractor’s industrial hygienist (refer to section 2080.1.4.B) and shall include:

1. A physical description of the work area;

2. A detailed work area layout plan showing the location of temporary scaffolding, decking, access ladders, stairways, and elevators (interior & exterior), as needed;

3. A layout of decontamination and bag-out chambers;

4. A detail of the "Z-flap" construction;

5. A description of the material to be removed and the approximate quantity;

6. A description of the methods to be used to remove the asbestos-containing material;

7. The wetting agent to be used, including manufacture’s product data;

8. A description of the lock down agent to be used at the end of the project, including manufacture's product data;

9. Interface of trades involved in the construction and sequencing of asbestos- related work;

10. A schedule for turning off and sealing existing ventilation systems;

11. A description of work practices to be observed by employees;

12. A description of personal protective equipment and clothing to be worn by employees;

13. Personal hygiene procedures;

14. Labeling procedures;

15. A description of the local exhaust ventilation systems to be used and air change calculations;

16. A description of the method to be used to transport waste material;

17. Location of the EPA approved landfill;

18. An abatement schedule in time line format;

19. A description of all hazard sign text.

20. Locations of air sampling stations, as coordinated with and approved by the RE.

L. Laboratories: Submit copies that the laboratory to be used by the Abatement Contractor for personnel and air monitoring samples on this contract is accredited by the American Industrial Hygiene Association (AIHA) for Phase Contrast Microscopy and is participating in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program, and accredited for Transmission Electron Microscopy (TEM) analysis by the National Voluntary Laboratory Accreditation Program (NVLAP).

M. Miscellaneous: Submit copies of the Notification to the EPA, Asbestos Abatement Contractor's State License for Asbestos Removal, Hazardous Waste Manifest Form, and manufactures data on materials used at the site.

N. Submittal Notarization: Sign and date submittal, indicating name and title of person signing.

O. Title to Materials: Provide all required Federal, State and Local documentation regarding the transportation and disposal of ACM and asbestos contaminated materials at the earliest possible time. Submit proof of proper ACM material disposal to COR.

1.4 SYSTEM DESCRIPTION

A. The work consists of the containment and removal of asbestos containing materials.

Asbestos is a material which can cause a serious health risk to humans. The work is governed by a body of local, state and federal rules, regulations and laws. The Asbestos Abatement Contractor agrees by accepting the contract that their company is fully knowledgeable of this information and will bear full responsibility for the health and safety of workers, FAA's employees and invitees, and third parties, who come in contact with the work site.

B. The contractor's industrial hygienist shall be responsible for reviewing and approving the contractor's abatement plan.

C. The FAA will employ a Certified Industrial Hygienist to monitor conformance of the abatement contractor to the Contract Documents. This does not relieve the contractor of any responsibility for conformance to contract requirements.

D. Before any abatement work begins and in preparation of submitting the asbestos abatement plan, the contractor and the FAA shall review the building and determine air sampling station locations to be used to establish baseline readings and to monitor ongoing abatement operations. At least two of these stations shall be in occupied areas outside the designated work area. The Contractor shall monitor fiber counts and provide this information to the RE for posting within the building.

E. The Contractor shall cooperate with the COR and the COR. This cooperation shall include allowing access to the work areas to allow for visual and air monitoring, collecting samples, providing requested data on personnel, equipment, scheduling and facilitating FAA's monitoring of the work.

F. The Contractor shall not allow anyone access to the site who is not authorized by FAA or the Contractor to enter the site of work.

G. The Contractor shall provide personal protective equipment for two (2) authorized persons including full protective clothing and Powered Air Purifying Respirator (PAPR) with adequate filters without charge. The Contractor shall allow full use of facilities by the COR.

H. The Contractor is responsible for maintaining a log of all personnel who enter the work place. A copy of logs shall be submitted to the COR on a weekly basis.

I. The Contractor shall install warning labels in prominent locations adjacent to asbestos containing material identified in this specification to remain. The labels shall be installed before demolition or construction starts under this contract. The labels will remain in place as the property of the FAA. The labels shall be printed in large, bold letters on a contrasting background and conform to the requirements of 29 CFR 1926.1101 and contain the following information:

DANGER
CONTAINS ASBESTOS
FIBERS

AVOID CREATING DUST
CANCER AND LUNG
DISEASE HAZARD

1.5 PROJECT CONDITIONS

A. The ARTCC is a 24-hour per day, 7-day per week facility which is essential to the safe operation of Air Traffic. The Contractor will be responsible for the continuous protection of this facility and its employees and shall immediately notify the RE in the event of a breach of this protection. Coordinate construction and abatement activities with the RE in order to prevent any disruption of this critical operation.

1. Disruption of operations for any amount of time could jeopardize the safety of the flying public and may result is criminal prosecution.

2. The FAA will occupy the facility during construction activities. The Contractor shall cooperate fully with the COR during construction operations to minimize conflicts and to facilitate FAA usage. The Contractor shall perform the work so as not to interfere with FAA operations. The Contractor shall provide FAA personnel access to equipment remaining in service. The Contractor shall construct containments to allow travel routes for FAA personnel and to allow moving of necessary equipment.

3. The work shall be limited to specific areas of the building and site. Unlimited Contractor access is specifically not permitted. Arrangements for use of the buildings and site will be restricted to those areas specifically allowed by FAA. Other contractors will be working at the site prior to and after asbestos abatement. The contractor shall cooperate with other contractors and prevent work by others from jeopardizing the asbestos work.

1.6 WORK BY FAA

A. Environmental monitoring and sample analysis for quality assurance.

B. The shut-down and re-start of mechanical equipment.

C. The shut-down of electrical circuits and equipment.

D. The removal of furniture and furnishings from the area prior to the start of the contract.

1.7 NOTIFICATION

A. The Contractor is responsible for asbestos related notifications and permits prior to and following abatement. Notify the COR ten (10) working days prior to the start of the asbestos removal operation.

1.8 HOURS OF WORK

A. The Contractor shall strictly adhere to work hours as specified. Deviations shall be pre- approved, in writing, by the COR 48 hours in advance.

B. Request to change work hours or overtime proposed by the Contractor shall require the RE's written approval prior to implementing changes. The COR's rejection of request for change shall not result in changing contract sum or extending contract time.

1.9 SCHEDULE OVERRUNS

A. If the work is behind the agreed time of completion, the CO shall deduct extra costs, including expenses, for FAA services due to the overrun, from the final payment to the Contractor, in addition to compensation for damages identified in other parts of the contract documents.

1.10 PRECONSTRUCTION MEETING

A. The FAA will schedule a preconstruction meeting after the Notice to Proceed. The minimum agenda will consist of the following:

1. Designation of responsible personnel and name the COR.

2. Establishing chain of authority. (The direction will be from the FAA in continual consultation with the COR.)

3. Tentative abatement schedule, as identified by the Contractor.

4. Critical work sequencing, scheduling.

5. Processing of field decisions and change orders.

6. Adequacy of distribution of Contract Documents.

7. Discuss procedures to be followed for Application for Payment.

8. Submittals: schedules, shop drawings, product data and samples, manufacturer's certifications of products, manpower reports, major equipment deliveries and priorities, procedures for maintaining record documents, use of FAA facilities by contractor (access, parking, office area, storage area, and waste load-outs), safety and first aid procedures, security procedures and housekeeping procedures.

1.11 PROJECT CLOSEOUT

A. Closeout Submittal: Upon completion of the work, the Contractor shall provide to the FAA, through the Contractor’s IH, a closeout submittal. The closeout submittal will consist of the following documents:

1. Written certification on final completion of the Work that Work complies with Contract Documents.

2. Certification that items on punch list issued at substantial completion have been completed or corrected and that tools, construction equipment and surplus materials have been removed from the site.

3. Contractor daily logs for abatement work.

4. Contractor entry/exit logs for each containment.

5. Copy of asbestos Waste Manifests for the project.

6. Copies of asbestos worker and supervisory personnel certifications, fit test records, and physicians written opinion forms.

7. Copies of air monitoring results.

PART 2 – MATERIAL

2.1 MATERIALS AND EQUIPMENT

A. Materials and products shall comply with the requirements of 29 CFR 1910.134 and 29 CFR 1926.1101.

B. Polyethylene Sheeting: ASTM D2l03, 6 mils thick, flame-retardant. Sheeting shall meet flammability requirements of NFPA 701, and flame spread and smoke density requirements of ASTM E84.

C. Duct Tape: Pressure-sensitive adhesive tape, 3 mils (min.) thick by 2 or 3 inches wide, water-proof.

D. Aluminum Foil Tape: General purpose aluminum foil tape. To be used to water proof area of work. See 3.7. Total thickness of 5 mils with a foil thickness of 2 mils. Tensile strength of 15 lbs/in.

E. EPDM: To be used to water proof area of work. See 3.7. Thickness shall be a minimum of 45 mil.

F. Protection Mat: To be used to water proof area of work. See 3.7. Thickness shall be 4.5 oz per sq yd.

G. HEPA Filtered Vacuum: Vacuum(s) shall be:

1. Capable of removing 99.97% of the asbestos particles (0.3 microns or greater in diameter) from the air.

2. Portable

3. Equipped with hoses of sufficient length to reach areas behind pipes, ducts and other obstacles.

H. HEPA Filtered Ventilation System: Portable ventilation system designed to exhaust and clean the air inside the enclosure prior to exhausting to the outside of the building. The system shall be capable of filtering particles of 0.3 micron in size with an efficiency of 99.97%. Units shall be equipped with the automatic restart feature.

I. Wetting Agent: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the asbestos-containing material and in retardation of fiber release during disturbance of the material, equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether mixed with five gallons of water.

J. Encapsulant: Provide an encapsulant/sealant which will be compatible with the existing surfaces and one which will act as a suitable substrate for future sprayed-on fireproofing. Taint (or tint) the encapsulant with a contrasting color, to be approved by

the COR, so as to identify coverage.

K. Airless Sprayer: Hand-pump type, pressure-can sprayer fabricated of either metal or plastic, equipped with a wand at the end of a hose capable of delivering a stream or spray of liquid under pressure.

L. Respirators: Personal protective breathing equipment shall be in accordance with 29 CFR 1910.134, 29 CFR 1910.1001 and 29 CFR 1926.1101.

M. Signs and Labels: Signs and labels shall be provided in accordance with 29 CFR 1910.145, 29 CFR 1910.1001, 29 CFR 1910.1200, 29 CFR 1926.1101 and 40 CFR 61 subpart M.

N. Disposal Bags: Leak-tight, 6 mil thick polyethylene bags with appropriate hazard warning, per EPA regulations 40 CFR 61.150 (a) (1) (v) or OSHA requirement 29 CFR 1910.1001 (g) (2) (ii), and 29 CFR 1926.1101.

O. Miscellaneous Materials: Provide tangible supplies (such as coveralls, duct tape, soap, shampoo, towels, etc.), for persons entering the removal area. This includes FAA personnel and other persons approved for entry.

PART 3 – EXECUTION

3.1 EMERGENCY PLANNING AND PROCEDURES

A. Emergency planning procedures shall be developed by the Contractor and agreed to by the RE prior to abatement initiation.

B. Emergency procedures shall be in written form and prominently posted in the clean change area and equipment room of the worker decontamination area. Everyone, prior to entering the work area, shall be required to read and sign these procedures to acknowledge receipt and understanding of work site layout, location of emergency exits and emergency procedures. The Contractor shall review and designate containment area emergency exits in adequate number and location to safely exit workers in the event of the need to do so. Consideration shall be given to the resultant contamination, but as a second priority to life safety. The Contractor shall be responsible for required decontamination.

C. Emergency procedures shall include a schedule of planned abatement activities, work schedule, and layout of work area, particularly barriers that may affect response capabilities, shall be provided to the facility Area Operations Manager in case of emergencies.

D. Emergency planning shall include considerations of fire, explosion, toxic atmospheres, electrical hazards, slips, trips and falls, confined spaces and heat related injury. Written procedures shall be developed and employee training in procedures shall be provided.

E. Employees shall be trained in evacuation procedures in the event of work place emergencies:

1. For non-life threatening situations, employees injured or otherwise

incapacitated shall be decontaminated following normal procedures, with assistance from fellow workers if necessary, before exiting the work place to obtain proper medical treatment.

2. For life-threatening injury or illness, worker decontamination shall be secondary after measures stabilize the injured worker. Remove workers from the work place and secure proper medical treatment prior to decontamination.

F. Telephone numbers of emergency response personnel shall be prominently posted in the clean change area and equipment room, along with the location of the nearest telephone.

G. Upon coordination with the COR, the Contractor shall clearly mark the exit paths within the enclosure for emergency egress. The Contractor shall use a fluorescent paint or tape and apply the markings no more than 24" above the floor surface.

H. Inspection by the COR: During asbestos work, the work will be subject to on-site inspection by the COR, who may be assisted by the Contractor's IH, safety personnel or a Certified Industrial Hygienist.

I. Work Stoppage: The COR will immediately issue a "stop work" order to the Contractor for any of the reasons listed below. No work will be allowed to resume until the conditions stabilize and upon approval from the COR. Time before work resumes includes FAA management notification to local unions. Standby time required to identify and resolve the problem will be at the expense of the Contractor and may include the costs incurred by the FAA.

1. If asbestos air monitoring results indicate the presence of airborne fibers to be greater than 0.01 f/cc above the established airborne fiber baseline readings outside the containment at the established air monitoring stations. All air monitoring samples exceeding the 0.01 f/cc (above established baseline readings)

   shall be immediately sent by the contractor (at the contractor's expense) for analysis by Transmission Electron Microscopy (TEM) to determine actual fiber composition. Results shall be provided to the RE within 24 hours. No work will be allowed to resume until the conditions stabilize and upon approval from the COR. Standby time required to identify and resolve the problem will be at the expense of the Contractor and may include the costs incurred by the FAA.

2. If the pressure differential inside the containment varies more than 0.015 inches of water beyond the design pressure differentials established in Section 2080.3.5 (B).

3. If excessive water accumulations appear or if water leakage is detected in areas

   adjacent to the removal area.

4. If the work is found to violate specified requirements

3.2 GENERAL DESCRIPTION OF WORK

A. Comply with the requirements of these Specifications and ANSI Z9.2, 29 CFR 1910.145, 29 CFR 1926.1101 and 40 CFR 61 and 763. The most stringent of codes shall apply. The following will be considered as the typical sequence to the asbestos abatement work. Refer to the following sections for specific procedures for the asbestos removal project.

1. Establishing Baseline TWA: Area monitoring, sufficient to establish a reference or baseline time-weighted average (TWA) for each abatement area, shall be accomplished by the Contractor at least 24 hours prior to the start of any construction activity.

2. Preparing the Work Area: Prepare the work area in accordance with Section 2080.3.7 of these specifications. In addition, be able to withstand the project design pressure differentials of Section 2080.3.5 (B).

3. Establish a worker decontamination system and a waste and equipment decontamination system in accordance with Section 2080.3.6 of these Specifications.

4. Initiate removal activities, cleaning and waste load-out.

5. Perform final cleaning, pass inspection from COR and initiate clearance testing.

6. Upon passing final clearance testing, restore work area to original conditions.

B. Environmental Monitoring: Environmental monitoring for airborne fiber concentrations and pressure differential, and all other abatement inspections will be accomplished by or under the direction of the contractor's Industrial Hygienist. The FAA will obtain the services of an independent Industrial Hygienist for quality assurance and consulting on abatement operations.

C. Wet Removal: All ACM will be removed using an amended water wet removal method as recommended by the EPA and OSHA. The Contractor shall provide for the continual prevention of excessive water accumulation throughout the duration of the project.

D. Housekeeping: Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris. Keep waste from being distributed over the general area. Do not blow down the space with compressed air. The COR and/or the contractor's IH will inspect the removal area daily for residual asbestos material on the floors and decks, and for the accumulation of dust. The Contractor will be required to re-clean all areas noted having visible emissions by the inspection.

E. Asbestos Abatement Superintendent: The Contractor shall designate a qualified employee as superintendent to perform the following:

1. Oversee all Contractor personnel performing any asbestos related work, including:

a) Licensed carpenters

b) Licensed electricians

c) Licensed mechanical workers

2. Oversee construction of all enclosures, including the worker decontamination chamber and the waste load-out chamber.

3. Control entry to and exit from the removal area.

4. Supervise all employee exposure monitoring required by OSHA.

5. Verify the proper use of protective clothing and equipment.

6. Verify that all occupants of the removal area are properly trained and certified.

7. Verify the proper use of hygiene facilities and decontamination procedures.

8. Verify that all engineering controls are functioning per design.

F. Disposal Supervisor: The Contractor shall designate a qualified individual to oversee the following "clean-up", "housekeeping" and disposal tasks in accordance with these Specifications, specifically:

1. Continuous floor and horizontal surface clean-up.

2. Continuous clean-up of ACM debris.

3. Continuous collection and disposal of water build-up. No puddling or ponding water will be tolerated. The Contractor SHALL take precautions to insure that no water used during the abatement process affects other floors of the facility.

4. Regular inspection of disposal procedures to verify conformance with this specification as well as all Federal, State and Local Laws.

5. This individual shall have no other duties and shall be responsible for the daily removal of ACM from the regulated area.

3.3 PERSONAL PROTECTIVE EQUIPMENT

A. Personal Protective Equipment (PPE): The Contractor shall provide PPE for workers, FAA representatives, and authorized visitors and shall include, at a minimum, full body and head coverings (i.e. Tyvek coveralls) as well as full face PAPR. Respiratory protection shall comply with 29 CFR 1910.134 and 29 CFR 1926.1101.

3.4 TEMPORARY FACILITIES AND UTILITIES

A. Field Office: The FAA shall furnish temporary office space for the contractor. The office shall be made available for use by FAA representatives; Contractor’s IH or authorized visitors.

B. Temporary Electric: The FAA shall provide the contractor access to utilities. The contractor is responsible for providing all modifications necessary to meet

safety requirements specific to abatement operations. The Contractor shall provide:

1. Circuit protection for each circuit.

2. Ground fault interruption protection for all circuits.

3. Grounded, UL listed extension cords from power centers to the point of operation.

C. Temporary Lighting: The Contractor shall provide temporary lighting for construction needs, safe working conditions, public safety and security lighting. Lamps shall be covered with safety guards or deeply recessed in reflector. Lamps shall not be suspended by their electric cords unless cord and fixture is designed for that purpose.

D. Temporary Water: The FAA shall provide the contractor access to utilities.

E. Monitor Temporary Utilities: The Contractor shall be responsible for all damage to the work and the facility caused by a defect in such utilities.

F. Existing Systems: The Contractor may make written arrangements with the FAA to modify, supplement and extend an existing system to meet temporary requirements for the project, subject to approval by the COR. If existing systems are modified, supplemented and/or extended, the Contractor shall not overload the system or interfere with FAA's normal use of the system. The Contractor is advised that: The Loss of an Operation System for Any Amount of Time Will Jeopardize the Safety of the Flying Public.

G. Removal of Temporary Systems: The Contractor shall repair all damage caused by installation and restore to original conditions.

3.5 ISOLATION OF THE WORK AREA

A. Prepare the work areas in accordance with 29 CFR 1926.1101, Appendix F, and as detailed in section 2080.3.7 for each work area.

B. Establishing Negative Pressure: Establish negative pressure in accordance with the recommendations of 29 CFR 1926.1101 Appendix F, and to the extent stated below. Each system for each Phase shall run, without failure, for a 24-hour prior to the start of asbestos-related activity. Pressure differentials throughout the asbestos removal phases will be monitored continuously by the Contractor’s IH.

1. In the event of a loss of pressure to less than 0.015 inches of water from the Design Pressure Differentials at any time of the day or night, for any reason, the Contractor will immediately be called to the site to remedy the situation. Contractors shall be "on call" throughout the duration of the removal project, 24- hours a day, 7-days a week. Failure to remedy the situation may result in back charges to the Contractor for the services rendered from an outside source. Furthermore, an acute loss of pressure could result in the evacuation of the Control Room, which would jeopardize the safety of the flying public and may result in criminal prosecution against the contractor.

2. The negative-air pressure shall be adjusted to meet the Design Pressure Differential as indicated below and shall run continuously until final clearance is achieved. Once the Contractor has satisfied the pressure differential requirements, two (2) additional 2000 CFM negative-air units shall be set up to act as redundant elements, to be utilized in the event of equipment failure.

3. Definition of Zones: To verify the safety of the non-abatement environments inside and outside the ARTCC, the following Zones shall be established:

   a) ZONE I - Areas outside the asbestos removal area.

   b) ZONE II - The Asbestos Removal Area.

4. Design Pressure Differential Concept -

   a) $P_{ZONE\ I} > P_{ZONE\ II}$

   b) The intent of this Design Concept is to prevent the contamination of non-

   abatement areas.

5. Design Pressure Differentials Inches of

   water During Abatement Activities:

   P ZONE I - ZONE II 0.05

   During Off Hours:

   P ZONE I - ZONE II 0.03

6. Negative air units shall exhaust to the buildings exterior. The Asbestos Abatement Contractor shall be responsible for the restoration of the buildings to the preabatement condition after the completion of abatement.

C. Pre-Abatement Inspection: Upon completion of the work area containment and the establishment of negative pressure, the Contractor shall receive notification from the Contractor's IH before removal work is initiated.

D. Work Place Entry and Exit: Enforcement is the responsibility of the Contractor's Abatement Supervisor. Entry shall be controlled to prevent unauthorized, accidental access into the containment area.

E. Maintenance of Enclosure System: The COR shall be immediately notified of problems that have developed such as a puncture of the barrier system, electrical power loss, GFCI failure, equipment failure, accidental discharge into occupied areas, and partial collapse of the critical barrier (plastic sheet fails to remain in place), etc.

3.6 DECONTAMINATION UNITS

A. Worker Decontamination Unit: The Contractor shall provide a detailed plan of the decon chamber and location to the COR (in coordination with the Contractor's IH) for approval prior to beginning construction. Seal vertical and horizontal surfaces similar to Section 2080.3.7 of these Specifications. The chamber shall be water-tight, the Contractor shall be liable and responsible to the FAA for any leaks/damages occurring during the abatement activities. The worker decontamination chamber shall consist of, at a minimum, a clean room, an airlock, a shower area, a second airlock and a dirty room. Provide lockers for each asbestos worker. Keep street clothing and street shoes in locker. While in removal area, only disposable protective clothing may be worn, reuse will not be allowed nor will laundering be acceptable. Shoes and undergarments worn in the removal area shall not be removed without being thoroughly cleaned in the shower first and then properly bagged. Locate showers between the decontamination room and the clean room. The shower shall be equipped with hot (Contractor furnished) and cold running water.Each Person Entering the Removal Area Shall Shower Upon Exiting. Do Not Use the Worker Decontamination Unit for Equipment or Waste Decontamination.

The door to the decontamination unit, on the clean side, shall be lockable. The Contractor shall provide the RE with two (2) keys to the lock, or the combination. The door will be locked during hours when abatement work is not being performed.

B. Equipment and Waste Decontamination Unit: Provide a detailed plan of the proposed equipment and waste decontamination unit and location to the RE (in coordination with the Contractor's IH) for approval prior to the beginning of construction. Seal vertical and horizontal surfaces similar to Section 2080.3.7 of these Specifications. The unit shall be maintained water-tight, the Contractor will be liable and responsible to the FAA for leaks/damages occurring during the abatement activities. The equipment and waste decontamination unit shall consist of, at a minimum, a clean room, an airlock, a wash station, a second airlock and an equipment room. The unit shall provide a continuous closure from the building to the temporary storage unit. The unit shall be designed in such a way as to be completely enclosed and restrict access to the casual observer or passerby. In the event a vacuum type system is used, the Contractor shall install a 4 foot tall fence completely around the unit, creating a buffer zone between the unit and pedestrians passing by. The door to the bag-out chamber, on the clean side, shall be lockable. The Contractor shall provide the RE with two (2) keys to the lock, or the combination. The door will be locked during hours when abatement work is not being performed.

C. Wastewater: Water produced from the decontamination of persons, equipment or waste shall be collected and filtered through a system capable of trapping particles 5 microns or larger (unless local regulations are more stringent), specifically designed to remove asbestos fibers and approved by EPA. The used filters shall be disposed of as asbestos-contaminated waste. Comply with any local wastewater systems regulations regarding the disposal of wastewater from asbestos abatement activities.

3.8 ABATEMENT PROCEDURES

A. It is imperative that protection to the employees and FAA electronic equipment is in place before abatement procedures commence. The following procedures shall be followed unless otherwise approved.

1. Seal all wall penetrations that will be affected by the asbestos removal process.

2. Install waterproof flooring system on 1st floor slab to help prevent leakage

3. Prepare the work area. Erect Critical Barriers with duct tape and two (2) layers of 6 mil plastic sheeting to prevent air movement out of the area. All ceiling opening, ventilation grills and light fixtures shall be sealed to prevent air movement through ceiling openings. Access shall be limited to authorized personnel. Install OSHA/EPA approved ASBESTOS WARNING signs at the entrances to the work area. Materials that may be damaged from water contact shall be sealed water tight with 6 mil plastic sheeting to prevent water contact.

4. Establish respiratory protection for workers.

5. Construct a worker decontamination chamber and equipment and waste decontamination chamber according to Section 2080.3.6.

6. Establish negative pressure with HEPA negative pressure exhaust units according to Section 2080.3.5 (B).

7. Pass the contractor's industrial hygienist's (in coordination with the FAA's CIH) inspection of containment area set-up.

8. After written certification by the COR, initiate gross removal of the asbestos contaminated materials (as applicable).

9. Pass periodic inspections and air monitoring by the contractor's industrial hygienist to verify removal progress. The FAA's CIH will do quality assurance checks.

10. Upon completion of gross removal, double bag in clear 6 mil plastic disposal bags. Initiate final cleaning of the work area according to section 2080.3.7 (B).

11. Upon passing clearance testing, remove containment and prepare area for construction activities.

B. Final Clean-up: The following sequence of events shall apply:

1. Remove and containerize visible accumulations of asbestos-containing material and asbestos-contaminated debris utilizing rubber dust pans and rubber squeegees to move material around. Do not use metal shovels to pick up or move accumulated waste.

2. Wet clean surfaces in the work area using rags, mops, and sponges as appropriate. Be certain not to create any excess water build-up.

3. Doors, HVAC system vents and other openings shall remain sealed. The negative pressure ventilation units shall remain in continuous operation. Decontamination enclosure systems shall remain in place and be utilized.

4. Remove containerized waste from the work area and waste container bag-out airlock.

5. Decontaminate tools and equipment, and remove at the appropriate time in the cleaning sequence.

6. After cleaning the work area, wait at least 24 hours to allow fibers to settle, and HEPA vacuum and wipe clean objects and surfaces in the work area again.

7. Inspect the work area for visible residue. If any accumulation of residue is observed, it will be assumed to be asbestos, and the 24-hour settling period/cleaning cycle repeated.

8. Once the area passes the visual inspection by the contractor's industrial hygienist, equipment not going to be used should be recleaned and removed from the work area.

9. Apply encapsulant on surfaces and wait 8-24 hours before continuing.

10. Allow area to dry and then conduct visual inspection, reclean if required.

11. Conduct final air clearance tests according to Section 2080.3.9 (B) (3).

    Negative-air machines will operate continuously until test results verify a "clean" environment.

12. This process shall be repeated, at no expense to the FAA, until clearance is achieved. Repeated clearance testing due to unacceptable results shall be charged to the Contractor.

13.

3.9 PROCEDURE FOR DISPOSAL

A. Collect asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing which may produce airborne concentrations of asbestos fibers, and place in sealed impermeable asbestos bags. Each bag shall be pre-printed with an asbestos warning label. Double bag debris. Identify all waste bags and containers as follows:

FAA – Oakland,
ARTCC Freemont,
CA

(Name of Contractor)

1. Dispose of waste asbestos material at an Environmental Protection Agency

(EPA) or state-approved landfill off Government property. For temporary storage, store sealed impermeable bags in asbestos waste drums or waste storage containers. An area for interim storage of asbestos waste-containing drums or containers will be assigned by the FAA. Procedure for hauling and disposal shall comply with 40 CFR 61 (Subpart B), state, regional, and local standards. Workers unloading the ACM waste shall wear appropriate respirators and personal protective equipment when handling asbestos materials at the disposal site. A fully-sealed and plastic lined dumpster will be used for transportation of all ACM wastes.

The Waste Manifests will be signed by the Generator (FAA), the Waste Transporter and the Approved Landfill. Chain of custody procedures shall be complied with. Final payment will be held until the original waste manifest is provided to the FAA. The original waste manifest shall posses the signature of the representative of the disposal site receiving the waste. The Contractor shall not commingle asbestos waste generated on this project with asbestos wastes from other projects.

2. Minimum requirements for a waste manifest are as follows:

   a) Contain a unique number.

   b) Be signed by generator when shipping.

   c) Be signed by transporter when material is picked-up.

   d) Be signed by disposal facility when received.

   e) Name and address of pick-up site.

   f) Estimated quantity of waste.

   g) Specific location within the building where waste was generated.

   h) Type and number of bags and drums used at each specific location within the building.

   i) Name of Transporter.

   j) Disposal site name, location and EPA identification number.

   k) Copies of the manifest signed by the generator, transporter and disposal site shall be maintained by each entity.

3. The ACM waste shipment shall be transported directly from the job site to the EPA approved landfill. The Contractor shall notify the landfill of the date and time the ACM waste will arrive at the landfill. The landfill shall have a hole excavated to receive the ACM waste upon arrival. The waste containers shall be hand-placed into the hole, not tossed or thrown, and immediately covered with 6 inches of soil. Cost due to delay to the FAA caused by the ACM waste transporter, landfill operator or Contractor's failure to coordinate ACM debris landfilling will be charged to the Contractor and deducted from payments to the Contractor.

3.10 ABATEMENT AIR MONITORING (An IH Contractor Hired by the FAA to Monitor the Abatement and Establish the Air Monitoring on this Contract and this Contractor(s)).

A. Personal Monitoring: The Contractor is responsible for required air samples. An independent American Industrial Hygiene Association accredited laboratory shall be used to analyze air samples in accordance with OSHA Regulations 29 CFR 1910.1001 and 1926.1101. Fiber counting shall be completed and results reviewed by the IH and posted within 2 hours. The CIH shall notify the contractor and the RE immediately of any exposures to fibers in excess of the acceptable limits. Submit monitoring results to the RE and Facility Safety Officer within 3 working days, signed by the employee(s) performing the bulk sampling and air monitoring, the employee(s) that analyzed the sample, and the CIH.

B. Environmental Monitoring: The contractor shall be responsible for environmental monitoring for airborne fiber count and pressure differential on a daily basis when ever abatement work is on going. This work will be accomplished by a Certified Industrial Hygienist or an air sampling technician supervised by a CIH. Fiber counting shall be completed and results reviewed by the CIH and posted within 2 hours. The CIH shall notify the contractor and the RE immediately of any exposures to fibers in excess of the acceptable limits. Submit monitoring results to the RE and Facility Safety Officer within 3 working days, signed by the employee(s) performing the bulk sampling and air monitoring, the employee(s) that analyzed the sample, and the CIH. An independent accredited industrial hygiene laboratory shall be used to analyze air samples in accordance with OSHA Regulations 29 CFR 1910.1001 and 1926.1101.

1. Background Monitoring: Background samples will be collected 24 hours prior to the isolation of the work area. Background samples will be conducted by the contractor and will consist of a minimum of two (2) samples per work area and an additional sample for each 25,000 cubic feet of air space in excess of 50,000 cubic feet of air space. In addition, background samples shall be taken in at least three (3) other occupied areas in the facility in locations selected by the contractor's IH and the FAA's CIH (Five total samples).

2. Asbestos Abatement Monitoring: During asbestos abatement, the contractor's IH will collect one air sample at the worker decontamination chamber in the clean room, one air sample at the equipment and waste decontamination chamber in the clean room, one sample for each 50,000 cubic feet of air space (minimum of two samples) inside the work area and at least two samples outside the asbestos containment near the work area. Samples shall be taken by the contractor in at least three other occupied areas in the facility. Sample locations will be as previously selected by the contractor's IH and the FAA's CIH in during background/baseline sampling.

3. Clearance Monitoring: The Contractor shall notify the COR when the work areas are ready for clearance air monitoring. The contractor shall arrange to sample the air in the work area for airborne fiber concentrations in accordance with 40 CFR 763.

a) A minimum of five (5) samples will be taken in the abatement work area and analyzed by Transmission Electron Microscopy (TEM). Air volumes will be sufficient to provide reliable results down to a fiber

density of 70 s/mm^2 or lower. If any of the five samples show asbestos fiber density greater than 70 s/mm^2, or baseline, the area shall be recleaned and reanalyzed. The Contractor shall be required to bear the extra expense of recleaning as well as other FAA delay expenses incurred due to the Contractor's failure to pass clearance.

b) Clearance sampling shall be done under aggressive conditions as follows:

1) The Contractor shall set up at least one portable 20" diameter fan per 10,000 cubic feet (ft^3) of containment volume. The fans shall be positioned in the center of the space and the air flow directed towards the ceiling and operated on the "slow" speed setting. The fans shall operate throughout the duration of the final clearance air sampling period. Negative pressure ventilation units shall not be utilized for this purpose.

2) The contractor shall blow down surfaces with a portable electric leaf blower. The contractor shall operate the leaf blower for a minimum of 5 minutes per 1,000 square feet (ft^2) of containment area.

C. Accreditation of Laboratories: Proof shall be provided of the qualifications of the testing laboratory and personnel used by the Abatement Contractor for Personnel Samples and Environmental Monitoring. Accreditation by the American Industrial Hygiene Association (AIHA) for Phase Contrast Microscopy and certifications that persons analyzing the samples have been judged proficient by successful participation in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program shall be considered sufficient proof of compliance. Submittal shall be approved by the RE prior to beginning work.

SECTION 020900

LEAD CERAMIC TILE DEMOLITION AND DUST CLEAN-UP

PART 1 – GENERAL

1.1 SUMMERY OF LEAD RELATED WORK

A. This contract involves removal and disturbance of surface finishes that contain detectable quantities of lead. Certain existing ceramic tiled walls must be demolished as part of the plumbing renovation process of this contract. Ceramic wall tile demolition shall be completed in strict accordance with HUD lead guidelines, applicable regulations, this section, and other applicable sections of this contract.

1.2 SECTION INCLUDES

A. This section specifies requirements for lead ceramic wall tile demolition and lead dust clean up, but not limited to:

1. Submittals
2. Owner's Consultant
3. Contractor's Compliance and QA/QC Program
4. Products
5. Execution of Lead Related Work including:
    a. Work Area preparation
    b. Worker protection and decontamination
    c. Cleaning and decontamination
    d. Clearance inspection testing
    e. Waste storage, characterization, and disposal
6. Stop work orders
7. Project closeout

1.3 REGULATIONS

A. The Contractor shall comply with the requirements of the current issue of the following regulations and guidelines governing lead impacted construction and disposal and other applicable Federal, State, and Local Government regulations. The regulations listed herein are incorporated by reference.

1. FAA
    a. AWP-474.3
2. Code of Federal Regulations (CFR):
    a. 29 CFR 1926, Construction Standards
    b. 29 CFR 1926.62, Lead in Construction
    c. 40 CFR Part 50.12, Ambient Air Quality Standard for Lead
    d. 40 CFR Part 745 Lead,: Identification of Dangerous Levels of Lead
    f. 40 CFR Parts 261, 265 and 268, Hazardous Waste Management
    g. 49 CFR Parts 172, 173, 178, 179, Hazardous Material Transportation
3. California Code of Regulations:
    a. 8 CCR Division1, Chapter 4, Subchapter 4, Construction Safety Orders

b. 8 CCR 1532.1, Lead in Construction
c. 8 CCR 1531, Respiratory Protection
d. 22 CCR Division 4, Chapter 30, Hazardous Waste Management
e. 17 CCR Division 1, Chapter 8, Accreditation/Certification, and Work Practices in Lead-related Construction
f. 8 CCR 1532.1 Lead work Pre-Job Notification

4. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, U.S. Department of Housing and Urban Development (HUD), June 1995.

1.4 DEFINITIONS

A. Definitions specific to the work of this section:

1. **Air Monitoring -- The process of measuring the lead content of a specified volume of air in a stated period of time.**

2. Authorized Visitor -- The Building Owner, or Owner's Representative, Owner's Consultant, or a representative of any regulatory or other agency having jurisdiction over the project.

3. Competent Person -- An onsite supervisor who has been formally trained in lead related construction and who is capable of identifying lead hazards, substandard and improper lead abatement controls, procedures, practices, and conditions and who has sufficient experience and authority to take prompt corrective measures to eliminate them.

4. Fixed Object -- A unit of equipment or furniture in the Work Area which cannot be removed from the Work Area.

5. Hazardous Lead Waste -- Lead debris shall be classified as hazardous due to the characteristic of toxicity, as determined by testing in accordance with the California Code of Regulations, Title 22, Division 4, Chapter 30, Article 11. Any substance(s) listed in Article 11 Section 66699 at concentrations greater than their listed Soluble Threshold Limit Concentration (STLC) or Total Threshold Limit Concentration (TTLC) may need to be further characterized by the Toxicity Characteristic Leaching Procedure (TCLP) in accordance with 40 CFR 261 and other tests prior to disposal as a hazardous waste.

6. HEPA Filter -- A High Efficiency Particulate Absolute (HEPA) filter capable of trapping and retaining 99.97% of lead particles greater than 0.3 microns in diameter.

7. HEPA Vacuum Equipment -- High efficiency particulate air (absolute) filtered vacuuming equipment with a filter system capable of collecting and retaining lead dust. Filters shall be certified to be of 99.97% efficiency for retaining particles of 0.3 microns diameter or larger.

8. Lead Dust Clean Up – Clean up and decontamination of all dust and debris in Work Area. For this project, clean up includes surfaces of adjacent wall and floor area.

9. Lead-Based Paint (LBP) -- Lead-based paint as defined by HUD, EPA, and California DHS is any paint with a lead content that equals or exceeds 0.5%

lead by weight or 1.0 milligrams of lead per square centimeter of surface area.

10. Lead-containing paint (LCP) -- is paint with any detectable level of lead. All paints shall be assumed to contain lead unless laboratory testing proves otherwise.

11. Lead Paint Related Waste -- Paint chips, vacuum dust, and debris, used cleaning articles, waste water, plastic sheets, and other disposable items which were used during the LBP stabilization process and as a result are considered lead contaminated waste or assumed hazardous waste pending further characterization.

12. Owner -- Owner of the Building/Property, San Francisco Housing Authority.

13. Owner's Representative -- Person(s) designated or appointed by the Owner to represent them in all matters concerning the construction project at the site.

14. Owner's Consultant -- The environmental consulting firm and individual representatives of that firm, hired to provide technical oversight, including observation and monitoring services during the lead stabilization phase of the project.

15. Owner's Construction Inspector -- Owners Painter Supervisor or Construction Inspector appointed by the Owner to inspect work for conformance with the Contract Documents.

16. Qualified Person -- The individual identified by the Contractor to be responsible for conducting air sampling, calibration of air sampling pumps, evaluating sampling results, and conducting respirator fit tests.

17. Recognized Training/Educational Institution -- University, college, or a professional training organization funded by or meeting U.S. Environmental Protection Agency (EPA) and/or California Department of Health Services (DHS) accreditation requirements for contractors performing lead-related construction work.

18. Removal -- All herein specified procedures necessary to remove and clean-up all lead-containing waste from the designated areas and to dispose of these materials at an acceptable site in accordance with Federal, State, and Local Regulations.

19. Visually Clean -- Free of visible dust, paint chips, dirt, debris, or films removable by vacuuming or wet cleaning methods specified. For outside soil or ground cover areas, visually clean shall mean free of construction or paint debris, chips, or dust distinguishable from the initial soil or ground conditions.

20. Wet Cleaning -- The process of eliminating lead contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been washed with specified detergent solutions and rinsed with clean water. Includes use of 10% solution of chlorine bleach for mildew clean up.

21. Work Area -- A designated and controlled area in which lead containing

materials are impacted, lead dust clean up actions are undertaken or which may become contaminated as a result of such demolition actions. A Work Area is a controlled area delineated at minimum by barrier tape (or similar means) and signage to restrict access to Authorized Personnel. In some instances a higher degree of physical isolation and control may be required and specified.

21. Certified Lead Worker -- For this project, the term "certified lead worker" certifications, shall mean: 1. Supervisors that have been certified through the Department of Health Services (DHS) lead related construction certification program for Lead Supervisors (40-hour training program, exam, and experience);

    2. Workers (other than Resident Workers) that have been certified as DHS certified Lead Workers (24 hour training program); and Resident Workers (Section 3 Residents) that are trained a minimum of 8 hours to meet Cal/OSHA lead worker and job specific hazard training requirements.

1.5 SUBMITTALS AND NOTICES

A. In addition to any other submittal required by this contract, within the scheduled time frame, the Contractor shall submit three (3) complete copies of the following for the Owner's Representative and Owner's Consultant's approval. Partial submittals and/or submittals not ORGANIZED in the following format will NOT be accepted for review. WORK WILL NOT BEGIN UNTIL THE SUBMITTAL PACKAGE HAS BEEN FULLY APPROVED.

Submit the following:

1. Detailed work plan for lead ceramic wall tile demolition. Include equipment and materials proposed to remove ceramic tile and associated dust and debris. Include the procedures and practices for protection of building occupants, public, and the environment. At minimum, the plan should detail work area preparation and containment controls for all work areas, cleaning and decontamination procedures, signage, and security measures.

2. Detailed plan for disposal of lead wastes generated by this work in accordance with all applicable Federal, State, and Local regulations. Provide name and address of waste transporter and disposal sites for lead hazardous wastes.

3. Proposed location, size and type of secured lead waste storage containers to be used and describe how they will be kept safe and secure until disposal.

4. Detailed schedule for completion of lead ceramic tile demolition work to be updated on a weekly basis indicating tasks being performed until job completion.

5. Submit OSHA Lead Compliance Plan. This is a detailed plan for protection of workers, which includes all information required for the Cal/OSHA compliance plan per 8 CCR 1532.1. Additionally, submit the Cal/OSHA Pre-Job Notification in accordance with Cal/OSHA 8 CCR 1532.1.

6. Provide Certifications demonstrating that all employees engaged in lead related activities have attended formal training by a recognized training or educational institution to conduct lead-impacted construction activities, and are certified in accordance with the lead worker certification provisions in the Cal/OSHA and California Department of Health Services (DHS) lead regulations and this specification.

7. Provide documentation that all employees engaged in lead paint stabilization related activities have had the appropriate medical examinations within the prescribed time periods immediately preceding project start-up. Evidence of medical requirement compliance shall include, but are not necessarily limited to:

   a. Documentation of medical surveillance examination by a licensed medical physician prior to commencement of onsite lead-related work including baseline blood lead levels performed in accordance with Cal/OSHA 8 CCR 1532.1 Lead within the last twelve (12) months. The baseline blood lead shall have been within the past 30 days.

   b. Statement by the examining physician that employee is fit to wear a respirator in accordance with 8 CCR 1531 within the last twelve (12) months.

8. Product data sheets and material safety data sheets (MSDS) for each product proposed for use on this project.

9. Manufacturer's certification that HEPA vacuums, HEPA ventilation equipment, and other equipment required to contain airborne dust conform to ANSI Z 9.2

B. Daily/In Progress Submittals - submit the following documentation daily to the Owner's Consultant within 24 hours of initiation:

1. Updated training and medical certifications as required herein shall be provided prior to assignment of new personnel and for existing personnel prior to the stated allowable time limits, expiration dates. The allowable intervals since the last medical examination (12 months), blood lead test (6 months), or fit test (6 months), shall not be exceeded.

C. Close-Out Submittals

1. Copies of the waste manifest for all lead hazardous wastes generated by the Contractor during this project.

1.6 OWNER'S CONSULTANT

A. The Owner's Consultant is authorized to provide lead-related construction compliance observation and monitoring, testing, and technical oversight services including, but not limited to:

1. Airborne lead monitoring to evaluate the effectiveness of the Contractor's lead dust control work practices, procedures, and dust containment methods. The results from this monitoring shall be used to evaluate the Contractor's personal monitoring data and to evaluate the Contractor's compliance with occupational and environmental regulations.

2. Visual inspections to verify if the Contractor has met the requirements for various phases including Work Area preparation, removal, clean-up and decontamination.

3. Wipe sampling for lead contamination to determine if the Contractor has successfully completed the project decontamination completion standards.

4. Verification waste characterization to classify the typical waste streams produced by lead-impacted construction operations according to existing California hazardous waste criteria by laboratory analysis. Note: The Contractor is responsible for all waste profiling required by the landfill to accept the waste.

B. The cost of the Owner's Consultant's services will normally be the responsibility of the Owner except under the following circumstances. The Contractor shall be responsible for the cost of the Owner's Consultant for additional services provided when:

1. The Contractor's Work Area fails final clearance inspection and/or testing;

2. Additional workdays or workday hours (overtime) are required by the Contractor to complete project work;

3. The Contractor exceeds the allowable number of workdays for work completion; and/or

4. Additional Owner's Consultant services associated with response to an uncontrolled, unauthorized hazardous dust release to the environment by the Contractor's work or operations.

1.7 CONTRACTOR'S COMPLIANCE AND QUALITY ASSURANCE

A. The Contractor shall have a Competent Person onsite at all times during lead demolition operations are in progress. The Contractor's Competent Person shall communicate and coordinate with the Owner's Consultant with regard to work schedules, inspections, daily submittals, and compliance issues.

B. The Contractor's Competent Person shall:

1. Ensure the Contractor's compliance with the specifications.

2. Conduct worker exposure monitoring using a Qualified Person and provide results to the Owner's Consultant.

3. Pre-inspect Work Areas for compliance and completion prior to notifying the Owner of the Work Area's readiness for inspection.

4. Ensure all of the Contractor's workers have current valid medical, blood- lead test, training, and respirator fit test records and provide copies of all new or updated records to the Owner's Consultant for approval before assigning the workers to any work within Work Areas.

5. Take timely and appropriate corrective actions to ensure compliance with the demolition plans and specifications and to eliminate unsafe, unhealthful, and environmentally unsound work practices regardless of

whether or not they are brought to the Contractor's attention by the Owner's Consultant.

6. Adhere to the specification and the Consultant's initial characterization of lead waste for proper packaging, labeling, storage, transportation, and disposal of waste.

PART 2 - PRODUCTS

2.1 POLYETHYLENE

A. Polyethylene sheets, of 6 mil thickness in size (dimensions) to minimize the frequency of joints.

2.2 CLEANERS

A. For clean-up and decontamination, a tri-sodium phosphate (TSP) wash solution containing at least five percent (5%) TSP or a household cleaning agent shall be used. Alternative cleaning and decontamination agents shall be subject to approval by the Owner's Consultant and the Owner.

2.3 TAPE

A. Duct tape (or approved equivalent) two (2) inches or wider, capable of sealing joints of adjacent sheets of polyethylene sheeting and for attachment of polyethylene sheeting to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions.

2.5 SPRAY ADHESIVE

A. Spray Adhesives: Spray adhesives for sealing polyethylene sheeting shall not contain any methylene chloride. The Contractor shall be responsible for any damage or cleaning of finished or unfinished surfaces resulting from the use of spray adhesives.

2.6 DISPOSAL CONTAINERS

A. Provide six (6) mil thick polyethylene sheeting, six (6) mil leak-tight polyethylene bags and other impervious containers as required by applicable regulations. All waste shall be labeled as hazardous or potentially hazardous waste unless proven otherwise by appropriate sampling and laboratory analysis.

B. All hazardous waste shipping containers (drums) shall meet applicable DOT requirements.

2.7 WARNING SIGNS AND LABELS

A. Caution Signs: To be minimum of 20 x 14 inches and includes phrase "**Caution Lead Hazard, Keep Out Unless Authorized"** in minimum two-inch high letters. These shall be posted at each approach to each lead Work Area.

B. Cal/OSHA Lead Warning Posters: "**Warning - Lead Work Area, Poison, No Smoking or Eating"** shall be posted at the entrance to each lead demolition Work Area.

C. Labels: Hazardous waste shall be labeled according to Federal, State and Local

regulations including but not limited to the California Code Regulations, Title 22, Chapter 30 and the

U.S. Department of Transportation 49 CFR Parts 172, 173, 178 and 179.

2.8 PERSONAL PROTECTIVE EQUIPMENT

A. Personal protective equipment shall comply with the requirements of 8 CCR 1532.1 Lead.

B. Minimum protective clothing and equipment shall consist of fire-retardant, disposable or re- useable full-body coveralls, work boots, gloves, or equivalent in accordance with ANSI Z41. Sleeves at wrists and cuffs at ankles shall be secure.

C. Eye protection shall be available and worn as required by applicable safety regulations and shall conform to ANSI 87.1 and ANSI 89.1. Eye protection shall be worn during mechanical paint removal work.

C. All disposable or re-usable work clothing worn during each work shift shall be removed prior to exiting the Work Area. Disposable clothing shall be properly segregated and placed in containers for proper waste characterization.

2.9 RESPIRATORS

A. Provide workers with personally issued respiratory equipment approved by NIOSH and MSHA and suitable for the lead exposure level in the Work Area. Where respirators with disposable filters are employed, provide sufficient filters for replacement as required by the worker or applicable regulation. HEPA Type H cartridges shall not be used any longer than one work period. Each respirator shall be washed whenever the worker wearing it showers or at least daily prior to storage. The following general conditions shall apply to respirator use:

1. All respirators used must be certified by NIOSH and a respirator program shall be established and implemented.

2. Respirators shall be used whenever airborne lead concentrations will exceed, or are likely to exceed, 0.5 mg/m^3.

3. Respirators that are to be worn shall be selected based on measured or reasonably expected airborne concentrations of lead as follows:

   a. Half-face negative pressure air purifying respirator: up to 0.5 mg/m^3

   b. Powered air purifying respirator: up to 2.5 mg/m^3

   c. Type C supplied air respirator full-face piece pressure demand mode: up to 100 mg/m^3

   Note: Disposable respirators are not acceptable at any time. It is always permissible to upgrade to a more protective type of respirator.

B. The Contractor is responsible for determination of airborne lead concentration levels for

the Contractor's personnel and for providing and enforcing use of appropriate personnel respirator protection based upon airborne lead concentrations and this specification.

C. Respirators shall not be removed inside the Work Area. Workers shall proceed to the designated washing area and clean the external surface of the respirator body before removing the respirator.

2.10 TOOLS AND EQUIPMENT

A. Provide suitable tools for the removal of lead wall tile including HEPA vacuums, Ground Fault Circuit Interrupters (GFCIs), ladders, and hand held sprayers. All tools and equipment brought onsite shall be clean and free of lead and other hazardous material contaminants.

B. Provide enough support equipment, including but not limited to waste storage drums and, at minimum, a hand and face washing facility.

C. with DOP certification successfully completed onsite, prior to start of project. Provide clean and fully decontaminated HEPA vacuum cleaners

PART 3 - EXECUTION

3.1 GENERAL

A. Public Warning and Safety Information to be posted:

1. Post the Cal/OSHA Lead Hazard Warning sign at all approaches to the interior Work Areas.

B. Items that cannot be removed from the work area shall be pre-cleaned and protected with plastic sheeting.

C. In all cases, the Contractor shall employ and enforce continuous protective measures to prevent lead exposure outside the work area, buildings, and grounds.

3.2 GENERAL PREPARATION OF THE LEAD WALL TILE and DUST CLEAN UP.

A. Temporarily move all non-contaminated movable furniture, fixtures and objects within the Work Area to an area outside and at least five feet from the lead Work Area perimeter.

B. Restrict access to the Work Area by posting warning signs at entry of work area.

C. Shut down any room ventilation and install critical barriers consisting of one layer of 6 mil plastic sheeting on any ventilation registers within five feet of the Work Area.

D. Provide a designated entry/exit point to exterior Work Areas suitable for workers to properly decontaminate and exit from the Work Area as specified herein. Install lead caution and warning signage as specified above.

E. Verify that all tenants and other unauthorized personnel have vacated the room(s) where work is to be conducted.

F. Notify the Owner's Consultant in advance when the Work Area is ready for inspection. Work shall not proceed until the Owner's Consultant has checked and approved Work Area preparations on the first day of such work at the site.

3.3 WORKER PROTECTION AND DECONTAMINATION PROCEDURES

A. The Contractor shall use only workers medically qualified and trained and certified for lead work and respirator usage.

B. Each worker and Authorized Visitor shall, don protective equipment required before entering the Work Area.

C. Each worker and Authorized Visitor shall HEPA vacuum or wipe loose contamination from protective clothing before leaving the Work Area.

D. At the end of the workday, all workers are to do the following: 1). Place disposable outer garments in separate labeled waste containers dedicated to PPE for proper waste characterization and/or place reusable protective work clothing for laundering in a closed container; 2). Clean protective gear used (i.e. respirator); 4). Shower, or wash hands and face at minimum; and 4). Wear only clean street clothes when leaving for home.

E. All tools and equipment shall be decontaminated by HEPA vacuuming and/or wet wiping prior to being taken out of the Work Area.

F. Workers shall not eat, drink, smoke, or chew gum or tobacco at the work site within any Work Area and as specified by the Owner or the Owner's Consultant.

G. Each worker shall have a final medical blood-lead laboratory test within one week of job completion and before engaging in other lead related work.

3.4 CLEANING AND DECONTAMINATION OF WORK AREAS

A. Daily Clean up: Perform the following clean up procedures daily.

1. Clean all Work Areas daily or sooner if lead wall tile demolition within the Work Area is complete, until each Work Area is free of loose dust and debris to the satisfaction of the Owner's Consultant and/or Owner using HEPA and/or wet-wiping after pick-up of large debris.

2. Wet debris with a fine mist of water and collect material. All material to be properly segregated, bagged in six (6) mil plastic bags or drums, sealed, and moved to a designated, secure, waste storage area for waste characterization.

3. At the end of each work day the Contractor's Competent Person shall inspect work performed that day to ensure the work has been completed and no dust or residue remains on the areas removed and/or in the Work Area.

4. At least 24 hours prior to completion of final clean-up and decontamination of each dwelling unit, notify the Owner’s Consultant in order to allow for a final clearance inspection and testing by the Owner’s Consultant.

3.5 FINAL CLEARANCE INSPECTION AND TESTING

A. Clearance Inspection. After the final clean up by the Contractor, the Owner's Consultant shall conduct a visual inspection to ensure that all-visible dust and debris has been properly removed.

B. The Contractor must provide the Owner's Consultant at least twenty-four (24) hours notice prior to scheduling final clearance inspections. If the results of the final clearance inspections are satisfactory to the Owner's Consultant then the Work Area shall be released for unrestricted access. If the results of the final clearance inspections are unsatisfactory, the contractor shall re-clean and decontaminate the Work Area prior to requesting another clearance inspection by the Owner's Consultant.

C. Upon completion of lead wall tile demolition and acceptable visual inspection by the Owner's Consultant, dust wipe samples of horizontal surfaces will be collected and analyzed to determine if protection and decontamination measures by the contractor have been adequate and complete.

D. Lead wipe test results shall meet current HUD and/or California Department of Health Services criteria for acceptable clearance levels. Where there is a conflict, the more stringent standard shall apply.

3.6 LEAD CONTAMINATION OF BUILDING OR ENVIRONMENT

A. In the event that removed lead dust or debris is not properly contained within the Work Area and thereby escapes, bypasses or penetrates established barriers, the Contractor shall stop work immediately, notify the Owner's Consultant immediately, and commence clean-up and decontamination procedures as described herein or directed by the Owner's Consultant.

B. All remedial costs and cost of testing associated with clean-up of lead contamination of room or apartment unit shall be born solely by the Contractor.

3.7 WASTE STORAGE, SEGREGATION, AND CHARACTERIZATION

A. The Contractor shall provide for secure onsite temporary storage of lead waste, dust/debris, and clean-up related waste. Waste storage location, equipment, containers, and methods are subject to prior approval by the Owner.

B. Construction waste materials, dust, and debris removed as the result of related work must be evaluated to determine waste characteristics prior to disposal. The contractor shall be responsible for all waste testing, profiling and segregation. All waste streams, and waste categories shall be considered hazardous until proven otherwise.

C. The Contractor shall be responsible for all disposal costs of all wastes generated from this project including hazardous lead wastes. The Contractor shall also be responsible for segregating waste into the following categories:

1. Category I: Paint LBP chips, dust and debris, HEPA vacuum waste, and used

cleaning materials. The Contractor shall handle, store and dispose of these items as a hazardous lead waste without further characterization except for profiling

necessary for disposal.

2. Category II: Plastic sheeting/ tape and disposable clothing and equipment. These used items, if properly cleaned, should be non-hazardous. However, these items shall be considered hazardous unless proven otherwise by testing.

D. Each lead-related waste produced shall be placed in properly segregated, labeled and sealed, impervious containers.

E. All waste containers, bags, and packaged waste shall be stored in a designated, secure, locked waste storage area with the following information (pending analysis):

1. Waste Category (i.e. Lead, California Special Waste)

2. Date Accumulated

3. Name, address, owner

4. Origin of waste (i.e.. Category I: ceramic tile, vacuum bags, etc.)

F. HEPA vacuum and wet-wipe the exterior of all waste containers prior to removing them from the Work Area to the designated storage area.

G. All lead waste shall be considered hazardous until waste characterization has been performed under the California Code of Regulations, Title 22. The Contractor shall be responsible for all waste disposal costs for hazardous and non-hazardous wastes including characterization and profiling.

H. Each category of waste shall be tested and characterized by the Contractor using one or more of the following testing protocols:

1. Cal-EPA testing protocol: Criteria

(a) Total Threshold Limit Concentration (TTLC): 1,000 ppm

(b) Soluble Threshold Limit Concentration (STLC): 5 ppm

2. Federal-EPA testing protocol:

(a) Toxicity Characteristic Leaching Procedure (TCLP): 5 ppm

I. Based on the testing protocols, any waste greater than or equal to five (5) ppm lead using STLC or TCLP tests or any waste greater than or equal to 1000 ppm lead using the TTLC test shall be considered a hazardous waste.

J. When the TTLC is less than 50 ppm lead, no further testing is required for that waste category sampled. A minimum of four samples will be taken to represent each category of waste generated and composited into one sample. It will be the responsibility of the Contractor to ensure representative samples are taken from each category of segregated waste.

K. The Contractor shall package, store, handle, transport and dispose of each category of waste generated based on the testing results obtained unless specific written direction is provided by the appropriate regulatory agency and reviewed.

L. Upon verbal request of the Owner's Consultant, the Contractor shall provide samples of lead- related waste to the Owner's Consultant. The Contractor shall provide samples within full view and presence of the Owner's Consultant. Samples taken may entail cutting, waste bags, and clean up of any resulting dust or debris.

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 SCOPE

The contractor shall provide the necessary materials, labor and equipment for the placement of new concrete for the floor slab portions that were removed due to modifications under floor slabs. Contractor shall determine what piping and associated items are needed to be removed along with existing floor slabs and then after new piping and associated items installed install new concrete for the removed portions after laying down a vapor barrier/retarder underneath the concrete floor slab.

1.2 APPLICABLE PUBLICATIONS

The following specifications and standards of the issues currently in force form a part of this section and are applicable as specified herein.

American Society for Testing and Materials (ASTM) Publications

ASTM A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM C 33	Specification for Concrete Aggregates
ASTM C 94	Specification for Ready-Mixed Concrete
ASTM C 143	Slump of Hydraulic Cement Concrete
ASTM C 150	Specification for Portland Cement
ASTM C 231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete
ASTM C 494	Specification for Chemical Admixtures for Concrete
ASTM C 1107	Standard Specification for Packaged Dry Hydraulic Cement Grout (Non-shrink)

American Concrete Institute (ACI) Standards

ACI 211.1	Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete
ACI 301	Structural Concrete for Buildings
ACI 301R	Hot Weather Concreting
ACI 306R	Cold Weather Concrete
ACI 318	Building Code Requirements for Reinforced Concrete.

PART 2 – MATERIAL

2.1 CONCRETE

Concrete shall be produced from a certified concrete mix design. It may be truck mixed or mixed on site from dry concrete premix. The contractor shall submit mix certification prior to initial concrete placement.

2.2 CEMENT

Cement shall conform to ASTM C 150, Type IA or IIIA.

2.3 AGGREGATES

Aggregates shall conform to ASTM C 33. Maximum aggregate size shall be 1/2 inch.

2.4 WATER

Water used in mixing and curing operations shall be clean, and free from oils, acids, organic matter and chemical suspensions which may adversely affect cure times, strength requirements, or service life of the concrete.

2.5 ADMIXTURES

Air entraining admixtures shall conform to ASTM C 260. Admixtures used for water-reducing and retarding shall conform to ASTM C 494, Type A or Type D.

2.6 CONCRETE PROPERTIES

A. Slump - The concrete shall have a maximum slump of 3 to 4 inches when tested in accordance with ASTM C 143.

B. Strength - Concrete shall have a 28-day compressive strength of 4,000 psi.

C. Air Content - Air entrained concrete shall have an air content of 5 to 7 percent.

D. Proportions - Concrete materials shall be proportioned in accordance with ACI 211.1 for site mixed concrete and ASTM C 94 for ready mixed concrete.

2.7 NON-SHRINK GROUT

Non-shrink Grout shall be in accordance with ASTM C 1107, Grade A. Mixing and installation shall be as recommended by the manufacturer.

PART 3 – EXECUTION

3.1 EMBEDDED ITEMS

All concrete encased items shall be held rigidly in the correct position so they will not be displaced or moved during the concrete and/or grout placement. The Contractor, at no additional cost, will replace items that shift during concrete placement.

A. Conduit - The Contractor shall take precautions to ensure the conduit is not damaged during placement and that concrete is not allowed to enter the conduit. All couplings shall be set level and plumb.

3.2 SITE PREPARATION

Prior to placing concrete, all areas to receive concrete shall be inspected and approved by the COR. Concrete shall not be deposited on muddy or frozen material. All surfaces to be in contact with the concrete shall be wetted.

3.3 MIXING

All mixers used for ready mix or site mix operations shall be cleaned prior to material recharge. The area of operation of the mixers shall be such as to not endanger existing structures or excavations. All concrete shall be mixed until there is a uniform distribution of materials. Concrete having attained initial set or having contained water for more than 90 minutes shall not be used. Tempering shall not be allowed. Adding mix water after batching shall be allowed at the Subcontractor's risk. Added water shall not cause the concrete to exceed the specified parameters for slump, air entrainment, and water to cement ratios. Slump tests shall be performed after the addition of any water to the mix.

3.4 CONVEYING

Concrete shall be conveyed from the mixer to the deposit site by equipment which will prevent separation or loss of material and which will ensure a nearly continuous flow of material at the deposit site.

3.5 DEPOSITING

Concrete shall be placed in such a manner as to prevent displacement of forms or reinforcement and segregation of aggregate. Placing shall be stopped if contamination due to sloughing occurs until the contaminant can be removed. In the case of form or reinforcement displacement, placing may be continued only if the displacement is corrected within specified tolerances. The placing of concrete shall be a continuous operation at each deposit site and shall be completed within 1½ hours after the addition of water. Under no circumstances shall fresh concrete be placed over concrete that has attained initial set. Time between placements at each deposit site shall not exceed one hour for regular mixes and two hours for retarded mixes.

3.6 CONSOLIDATION

Consolidation of concrete during and after placing shall be performed by thorough hand tamping or using an internal vibrator with a vibration frequency not less than 150 hertz. Each layer shall

be consolidated so that concrete is thoroughly worked around reinforcement, embedded items, and forms. Vibrators shall penetrate about 6 inches into underlying layers to ensure proper union of the layers. Movement of the vibrator over the layer shall be such as to ensure uniform plasticity without pooling of cement.

3.7 FINISH

After the concrete has been placed and consolidated, the surface shall be tamped with suitable tools to force coarse aggregate down from the surface, screed with straight edges, and floated and troweled to the required finish level. New concrete surfaces shall be finished to match existing adjacent concrete. All exposed edges shall be chamfered 1 inch. Concrete foundation pad must match the depth of the existing slab.

A. Broomed - Use on surfaces of stairs, platforms, sidewalks, and ramps. Perform a floated finish them draw a broom or burlap belt across the surface to produce a coarse scored texture, permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.

3.8 CURING

Concrete shall be maintained above 50° F and less than 120° F and in a moist condition during the cure period. The cure period shall be 3 days. Exposed surfaces shall be moist cured by use of mats (wet Burlap or other suitable material), impervious sheeting (polyethylene), or application of Liquid Membrane Forming Curing Compound (LMFCC) after surfaces have lost their water sheen. If air temperatures are expected to exceed 75° F, water curing shall be continuous and forms shall be loosened as soon as the concrete has set sufficiently to prevent damage. In conditions where air temperature may be expected to fall below 40° F, equipment and covering to maintain a 50° F concrete temperature shall be provided. Salt or other chemicals to prevent freezing shall not be permitted.

3.9 SURFACE DEFECTS

Upon removal of formwork, Subcontractor shall patch any areas containing unconsolidated concrete or honeycombing by removing all loose aggregate down to a solid substate and patching with an approved compatible patching compound

PART 4 – QUALITY ASSURANCE

4.1 CONCRETE CERTIFICATION

The Subcontractor shall provide the COR a delivery ticket for ready mix concrete from the concrete supplier at the time of each delivery, which certifies compliance with material, and quality requirements specified herein. The tickets shall indicate the delivery date, time dispatched, name and location of project, name of Subcontractor, name of concrete producer, truck number, quantity, air content, admixtures and design strength of the concrete delivered.

4.2 TESTING

Testing of concrete for slump, air, and strength shall be arranged and paid for by the Contractor. If these tests show concrete strength less than specified, the Subcontractor shall correct the situation and be responsible for all additional testing costs.

A. Slump Tests - Slump tests shall be completed as the concrete is placed from the mixer into the forms. Excessive slump shall be cause for rejection of the entire load or batch.

B. Air Entrainment Tests - Tests for air content of the wet concrete shall be made at the time of concrete placement. Air content outside the limits specified shall be cause for rejection of the load or batch.

C. Concrete Test Cylinders - For each concrete placement of 25 cubic yards or less and for each additional 50 cubic yards the Subcontractor's testing agency shall make one set of five cylinders for compressive strength tests, unless otherwise directed. Break two test cylinders at 7-days; break two test cylinders at 28-days, and keep an extra test cylinder. Concrete cylinders shall be marked with a unique identification number that corresponds to a log number. The log will include the concrete company, truck or ticket number; mix design, time of day, and temperature of ambient air and concrete temperature. The drawings will be marked with a colored mark that identifies the extent of concrete placed as represented by the test cylinder.

Concrete test cylinders made at the construction site shall be handled and protected in accordance with recognized test procedures.

D. Testing Waived

The tests can be waived when all of the conditions are met:

a) Concrete placement of less than 10 cubic yards.
b) The required 28-day compressive strength is 4000 psi or less.
c) The concrete mix is a standard proven design for the ready-mix plant and has been reviewed and approved by FAA in advance. Delivery tickets as described above shall be provided.
d) Visual inspection of the concrete as it is delivered and placed indicates that it has satisfactory slump, cement content and workability. Concrete that appears to fail any of these criteria shall be rejected and immediately removed from the site.

4.3 REPAIR OR REPLACEMENT

The Contractor shall restore concrete damaged by work under this contract to its original condition as directed by the COR. The COR may reject any and all concrete not meeting slump or air entrainment requirements. Any concrete not meeting strength requirements shall be removed and replaced by the Contractor at his expense. Any repair or replacement costs shall be paid by the Contractor.

4.4 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

Concrete Mix Design Certification

Concrete Test Results - Slump, % Air, Strength Tests

*** * * END OF SECTION * * ***

SECTION 042000

UNIT MASONRY

1.1 SUMMARY

This section pertains to the CMU wall that needs to be installed connecting the two CMU existing walls by filling in the gap of the walls to make it continuous thereby separating the women's restroom from the men's restroom. It, also, pertains to any other CMU wall where access is needed for utilities and any associated work. Any portions of any CMU wall that is removed shall be restored to its former state.

A. This Section includes unit masonry assemblies consisting of the following:
   1. Concrete masonry units (CMUs).

1.2 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 SUBMITTALS

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

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

C. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry.

D. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

E. LEED SUBMITTALS:
   1. Product Data for Credit MR 4.1, Credit MR 4.2 and Credit ID 1.4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
      a. Include statement indicating costs for each product having recycled content.
   2. Product Data for Credit MR 5.1 and Credit MR 5.2: For products or portions of products, that have been extracted or recovered, as well as manufactured, within 500 miles of the project:
      a. Include statement indicating costs for each product, or portion of product, that is extracted or recovered, as well as manufactured, within 500 miles of the project site.

1.4 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and

inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not uses units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

2.2 CONCRETE MASONRY UNITS (CMUs)

A. Concrete Masonry Units: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2500 psi.
2. Weight Classification: Normal weight.
3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

2.4 CONCRETE AND MASONRY LINTELS

A. General: Provide concrete masonry units, complying with requirements below.

B. Concrete Masonry Units: Precast units made from concrete matching concrete masonry units in color, texture, and compressive strength and with reinforcing bars indicated or required to

support loads indicated by above ceiling requirements. Cure precast lintels by same method used for concrete masonry units.

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

C. Masonry Cement: ASTM C 91.

1. Available Products:
   a. Holcim (US) Inc.; Mortamix Masonry Cement.
   b. Lafarge North America Inc.; Lafarge Masonry Cement.
   c. Lehigh Cement Company; Lehigh Masonry Cement.
   d. National Cement Company, Inc.; Coosa Masonry Cement.

D. Aggregate for Mortar: ASTM C 144.

E. Aggregate for Grout: ASTM C 404.

F. Water: Potable.

2.6 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951.

1. Interior Walls: Mill- galvanized, carbon steel.
2. Wire Size for Side Rods: W1.7 or 0.148-inch diameter.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.7 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with eight subparagraphs below, unless otherwise indicated.

1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 641/A 641M, Class 1 coating.
2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.

3. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.
4. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Partition Top anchors: 0.097-inch- thick metal plate with 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

C. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins, unless otherwise indicated.

2.8 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers:
   a. Diedrich Technologies, Inc.
   b. EaCo Chem, Inc.
   c. ProSoCo, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, 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 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
D. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.
E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

F. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

G. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

1. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 07 84 46 "Fire-Resistive Joint Systems."

3.3 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
   a. Reinforcement above is in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.4 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1/2 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.6 REINFORCED UNIT MASONRY INSTALLATION

A. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

B. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.7 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain COR's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
8. Clean stone trim to comply with stone supplier's written instructions.
9. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.8 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil- contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off FAA's property.

SECTION 055300

SLIP-RESISTANT PLANKS

PART 1- GENERAL/SUMMARY

Contractor shall provide, layout and install approx. 75 linear feet of steel planks supported by the CMU walls above the new ceiling for servicing of above ceiling fixtures and associated items. Contractor shall provide structural calculations to ensure OSHA compliance. Contractor shall layout and detail the planks with a submittal to be approved by the FAA.

Planks shall be galvanized steel and 24" - 30" wide throughout with an outer edge of not less than 3 inches in height..

It shall support a uniform load of 70 lb/SF and limit deflections to 1/4" and withstand the effects of earthquake motions.

Contractor shall clearly identify in the submittal placements such that there is no interference with other obstructions such as wires, pipes, etc. Planks must be able to allow the facility to maintain and service the above ceiling utilities without stepping onto the new ceiling and allow proper protection to the employee from falling.

1.1 SECTION INCLUDES

A. Safety Grating planks and metal slip resistant treads.
B. Regular and Heavy Duty Safety Grating products constructed from single-sheet with integrally-formed channels at the edges.
C. Slip resistant planks and treads with stamped surface textures/patterns.

1.2 SUBMITTALS

A. Submit drawings of (Safety Grating) (Slip Resistant Grating) products, accessories and attachments.
B. Submit manufacturer's product data on (Safety Grating) (Slip Resistant Grating) products including, but not limited to; types, materials, finishes, gauge thickness, surface patterns. For each grating cross-section, submit dimensional information, span, load capacity and deflection requirements.
C. Shop Drawings:
    1. Show fabrication and installation details, including plans.
    2. Coordination of drawings: Plans and sections, drawn to scale. Include scaled layout and relationships between grating and adjacent structural elements.

1.3 REFERENCES

A. ASTM A 123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
B. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
C. ASTM A 924 – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

D. ASTM A 1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability
E. OSHA-Occupational Safety and Health Administration- Standards for walking-working surfaces. Part Number 1910, Subpart D.
F. RR-G-1602D- Federal Specification For Safety Grating (other than bar type & excluding naval vessels)
G. ISO 9001:2000 Quality Management System- Requirements.

1.4 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in the manufacture of (Safety Grating) (Slip Resistant Grating) of the types required, whose products have been in satisfactory use in similar service for not less than 5 years.
B. OSHA Compliance: All grating installations must comply with OSHA Standards for walking-working surfaces.
C. Federal Specification RR-G-1602D (or current revision) defines the criteria for items to be considered “Safety Grating”. Slip resistant performance data must be available to support compliance.
D. Manufacturer must have an ISO registered quality system in place, and Manual available upon request.
E.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver (Safety Grating) (Slip Resistant Grating) and components carefully to avoid damage, denting and scoring of finishes. Do not install damaged material.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Safety Gratings: Subject to compliance with these specifications, Safety Gratings shall be installed as manufactured by McNichols Co.; PO Box 30300; Tampa, FL 33630; (866) 754-5144 (California Structural Engineer’s Stamp approval required) or approved equal with a California Structural Engineer’s Stamp of Approval.

B. Slip Resistant Gratings: Subject to compliance with these specifications, Slip Resistant Gratings shall be installed as manufactured by McNichols Co. (California Structural Engineer’s Stamp approval required) or approved equal with a California Structural Engineer’s Stamp of Approval.

2.2 MATERIALS AND FINISH

A. Hot Rolled, Pickled & Oiled Steel: Commercial steel per ASTM A 1011, minimum yield of 33 ksi.
B. Mill Galvanized Steel: Commercial steel per ASTM A 653 and ASTM A 924 with G-90 coating designation, minimum yield of 33 ksi.
C. Hot-Dip Galvanized After Fabrication: Commercial steel per ASTM A 1011, minimum yield of 33 ksi, hot-dip galvanized after fabrication per ASTM A 123.
D. Aluminum: Alloy 5052, Temper H32 aluminum per ASTM B 209

E. Stainless Steel: Type 304 (Type 316) stainless steel, 2B or 2D finish, per ASTM A 240.

2.3 GRATINGS AND COMPONENTS

A. Safety Grating: Planks and threads shall meet or exceed the Federal Standard for Safety Grating, RR-G-1602D.

B. Slip Resistant Grating: shall be constructed from a single sheet with integrally formed side channels and surface textures.

PART 3 EXECUTION

3.1 INSTALLATION

A. Inspect areas to receive Grating for obstacles. Notify the Engineer of conditions that would adversely affect the installation or subsequent utilization of the areas. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Install Grating according to manufacturer's recommendations and as shown on the construction drawings.

C. Position Grating sections flat and square with ends bearing minimum 1-1/2" on supporting structure.

D. Join abutting walkway sections with manufacturer supplied splice plates; bolted or welded as specified.

SECTION 074570

CEMENTITIOUS PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cementitious express/reveal jointed panel with accessories. (James Hardie HZ5 or HZ10 Hardie Reveal Panels.)

1.2 RELATED SECTIONS

1.3 REFERENCES

A. ASTM International (ASTM):
1. ASTM B136 - Standard Method for Measurement of Stain Resistance of Anodic Coatings on Aluminum.
2. ASTM B244 - Standard Test Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments.
3. ASTM C834 - Standard Specification for Latex Sealants.
4. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
5. ASTM C1186 - Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets.
6. ASTM D1117 - Standard Guide for Evaluating Nonwoven Fabrics.
7. ASTM D1730 - Standard Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting.
8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
9. ASTM E96 - Test Methods for Water Vapor Transmission of Materials.
10. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
11. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
12. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure.

B. AATCC127 - Water Resistance: Hydrostatic Pressure Test.

C. TAPPI - T460 - Air Resistance of Paper (Gurley Method).

1.4 SUBMITTALS

A. Submit under provisions of Section 013000.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Installation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Manufacturer's best practice guide.
4. Technical data sheet.
5. Standard CAD drawings

C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cladding junctions and penetrations which are outside the scope of the standard details and specifications provided by the manufacturer.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques
1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store siding flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

A. Manufacturer's Warranty: Provide Hardie HZ5 or HZ10 Reveal Panel

Limited Product Warranty, with 30-year limited product warranty against manufacturing defects.

1. Application Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: James Hardie Building Products, Inc., which is located at: 26300 La Alameda Suite 400 ; Mission Viejo, CA 92691; Toll Free Tel: 866-274-3464; Tel: 949-367-4980; Fax: 949-367-4981; Email: request info (info@jameshardie.com); Web: www.jameshardiecommercial.com

B. Substitutions: Not permitted.

C. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01600.

2.2 CLADDING

A. Cement Cladding Panels: Hardie Reveal Panel as manufactured by James Hardie Building Products, Inc. 7/16 inches thick, 3 feet 11.5 inches (1206 mm) wide by 7 feet 11.5 inches (2426 mm) long. Product shall be engineered for climate conditions.
   1. Manufacturer's Climate Zone Product: HZ5 for freezing wet climates with a green tint primer.
   2. Manufacturer's Climate Zone Product: HZ10 for hot humid and wet climates with a yellow tint primer.
   3. Refer to hardiezone.com to identify the specific zone of your project.

B. Code Compliance Requirement for Siding Materials:
   1. Fiber-cement siding, complies with ÅSTM C 1186 Type A Grade II.
   2. Fiber-cement siding, complies with ASTM E 136 as a noncombustible material.
   3. Fiber-cement siding, complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
   4. Fiber-cement siding, complies with ÅSTM E 119 1 hour and 2 hour fire resistive assemblies listed with Warnock Hersey.
   5. Fiber-cement siding, tested to ASTM E330 for Transverse Loads.
   6. Intertek Warnock Hersey Product Listing.
   7. Manufacturer's Technical Data Sheet.

2.3 WEATHER BARRIER

A. Weather Barrier: James Hardie HardieWrap and HardieWrap Flashing and Seam Tapes.

B. Code Compliance Requirement for Weather Barrier:

1. Thickness, 11 mil sheet.
2. Breathability in accordance with ÅSTM E96.
3. Tear strength in accordance with ASTM D1117.
4. Water resistance in accordance with AATCC127.
5. Air Penetration in accordance with TAPPI - T460.
6. HardieWrap Weather Barrier ICC-ES Evaluation Report ESR-2258

2.4 FURRING (STRAPPING)

A. Rainscreen Cavity: Install Hardie Reveal Panels on a drained and vented rainscreen cavity, with a minimum 3/8 inch (9.5mm) air cavity. Selection of cavity vent materials shall be incorporated into the design to prevent insect and pest entry.

2.5 ACCESSORIES

A. Trims: Reveal™ Trims in the following profiles supplied by James Hardie. Reveal Trims confirm to a 6063 alloy in T-5 temper with a minimum thickness of 0.050 inch. All reveal trims are 12 feet in length.
   1. Horizontal trim.
   2. Vertical trim.
   3. Outside corner trim.
   4. Inside corner trim.
   5. J channel trim.
   6. Drip cap trim.

B. Finishes of Reveal Trims:
   1. Chem Film for field painting of Reveal Trims; Chem Film Coating shall conform to ASTM N D1730
   2. Clear anodized metal finish aesthetic; clear anodizing shall conform to ASTM B244 and ASTM B136.
   3. Color coated finish as supplied in accordance with manufacturers requirements

2.6 FASTENERS

A. Fasteners: For attaching Hardie Reveal Panel to a rain screen provide the following:
   1. Steel Framing: 10-12 1-1/2 inch long x 0.47 inch HD low profile Torx (T20W) (TW-S-D12-4.8x38).
   2. Fasteners shall be of high quality stainless steel to ensure resistance to corrosion. For field painting, fasteners should be treated to accept paint adhesion.
      a. Alternatives must be approved by the architect. e.g. decorative screws, nails, bugle head screws, etc.

2.7 FINISHES

A. Factory Primer: Provide factory applied universal primer.
   1. Primer: Factory applied sealer/primer by James Hardie. Apply flat sheen finishes to panels.
   2. Topcoat: Refer to Section 09900 and Exterior Finish Schedule.

B. Factory Finish for Trim:
   1. Trim for Factory-Applied Coating and Field-Applied Finish: Chem Film.
   2. Trim for Factory-Applied Finish and No Field-Applied Finish: Clear anodized.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Ensure that drainage plane in intact and all penetrations are sealed.

3.3 INSTALLATION

A. Metal Framing: Minimum 20 gauge 5-1/2 inch C-Stud 16 inches maximum metal framing complying with local building codes, including the use of water-resistive barriers and/or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
   1. Install water-resistive barriers and claddings to dry surfaces.
   2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
   3. Protect siding from other trades.

B. Furring: Install furring on a minimum 3/8 inch rainscreen cavity, or in accordance with local building code for rainscreen requirements.

C. Panel Installation: Install materials in strict accordance with manufacturer's installation instructions.
   1. Place fasteners no closer than 3/4 inch (9.5 mm) from panel edges and 2 inches (51 mm) from panel corners.
   2. Use fasteners as specified in the James Hardie Tech Data sheet and in

the Hardie Reveal Panel Installation Instruction.

3. Install panel using 1/2 inch (13 mm) spacers at horizontal joints. Leave bottom edge of panel above all horizontal trims exposed, no caulking shall be placed at this overlap of Horizontal Reveal Trim. Factory primed edge shall always be used.
4. Install a kickout flashing to deflect water away from the siding at the roof intersection.
5. Install a self-adhering membrane on the wall before the subfascia and trim boards are nailed in place, and then install the kickout.
6. Allow minimum vertical clearance between the bottom edge of siding and any other material in strict accordance with the manufacturer's installation instructions and as determined by James Hardie Zone.
7. Maintain clearance between siding and adjacent finished grade.
8. Specific framing and fastener requirements - refer to the applicable building code compliance reports.

3.4 FINISHING

A. Finish factory primed siding with a minimum of one coat of high quality 100 percent acrylic exterior flat grade paint with flat finish within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

B. Field cut edges shall be coated during the installation process using an exterior grade primer/sealer that is compatible with the type of paint to used on project.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

SECTION 078400

THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes low-VOC through-penetration fire-stop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:

B.

1. Walls and partitions.
2. Smoke barriers.
3. Construction enclosing compartmentalized areas.

1.2 PERFORMANCE REQUIREMENTS

A. General: For the following constructions, provide through-penetration fire-stop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.

1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
3. Fire-resistance-rated floor assemblies.

B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

1. Penetrations located outside wall cavities.
2. Penetrations located outside fire-resistive shaft enclosures.
3. Penetrations located in construction containing fire-protection-rated openings.
4. Penetrating items larger than 4-inch- diameter nominal pipe or 16 sq. in. in overall cross-sectional area.

D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

E. For through-penetration firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

1.3 SUBMITTALS

A. Product Data: For each type of through-penetration firestop system product indicated, including MSDS sheets for all products.

B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.

E. Product Test Reports: From a qualified testing agency indicating through-penetration fire-stop system complies with requirements, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed through-penetration fire-stop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations: Obtain through-penetration fire-stop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide through-penetration fire-stop systems that comply with the following requirements and those specified in "Performance Requirements" Article:

1. Fire-stopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for fire-stop systems acceptable to authorities having jurisdiction.
2. Through-penetration fire-stop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:.

    a. Through-penetration fire-stop system products bear classification marking of qualified testing and inspecting agency.
    b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:

        1) UL in "Fire Resistance Directory."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Hilti Construction Chemicals, Inc.
2. Isolatek International.
3. Nelson Firestop Products.
4. 3M Fire Protection Products.
5. Tremco.

2.2 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer

and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:

    a. Slag-/rock-wool-fiber insulation.
    b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    c. Fire-rated form board.
    d. Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.3 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. 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.

I. 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.

J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

K. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop 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.

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

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing 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 indicated.

1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
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 Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.

1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.

B. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.

C. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.5 IDENTIFICATION

A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop 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 through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

SECTION 079200

JOINT SEALANTS

PART 1 GENERAL

1.1 REFERENCES

ASTM INTERNATIONAL (ASTM)

ASTM C 920	(2002) Standard Specification for Elastomeric Joint Sealants

BAY AREA AIR RESOURCES BOARD (BAARB)

BAARB, Reg. 8, Rule 51	(1992; R 2002) Organic Compounds, Adhesive and Sealant Products

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule #1168	(1989; R 2005) Adhesive and Sealant Applications

1.2 SUBMITTALS

Submit the following in accordance with Section 013000 SUBMITTAL PROCEDURES:

SD-03 Product Data

Environmental Data

Sealants

Manufacturer's descriptive data including storage requirements, shelf life, curing time and VOC content. Provide a copy of the Material Safety Data Sheet for each sealant material, highlighting VOC content.

SD-07 Certificates

Sealant

Certificates of compliance stating that the materials conform to the specified requirements.

1.3 ENVIRONMENTAL CONDITIONS AND REQUIREMENTS

The ambient temperature shall be within the limits of 40 and 90 degrees F when sealant is applied.

1.4 DELIVERY AND STORAGE

Deliver materials to the job site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, color, and material designation clearly marked thereon. Label elastomeric sealant containers to identify type, class, grade, and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 90 degrees F or less than 0 degrees F.

1.5 QUALITY ASSURANCE

1.5.1 Compatibility with Substrate

Verify that each of the sealants are compatible for use with joint substrates.

1.5.2 Joint Tolerance

Provide joint tolerances in accordance with manufacturer's printed instructions.

1.6 SPECIAL WARRANTY

Guarantee sealant joint against failure of sealant and against water penetration through each sealed joint for five years.

1.7 SUSTAINABLE DESIGN REQUIREMENTS

PART 2 PRODUCTS

2.1 SEALANTS

Provide sealant that has been tested and found suitable for the substrates to which it will be applied. Comply with applicable regulations regarding toxic and hazardous materials, and as specified. The VOC content of adhesives and sealants must be less than the current VOC content limits of SCAQMD Rule #1168, and all sealants used as filler must meet or exceed the requirements of BAARB, Reg. 8, Rule 51. Sealants containing asbestos, aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds, are not permitted. Sealants, primers, and cleaners required for sealant installation must also comply with all local regulations controlling VOC content.

2.1.1 Interior Sealant

One-component acrylic latex water-based sealant conforming to ASTM C 834. One-part, mildew-resistant silicone rubber conforming to ASTM C 920, Type S, Grade NS, Class 25, Use NT. Location(s) and color(s) of sealant for the following:

a. Small voids between walls or partitions and As selected

casework, shelving,
door frames, built-in or surface-mounted
equipment and fixtures, and similar items.

b. Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.	Gray or White
c. Joints formed where nonplaner tile surfaces meet.	As selected
d. Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occuring where substrates change.	As selected

2.2 CLEANING SOLVENTS

Provide type(s) recommended by the sealant manufacturer.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Clean surfaces from dirt, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Remove oil and grease with solvent. Surfaces must be wiped dry with clean cloths. When resealing an existing joint, remove existing caulk or sealant prior to applying new sealant. For surface types not listed below, contact sealant manufacturer for specific recommendations.

3.1.1 Steel Surfaces

Remove loose mill scale by using a residue-free solvent.

3.1.2 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, remove materials by wire brushing. Laitance, remove efflorescence and loose mortar from the joint cavity.

3.2 SEALANT PREPARATION

Do not add liquids, solvents, or powders to the sealant.

3.3 APPLICATION

3.3.1 Sealants

Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and can not be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's printed instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Make sealant uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant, and tool smooth as specified. Apply sealer over the sealant when and as specified by the sealant manufacturer.

3.4 PROTECTION AND CLEANING

3.4.1 Protection

Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

3.4.2 Final Cleaning

Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.

a. Masonry and Other Porous Surfaces: Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hour then remove by wire brushing or sanding.

b. Metal and Other Non-Porous Surfaces: Remove excess sealant with a solvent-moistened cloth.

3.4.3 Waste Management

Close and seal tightly partly used sealant containers and store protected in well ventilated fire-safe area at moderate temperature. Place used sealant tubes and containers in areas designated for hazardous materials and dispose of properly.

SECTION 081113

STEEL DOORS AND FRAMES

PART 1 GENERAL

SUMMARY:

Provide, install 3 new steel frame doors. Two (Men's and Women's Restroom) shall have 3 ft. x 7 ft. steel frame doors. Both doors shall have 20" x 20" aluminum bottom louvers installed. The third for the Janitor's Closet shall have a new 32 inches x 7 ft. steel door. All 3 doors shall have kick plates. Install new steel door frame and hinges for each door. The Men's Restroom door shall not have a lockset and be able to swing inward. There will be a steel plate at the area where a lockset normally is installed. For the Women's Restroom it shall have a lockable lockset.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A250.6	(1997) Hardware on Standard Steel Doors (Reinforcement - Application)
ANSI A250.8	(1998) SDI-100 Recommended Specifications for Standard Steel Doors and Frames

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2004) Structural Welding Code-Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 591	(1998) Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications

STEEL DOOR INSTITUTE (SDI)

SDI 105	(1998) Recommended Erection Instructions for Steel Frames

1.2 SUBMITTALS

Submit the following in accordance with Section 013000 SUBMITTAL PROCEDURES.

SD-02 Shop Drawings

Doors

Show elevations, construction details, metal gages, hardware provisions, and installation details.

Submit door locations.

SD-03 Product Data

Doors

Accessories

Submit manufacturer's descriptive literature for doors and accessories. Include data and details on door construction, panel (internal) reinforcement and door edge construction.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors and accessories undamaged and with protective wrappings or packaging. Store doors on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4 inch airspace between doors. Remove damp or wet packaging immediately and wipe affected surfaces dry. Replace damaged materials with new.

PART 2 PRODUCTS

2.1 STANDARD STEEL DOORS

ANSI A250.8, except as specified otherwise. Prepare doors to receive door hardware. Doors shall be custom sized to fit the existing and new door frames and hinge locations.

2.1.1 Classification - Level, Performance, Model

2.1.1.1 Heavy Duty Doors

ANSI A250.8, Level 2, physical performance Level B, Model 1, with core construction as required by the manufacturer for interior doors of size(s) indicated.

2.3 HARDWARE PREPARATION

Provide minimum hardware reinforcing gages as specified in ANSI A250.6. Drill and tap doors to receive finish hardware. Prepare doors for hardware in accordance with the applicable requirements of ANSI A250.8 and ANSI A250.6. For additional requirements refer to BHMA A115. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of ANSI A250.8, as applicable. Punch existing door frames

to receive a minimum of two rubber or vinyl door silencers on lock side of single doors. Set lock strikes out to provide clearance for silencers.

2.4 FINISHES

2.4.1 Factory-Primed Finish

All surfaces of doors shall be thoroughly cleaned, chemically treated and factory primed with a rust inhibiting coating as specified in ANSI A250.8. Where coating is removed by welding, apply touchup of factory primer.

2.4.2 Electrolytic Zinc-Coated Anchors and Accessories

Provide electrolytically deposited zinc-coated steel in accordance with ASTM A 591, Commercial Quality, Coating Class A. Phosphate treat and factory prime zinc-coated surfaces as specified in ANSI A250.8.

2.5 FABRICATION AND WORKMANSHIP

Finished doors shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Doors

Hang doors in accordance with clearances specified in ANSI A250.8. After erection, clean and adjust hardware.

3.2 PROTECTION

Protect doors from damage. Repair damaged doors prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until rust is removed. Clean thoroughly. Apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

3.3 CLEANING

Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

SECTION 087100

DOOR HARDWARE

PART - GENERAL

1.1 SUMMARY

A. Provide labor, materials, and equipment for door hardware, including but not limited to the following:

1. Finish Hardware
2. Thresholds, Gasketing and Weatherstripping

B. Products furnished but not installed under this Section include:

1. Final replacement cores and keys to be installed by Government.

C. Note the Men's Restroom door shall not have a lockset. The Women's Restroom and Janitor's Closet shall have locksets for opening and locking the doors. The Women's Restroom shall have a lock from the inside of the Restroom that can be locked and opened by the person inside for privacy.

D. Doors shall have a paint coating which matches the color of all of the existing restrooms of the facility.

1.2 REFERENCE STANDARDS

A. National Fire Protection Association (NFPA)

1. 80: Fire Doors
2. 101: Life Safety Code

B. American National Standards Institute (ANSI)

1. A 117.1: Building and Facilities - Providing Accessibility and Usability for Handicapped People.
2. A 156: Series for Door Hardware.

C. Door and Hardware Institute (DHI)

D. Underwriters Laboratories, Inc. (UL)

1.3 SUBMITTALS

A. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

B. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:

a. Type, style, function, size, and finish of each hardware item.
b. Name and manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of each hardware set.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for hardware.
g. Door and frame sizes and materials.
h. Keying information.

2. Submittal Sequence: Submit initial draft of final schedule along with essential product data in order to facilitate the fabrication of other work that is critical in the Project construction schedule. Submit final schedule after samples, product data, coordination with shop drawings of other work, delivery schedules, and similar information has been completed and accepted.
3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Government's final instructions on keying of locks has been fulfilled.

C. Samples of each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.
1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.

D. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1. The submission for templated and template list shall follow the procedure as set forth in the D.H.I. publication "For Processing Hardware Schedules and Templates."

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of hardware, such as latch and lock sets, hinges, and closers, from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to Government, COR, and Contractor, at reasonable times during the course of the Work, for consultation.

1. Require supplier to meet with COR to finalize keying requirements and to obtain final instructions in writing.

D. Quality levels of hardware are established by manufacturers' names and model numbers. Certain products are specified without substitution and shall be provided .

1.5 PRODUCT HANDLING

A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.6 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Government's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide hardware that complies with barrier-free facilities design standards, such as:

1. Knob/Lever Heights
2. Knurled Knobs/Levers
3. Closer Opening Face
4. Push, Pull and Kick Plates Height
5. Threshold Elevations and Slope

2.2 SCHEDULED HARDWARE

A. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of finish hardware is indicated in the Hardware Schedule at the end of this section. Products are identified by using hardware designation numbers of the following.

B. ANSI/BHMA designations used elsewhere in this section or in schedules to describe hardware items or to define quality or function are derived from the following standards. Provide products complying with these standards and requirements specified elsewhere in this section.

Butts and Hinges: ANSI A156.1 (BHMA 101)
Locks & Lock Trim: ANSI A156.2 (BHMA 601)
Exit Devices: ANSI A156.3 (BHMA 701)
Door Controls- Closers: ANSI A156.4 (BHMA 301)
Auxiliary Locks: ANSI A156.5 (BHMA 501)
Architectural Door Trim: ANSI A156.6 (BHMA 1001)
Template Hinge Dimensions: ANSI A156.7
Door Controls- Overhead Holders: ANSI A156.8 (BHMA 601)
Interconnected Locks & Latches: ANSI A156.13 (BHMA 621)
Closer Holder Release Devices: ANSI A156.15 (BHMA 321)
Auxiliary hardware: ANSI A156.16 (BHMA 1201)
Materials & Finishes: ANSI A156.18 (BHMA 1301)

2.3 MATERIAL AND FABRICATION

A: Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

B. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location. Remove removable nameplates, except in conjunction with required UL labels and as otherwise acceptable to COR. Manufacturer's identification will be permitted on rim of lock cylinders only.

C. Base Metals: Produce hardware units of base metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for the applicable hardware units by applicable ANSI A156 series standard for each type hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods without written approval from COR.

D. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.

E. Furnish screws for installation, with each hardware item. Provide Phillips flat-head screws typically, except as otherwise indicated. Exposed fasteners shall match hardware finish or, if exposed in surfaces of other work, shall match Work as closely as possible.

F. Provide concealed fasteners for hardware units which are exposed when door is closed, except to the extent no standard units of the type specified are available with concealed fasteners. Do not use through-bolts for installation where bolts head or nut opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. Where through-bolts cannot be avoided, provide sleeves for each through-bolt or use sex screw fasteners.

G. Tools and Maintenance Instructions for Maintenance: Furnish a complete set of specialized tools and maintenance instructions as needed for Government’s continued adjustment, maintenance, and removal and replacement of finish hardware.

2.4 FINISHED HARDWARE CRITERIA

A. Hinges And Butts:

1. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
2. Screws: Furnish Phillips flat-head or machine screws for installation of units. Finish screw heads to match surface of hinges or pivots.
3. Hinges Pins: Except as otherwise indicated, provide pin as follows:

    a. Steel Hinges: Steel pins
    b. Non-ferrous Hinges: Steel pins for wet areas and exterior doors.
    c. Interior Doors: Non-rising pins.
    d. Tips: Flat button and matching plug, finished to match leaves.
    e. Number of hinges: Typically, provide not less than 3 hinges per door leaf for doors 7 feet - 6 inches or less in height and one additional hinge for each 30 inches of additional height. Provide additional hinges where scheduled.

B. Lock Cylinders And Keying

1. Standard System: Provide new masterkey and grand masterkey system for Project in compliance with COR requirements.
2. Equip locks with manufacturer's standard 7-pin tumbler cylinder as available from Best Lock Company. No substitutions will be permitted.
3. Metals: Construct lock cylinder parts from brass or bronze,stainless steel, or nickel silver.
4. Comply with COR's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
5. Key Material: Provide keys of nickel silver only.
6. Key Quantity: Furnish 3 change keys for each construction code.
   a. Furnish one extra blank for each lock.
   b. Deliver keys to COR.
   c. Final keying will be completed by the Government.

C. Locks, Latches And Bolts

1. Strikes: Provide Manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set.
2. Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolt.
3. Provide roller type strike where recommended by manufacturer of the latch and lock units.
4. Lock Throw: Provide 3/4 inch minimum throw of latch and deadbolt used on pairs of doors. Comply with UL requirements for throw of deadbolts and latchbolts at rated fire openings.
5. Provide 3/4 inch minimum throw on other latch and deadlock bolts.
6. Flush Bolt Heads: Minimum of 1/2 inch diameter rods of brass, bronze or stainless steel, with minimum 12 inch long rod for doors up to 7’ - 0” high. Provide longer rods as necessary for doors exceeding 7' - 0" in height.
7. Exit Devices Dogging: At typical, non-fire-rated door assemblies, equip closers with keyed dogging device to hold the push bar down and the latch bolt in the open position for doors with exit devices.
8. Rabbeted Doors: Where rabbeted door stiles are indicated, provide special rabbeted front on lock and latch units and bolts.

D. Push/Pull Units:

1. Exposed Fasteners; Provide manufacturer's standard exposed fasteners for installation; thru-bolted for matched pairs, but not for single units

E. Closers And Door Control Devices:

1. Surface Applied Closer: Typically, provide parallel arms for overhead surface closers, except as otherwise indicated.
2. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather and anticipated frequency of use.
3. Barrier-Free Manual Closers: ABA/ADA-compliant; except where manual closers are specifically scheduled at doors identified as not required to be accessible to the physically disabled, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.
4. Combination Door Closers and Holders: Provide "Fail-safe" units designated to hold doors in open position under normal usage and to release and automatically close and latch door when Fire Alarm activates. Provide units with integral electromagnetic holder mechanisms, listed with UL for use with fire detector systems and provided with normally closed switching contacts. Coordinate and connect mechanisms with Work of Division 16 for release of hold open devices by fire detector and alarm systems.

F. DOOR TRIM UNITS:

1. Fasteners: Provide manufacturer's standard exposed fastener for door trim units with either machine screws or self -tapping screws.
2. Fabricate protection plates (armor, kick or mop) not more than 2 inches less than door width on stop side and not more 1/2 inch less than door width on pull side, X the height indicated. Protection plates shall be beveled three (3) sides. Metal Plates: Stainless Steel, .050 inch (U.S. 18 ga.)

	Height (inches)		Door Width (DW)
Kickplate	8	x	DW Scheduled
Armor	48	x	DW Scheduled
Mop	4	x	DW Scheduled

2.5 FINISH HARDWARE DATA

A. Materials: The following model numbers correspond to specifications in the catalogs of the manufacturers listed below to establish known acceptable sources.

Class/Description	Listed MFGR	Approved Substitutes	
A. HANGING DEVICES			
Hinges	McKinney	Stanley	Hager
	T2314 4.5x4.5	F191 4.5x4.5	1191 4.5x4.5
	TB2314 4.5x4.5	FBB191 4.5x4.5	BB1191 4.5x4.5
	T4B3386 4.5x4.5	FBB199 4.5x4.5	BB1199 4.5x4.5

B. SECURING DEVICES

Latch	Best 35H-Nx15H 93K-Nx15D	
Lock	93K-7Dx15D 93K-7Rx15D	
Flush Bolts:	Rockwood 555 1842	Ives 458 559	Hager 282D 292D

C. ACCESSORIES FOR PAIRS

Coordinators	DORMA SR405	DCI 672	Rockwood 1672

D. CLOSING DEVICES

Closer	DORMA 7801 R 7801 PA 7801 HO 7801 PAHO	LCN 4040 R 040 PA 4040 H 4040 PA	Sargent 350 0 350 P9 350 H 350 PH9

E. PROTECTIVE PLATES/TRIM

Kick Plate	Rockwood	Ives	Hager

F. STOPS/HOLDERS

Stop	Rockwood 441	Trimco 1211ES	Hager 241F
OH Stop/Holder	DORMA 710S	Rixson 3-131	Glynn-Johnson 310

G. ACCESSORIES

Weather-strip	Pemko	Nat'l Guard	Hager
	171A	425	412S
	303V	160	891SV
	319N	137N	878SN
	S88	5050	736S

H. MISCELLANEOUS

Silencers	Rockwood	Ives	Hager
	608	20	307D

I. FINISHES: Unless noted otherwise in the Hardware Sets scheduled, hardware finishes shall be as follows:

Hinges	630
Locks/Latch Sets	630
Flush Bolts	630
Push/Pulls	630
Surface Closers	646
Plates	630
Stops	626
Weatherstrip	689
Silencers	Gray

J. KEYING: Consult with the COR and obtain written approval of the complete keying system for the entire facility prior to placing lock order with the factory.

PART 3 - EXECUTION

3.1 INSPECTION

A. After installation has been completed, the finished hardware supplier shall have a qualified hardware consultant check the job and do a final inspection to determine that the doors and frames were prepared properly to receive the hardware. The inspection shall also determine that the proper hardware was used on each opening according to the approved hardware schedule.

B. The final inspection shall determine that hardware was installed according to the manufacturer's recommended instructions. Adjust hardware which is not operating properly.

3.2 INSTALLATION

A. The mounting heights for the finishing hardware shall be as listed in the DHI Publication "Recommended Locations for Builders Hardware For Custom Steel Door and Frames."

B. The handling of doors shall be as listed in the Finish Hardware Schedule and shall follow the DHI Publication "Basic Builders Hardware".

C. The finish hardware installer shall be skilled and qualified in the installation of contract builders hardware.

3.3 ADJUSTING AND CLEANING

A. Hardware shall be left clean and free from disfigurement, at final completion. The Contractor shall make final adjustment to all door closers and other hardware items. Defective or damaged items shall be repaired or replaced.

3.4 PROTECTION

A. Provide proper protection for the hardware and finish until time of Substantial Completion of the Project.

SECTION 092200

METAL SUPPORT ASSEMBLIES

PART 1 GENERAL

Note: Certain areas of the wall system will need to be reinforced due to the waterclosets and lavatories being wall supported.

1.1 REFERENCES

ASTM INTERNATIONAL (ASTM)

ASTM A 653/A 653M	(2004a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C 645	(2004a) Nonstructural Steel Framing Members
ASTM C 754	(2004) Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM ML/SFA MLF	(1991) Metal Lathing and Furring

1.2 SUBMITTALS

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the job site and store in ventilated dry locations. Storage area shall permit easy access for inspection and handling. If materials are stored outdoors, stack materials off the ground, supported on a level platform, and fully protected from the weather. Handle materials carefully to prevent damage. Remove damaged items and provide new items.

PART 2 PRODUCTS

2.1 MATERIALS

Provide steel materials for metal support systems with galvanized coating ASTM A 653/A 653M, G-6; or a 55-percent aluminum-zinc coating.

2.1.1 Nonload-Bearing Wall Framing

NAAMM ML/SFA MLF.

2.1.2 Materials for Attachment of Gypsum Wallboard and Hardieback. For the Hardieback system provide submittals of attachment, etc.

2.1.2.1 Nonload-Bearing Wall Framing and Furring
ASTM C 645, but not thinner than 20 gauge.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Nonload-Bearing Wall Framing

NAAMM ML/SFA MLF, except that framing members shall be 16 inches o.c. unless indicated otherwise.

3.1.2 Systems for Attachment of Gypsum Wallboard and Hardieback. Note: Contractor shall verify if depths listed are sufficient for piping that needs to be placed next to the boards. Any issue with depths shall be brought to the attention of the COR.

3.1.2.1 Nonload-Bearing Wall Framing and Furring

ASTM C 754, except as indicated otherwise.

3.2 ERECTION TOLERANCES

Framing members which will be covered by finish materials such as wallboard shall be within the following limits:

a. Layout of walls and partitions: 1/4 inch from intended position;

b. Plates and runners: 1/4 inch in 8 feet from a straight line;

c. Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and

d. Face of framing members: 1/4 inch in 8 feet from a true plane.

Framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive shall be within the following limits:

a. Layout of walls and partitions: 1/4 inch from intended position;

b. Plates and runners: 1/8 inch in 8 feet from a straight line;

c. Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and

d. Face of framing members: 1/8 inch in 8 feet from a true plane.

SECTION 092900

GYPSUM BOARD

PART 1 GENERAL

1.1 REFERENCES

ASTM INTERNATIONAL (ASTM)

ASTM C 36/C 36M	(2003) Gypsum Wallboard
ASTM C 475	(2002) Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C 840	(2003) Application and Finishing of Gypsum Board
ASTM C 954	(2000) Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM C 1002	(2001) Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
ASTM C 1396/C 1396M	(2003a) Standard Specification for Gypsum Board

GYPSUM ASSOCIATION (GA)

GA 214	(1996) Recommended Levels of Gypsum Board Finish
GA 216	(2000) Application and Finishing of Gypsum Board

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Gypsum Board; (LEED)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Adhesives; (LEED)

Joint Treatment Materials

Submit manufacturer's product data, indicating VOC content.

SD-07 Certificates

Asbestos Free Materials

Certify that gypsum board types and joint treating materials do not contain asbestos.

SD-08 Manufacturer's Instructions

Material Safety Data Sheets

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery

Deliver materials in the original packages, containers, or bundles with each bearing the brand name, applicable standard designation, and name of manufacturer, or supplier.

1.3.2 Storage

Keep materials dry by storing inside a sheltered building. Where necessary to store gypsum board outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, snow, sunlight, and other extreme weather conditions. Provide adequate ventilation to prevent condensation. Store per manufacturer's recommendations for allowable temperature and humidity range. Gypsum wallboard shall not be stored with materials which have high emissions of volatile organic compounds (VOCs) or other contaminants. Do not store panels near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.3.3 Handling

Neatly stack gypsum board flat to prevent sagging or damage to the edges, ends, and surfaces.

1.4 ENVIRONMENTAL CONDITIONS

1.4.1 Temperature

Maintain a uniform temperature of not less than 50 degrees F in the structure for at least 48 hours prior to, during, and following the application of gypsum board and joint treatment materials, or the bonding of adhesives.

1.4.2 Exposure to Weather

Protect gypsum board products from direct exposure to rain, snow, sunlight, and other extreme weather conditions.

1.4.3 Temporary Ventilation

Provide temporary ventilation for work of this section.

1.5 QUALIFICATIONS

Furnish type of gypsum board work specialized by the installer with a minimum of 3 years of documented successful experience.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to specifications, standards and requirements specified. Provide gypsum board types and joint treating materials manufactured from asbestos free materials only. Submit Material Safety Data Sheets and manufacturer maintenance instructions for gypsum materials including adhesives.

2.1.1 Gypsum Board
ASTM C 36/C 36M and ASTM C 1396/C 1396M. Gypsum board shall contain a minimum of 5 percent post-consumer recycled content, or a minimum of 20 percent post-industrial recycled content. Paper facings shall contain no post-consumer recycled paper content. Gypsum board may contain post-consumer or post-industrial recycled content.

2.1.1.1 Regular
48 inch wide, 5/8 inch thick, tapered edges.

2.1.2 Regular Water-Resistant Gypsum Backing Board
2.1.3 Joint Treatment Materials
ASTM C 475. Use all purpose joint and texturing compound containing inert fillers and natural binders, including lime compound. Pre-mixed compounds shall be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.

2.1.3.1 Embedding Compound

Specifically formulated and manufactured for use in embedding tape at gypsum board joints and compatible with tape, substrate and fasteners.

2.1.3.2 Finishing or Topping Compound

Specifically formulated and manufactured for use as a finishing compound.

2.1.3.3 All-Purpose Compound

Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape, substrate and fasteners.

2.1.3.4 Setting or Hardening Type Compound

Specifically formulated and manufactured for use with paper joint tape.

2.1.3.5 Joint Tape

Use cross-laminated or tapered edge tape recommended by the manufacturer. Fiberglass joint tape is not permitted.

2.1.4 Fasteners

2.1.4.1 Screws

ASTM C 1002, Type "G", Type "S" or Type "W" steel drill screws for fastening gypsum board to gypsum board and steel framing members less than 0.033 inch thick. ASTM C 954 steel drill screws for fastening gypsum board to steel framing members 0.033 to 0.112 inch thick.

2.1.5 Adhesives

Do not use adhesive containing benzene, carbon tetrachloride, or trichloroethylene. Adhesive shall contain a maximum VOC content of 50 grams per liter.

2.1.6 Accessories

ASTM C 1047. Fabricate from corrosion protected steel designed for intended use. Accessories manufactured with paper flanges are not acceptable. Flanges shall be free of dirt, grease, and other materials that may adversely affect bond of joint treatment.

2.1.7 Water

Provide clean, fresh, and potable water.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Framing and Furring

Verify that framing and furring are securely attached and of sizes and spacing to provide a suitable substrate to receive gypsum board. Verify that all blocking, headers and supports are in place to support plumbing fixtures. Do not proceed with work until framing and furring are acceptable for application of gypsum board.

3.2 APPLICATION OF GYPSUM BOARD

Apply gypsum board to framing and furring members in accordance with ASTM C 840 or GA 216 and the requirements specified. Apply gypsum board with separate panels in moderate contact; do not force in place. Stagger end joints of adjoining panels. Neatly fit abutting end and edge joints. Use gypsum board of maximum practical length; select panel sizes to minimize waste. Cut out gypsum board to make neat, close, and tight joints around openings. In vertical application of gypsum board, provide panels in lengths required to reach full height of vertical surfaces in one continuous piece. Lay out panels to minimize waste; reuse cutoffs whenever feasible. Surfaces of gypsum board and substrate members may be bonded together with an adhesive. Minimize framing by floating corners with single studs and drywall clips. Install 5/8 inch gypsum over framing at 16 inches on center. Provide type of gypsum board for use in each system specified herein as indicated.
For the new GWB ceiling system see the drawing for details.

3.3 PATCHING

Patch surface defects in gypsum board to a smooth, uniform appearance, ready to receive finishes.

SECTION 093000

TILING

PART 1 GENERAL

This Section is for the two new restrooms. For the Janitor's Closet see Section 096519

1.1 REFERENCES

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108.5 - Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.

ANSI A108.11 - Interior Installation of Cementitious Backer Units.

ANSI A118.1 - Dry-Set Portland Cement Mortar.

ANSI A118.4 - Latex-Portland Cement Mortar.

ANSI A118.6 - Ceramic Tile Grouts.

ANSI A118.9 - Test Methods and Specification for Cementitious Backer Units.

ANSI A137.1 - Specifications for Ceramic Tile.

AMERICAN SOCIETY FOR TESTING AND MATERIALS INTERNATIONAL (ASTM)

ASTM A185 - Welded Steel Wire Fabric.

ASTM C648 – Breaking Strength Test Method

ASTM C1028 - Test Procedure for Coefficient of Friction.

ASTM D4551 - Poly (Vinyl Chloride) (PVC) Plastic Flexible Concealed Water-Containment Membrane.

1.2 SUBMITTALS

Submit the following in accordance with Section 013000 SUBMITTAL PROCEDURES:

SD-03 Product Data

Tile
Grout, and Adhesive

Manufacturer's catalog data and preprinted installation and cleaning instructions.

SD-04 Samples

Tile: Submit 2 samples if different than that specified in the contract documents.

Grout: Submit 2 samples if different than that specified in the contract documents.

Schluter Strips: 2 samples, minimum 6".

Samples shall be of sufficient size to show color range, pattern, type and joints.

1.3 DELIVERY AND STORAGE

Deliver materials to the project site in manufacturer's original unopened containers with seals unbroken and labels and hallmarks intact. Protect materials from weather, and stored under cover in accordance with manufacturer's printed instructions.

1.4 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a 1-year period.

1.5 EXTRA STOCK

Supply an extra two percent of each type tile used in clean and marked cartons.

PART 2 PRODUCTS

2.1.1 Color

A. Floor Tile- 1A52 5

B. Wall Tile 1F52 6

C. Decorative Border 1TA57

D. Trim 330QRORINO QR

2.1.3 Schluter Strips

Schluter strips shall be aluminum satin finish, anodized and sized to be flush with top surface of the tile. Strips shall be installed at all locations where dissimilar flooring material abut.

2.2 WATER

Provide potable water.

2.3 GROUT AND ADHESIVE

Conform to the following for grout, and adhesive:

2.3.1 Grout Materials

A. Manufacturer – Polyblend

Colors - Linen, Earth

ANSI A108.6 latex-portland cement grout.

1. Acrylic resin latex additive

2. Dry mortar mix supplied by latex manufacturer

2.3.2 Mortar Materials

ANSI A118.4 Latex-Portland Cement Mortar and the following:

1. Acrylic resin latex additive

2. Dry mortar mix supplied by latex manufacturer

PART 3 EXECUTION

3.1 PREPARATORY WORK AND WORKMANSHIP

Inspect surface to receive tile in conformance to the requirements of ANSI A108.1 for surface conditions and for workmanship. Provide variations of tiled surfaces that fall within maximum values shown below:

TYPE	WALLS
Latex Portland Cement Mortar	1/8 inch in 8 ft.

3.2 GENERAL INSTALLATION REQUIREMENTS

Do not start tile work until roughing in for mechanical and electrical work has been completed and tested. Apply tile in colors and patterns indicated in the area shown on the drawings. Install tile with the respective surfaces in true even planes to the elevations and grades shown. Provide special shapes as required for sills, jambs, recesses, offsets, external corners, and other conditions to provide a complete and neatly finished installation. Solidly back tile bases and coves with mortar.

3.3 INSTALLATION OF WALL TILE

Various substrates and where each method is used. Where only one method is used on a project, clearly specify that method only.

Install wall tile in accordance with the TCA Hdbk, thinset method

3.4 CLEANING AND PROTECTING

Upon completion, thoroughly clean tile surfaces in accordance with manufacturer's approved cleaning instructions. Do not use acid for cleaning glazed tile. After the grout has set, provide a protective coat of a non-corrosive soap or other approved method of protection for tile wall surfaces.

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 floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.

C. Samples: 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.

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.

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.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project 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.

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 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. 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 tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore certification.

C. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 VINYL COMPOSITION FLOOR TILE

A. Thickness: 0.125 inch.

B. Size: 12 by 12 inches

C. Colors and Patterns: Provide to the COR 3 full-blown listing of colors for the facility to select from.

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.

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 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 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.

3.2 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.

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.

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 finished floor 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 flooring 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 F 1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless flooring. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.
2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless flooring. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.

SECTION 099000

PAINTS AND COATINGS

PART 1 GENERAL

Note: New ceiling needs to be painted with a color that will require approval from the facility.

1.1 REFERENCES

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100Doc	(2001) Documentation of the Threshold Limit Values and Biological Exposure Indices

ASTM INTERNATIONAL (ASTM)

ASTM D 4214	(1998) Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D 523	(1989; R 1999) Specular Gloss

MASTER PAINTERS INSTITUTE (MPI)

MPI 139	(Jan 2004) Interior High Performance Latex, MPI Gloss Level 3
MPI 141	(Jan 2004) Interior High Performance Latex MPI Gloss Level 5
MPI 153	(Jan 2006) Interior W.B. Light Industrial Coating, Semi-Gloss, MPI Gloss Level 5
MPI 50	(Jan 2004) Interior Latex Primer Sealer
MPI 79	(Jan 2004) Alkyd Anti-Corrosive Metal Primer

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Guide 3	(1982; R 1995) A Guide to Safety in Paint Application
SSPC PA 1	(2000) Shop, Field, and Maintenance Painting
SSPC SP 1	(1982; R 2000) Solvent Cleaning

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313	(Rev D; Am 1) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000	Air Contaminants

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-04 Samples

Color

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated.

SD-08 Manufacturer's Instructions

Application instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

1.3 APPLICATOR'S QUALIFICATIONS

1.3.1 Contractor Qualification

Submit evidence that key personnel have successfully performed surface preparation and application of coatings on a minimum of three similar projects within the past three years.

1.4 REGULATORY REQUIREMENTS

1.4.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

1.4.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.4.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.4.4 Asbestos Content

Materials shall not contain asbestos.

1.4.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.4.6 Human Carcinogens

Materials shall not contain ACGIH 0100Doc and ACGIH 0100Doc confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.5 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F. Do not store paint with materials that have a high capacity to adsorb VOC emissions. Do not store paint in occupied spaces.

1.6 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations.

1.6.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC Guide 3.

1.6.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

a. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.

b. 29 CFR 1910.1000.

c. ACGIH 0100Doc, threshold limit values.

1.7 ENVIRONMENTAL CONDITIONS

Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation.

1.7.1 Coatings

Do not apply coating when air or substrate conditions are:

a. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Resident Engineer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

1.7.2 Post-Application

Maintain one of the following ventilation conditions during the curing period, or for 72 hours after application:

a. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30 percent and 60 percent.

b. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

1.8 SCHEDULING

Allow paint installations to cure prior to the installation of materials that adsorb VOCs.

1.9 COLOR SELECTION

Colors of finish coats shall be as indicated on the drawings or as specified.

1.10 LOCATION AND SURFACE TYPE TO BE PAINTED

1.10.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

a. New factory finished surfaces that are damaged during performance of the work.

b. Existing coated surfaces that are damaged during performance of the work.

1.10.1.1 Interior Painting

Includes new surfaces and existing coated surfaces as indicated and existing coated surfaces made bare by cleaning operations.

1.10.2 Painting Excluded

Do not paint the following unless indicated otherwise.

a. Surfaces concealed and made inaccessible.

b. Hardware, fittings, and other factory finished items.

1.10.3.1 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Eggshell refers to G3 and Semigloss refers to G5.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	

Gloss is tested in accordance with ASTM D 523.

1.10.3.2 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an interior system (INT/RIN).

1.10.3.3 Paint

See Coating definition.

1.10.3.4 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents. Comply with applicable regulations regarding toxic and hazardous materials.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, plates and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as screw heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primmed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.2.1 Additional Requirements for Preparation of Surfaces With Existing Coatings defined as those which cannot be removed with a putty knife:

a. Sand existing glossy surfaces to be painted to reduce gloss. Brush, and wipe clean with a damp cloth to remove dust.

b. The requirements specified are minimum. Comply also with the application instructions of the paint manufacturer.

c. Previously painted surfaces specified to be repainted and damaged during construction shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter.

d. Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed.

e. Chalk shall be removed so that when tested in accordance with ASTM D 4214, the chalk resistance rating is no less than 8.

f. Slick surfaces shall be roughened. Damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls shall be repaired with suitable material to match adjacent undamaged areas.

g. Edges of chipped paint shall be feather edged and sanded smooth.

h. New, proposed coatings shall be compatible with existing coatings.

3.2.2 Existing Coated Surfaces with Minor Defects

Sand, spackle, and treat minor defects to render them smooth. Minor defects are defined as scratches, nicks, cracks, gouges, spalls, alligatoring, chalking, and irregularities due to partial peeling of previous coatings. Remove chalking by sanding so that when tested in accordance with ASTM D 4214, the chalk rating is not less than 8.

3.4 PREPARATION OF SURFACES

3.4.1 Gypsum Board and Plaster

a. Surface Cleaning: Plaster shall be clean and free from loose matter; gypsum board shall be dry. Remove loose dirt and dust by brushing with a soft brush, rubbing with a dry cloth, or vacuum-cleaning prior to application of the first coat material. A damp cloth or sponge may be used if paint will be water-based.

b. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.

c. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not surfaces with droplets of water.

3.5 APPLICATION

3.5.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Use trigger operated spray nozzles for water hoses. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.

b. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely.

c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

3.5.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the COR to use thinners. The written permission

shall include quantities and types of thinners to use. Paints of different manufacturers shall not be mixed.

3.5.3 Coating Systems

a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table

Division 5. Interior Metal, Ferrous and Non-Ferrous Paint Table
Division 9: Interior Plaster, Gypsum Board, Textured Surfaces Paint Table

b. Minimum Dry Film Thickness (DFT): Apply paints, primers, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.

c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.

d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:

(1) One coat of primer.

(2) One coat of undercoat or intermediate coat.

(3) One topcoat to match adjacent surfaces.

e. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers and fillers need not be provided on surfaces where existing coatings are soundly adhered and in good condition. Do not omit undercoats or primers.

3.6 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Interior.

a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.

b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.

c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.

d. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces.

3.7 WASTE MANAGEMENT

As specified in the Waste Management Plan and as follows. Do not use kerosene or any such organic solvents to clean up water based paints. Properly dispose of paints or solvents in designated containers. Close and seal partially used containers of paint to maintain quality as necessary for reuse. Store in protected, well-ventilated, fire-safe area at moderate temperature. Place materials defined as hazardous or toxic waste in designated containers.

SECTION 101550

TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes stock, manufactured toilet compartments.

B. Types of toilet compartments include:

1. Metal, baked enamel finish.

C. Styles of toilet compartments include:

1. Ceiling and Wall Supported. Wall Braced.

D. Styles of screens include:

1. Wall-hung.

E. Supports for attaching compartments to overhead structural system.

1.2 REFERENCE STANDARDS

A. American National Standards Institute (ANSI)

1. A 117.1 Accessible and Usable Buildings and Facilities.

B. American Society for Testing and Materials (ASTM)

1 A 591 Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications.

1.3 SUBMITTALS

A. Product data for materials, fabrication, and installation including catalog cuts of anchors, hardware, fastenings, and accessories.

B. Shop drawings for fabrication and erection of toilet compartment assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other work.

C. Samples of full range of colors for each type of unit required. Submit 6 inch square samples of each color and finish on same substrate to be used in work, for color verification after selections have been made.

1.4 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of work. However, allow for adjustments where taking of field measurements before fabrication might delay work.

B. Coordination: Furnish inserts and anchorages which must be built into other work for installation of toilet compartments and related items. Coordinate delivery with other work to avoid delay.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

1. Steel - Baked Enamel Finish:
   a. Sanymetal Products Co.

or Approved Manufacturer.

2.2 MATERIALS

A. General: Provide materials which have been selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discoloration's, telegraphing of core material, or other imperfections on finished units are not acceptable.

B. Steel Sheets for Baked Enamel Finish: ASTM A591, Class C, galvanized-bonderized, of following minimum thickness':
   1. Ceiling and Wall Supported: 0.0516 inch.
   2. Panels and Screens: 0.0396 inch.
   3. Doors: 0.0336 inch.

C. Concealed Anchorage Reinforcement: Minimum 0.108 inch, galvanized steel sheet.

D. Concealed Tapping Reinforcement: Minimum 0.0785 inch, galvanized steel sheet.

E. Core Material for Metal Partitions: Manufacturer's standard sound-deadening honeycomb of impregnated Kraft paper in thickness to provide finished dimension of 1 inch minimum for doors, panels, and screens and 1-1/4 inches minimum for pilasters.

H. Hardware and Accessories: Manufacturer's standard design, heavy duty operating hardware and accessories of chromium-plated, nonferrous cast alloy ("Zamac").

I. Anchorage's and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, chromium-plated steel, or brass, finished to match hardware, with theft-resistant-type heads and nuts. For concealed anchors, use hot-dip galvanized, cadmium-plated, or other rust-resistant protective-coated steel.

2.3 FABRICATION

A. General: Furnish standard doors, panels, screens, and pilasters fabricated for compartment system. Furnish units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated.

B. Door Dimensions: Unless otherwise indicated, furnish 24 inch wide in-swinging doors for ordinary toilet stalls and 32 inch wide (clear opening) out-swinging doors for stalls equipped for use by handicapped.

D. Wall-Hung Screens: Furnish panel units in sizes indicated, of same construction and finish as partition system panels.

E. Hardware: Furnish hardware for each compartment to comply with ANSI A117.1 for handicapped accessibility and as follows:

1. Hinges: Cutout inset type, adjustable to hold door open at any angle up to 90 degrees. Provide gravity type, spring-action cam type, or concealed torsion rod type to suit manufacturer's standards.
2. Latch and Keeper: Recessed latch unit, designed for emergency access, with combination rubber-faced door strike and keeper.
3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit, designed for handicapped accessibility, with combination rubber-faced door strike and keeper.
4. Coat Hook: Manufacturer's standard unit, combination hook and rubber-tipped bumper, sized to prevent door hitting mounted accessories.
5. Door Pull: Manufacturer's standard unit for out-swinging doors. Provide pulls on both faces of handicapped compartment doors.

2.4 FINISH

A. Color: One of manufacturer's standard colors in each room, as indicated or, if not indicated, as selected by COR.

B. Color: Custom color to match COR's sample.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's recommended procedures and installation sequence. Install compartment units rigid, straight, plumb, and level.

C. Screens: Attach with anchoring devices as recommended by manufacturer to suit supporting structure. Set units to provide support and to resist lateral impact.

3.2 ADJUST AND CLEAN

A. Hardware Adjustment: Adjust and lubricate hardware for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors (and entrance swing doors) to return to fully closed position.

B. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

SECTION 102800

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes toilet and lavatory accessory items as scheduled.
B. Mirrored glass for frameless applications."
C. Toilet compartments and related accessories.

1.2 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1.	A 153	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
2.	A 366	Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.
3.	A 527	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-forming Quality.
4.	B 456	Specification for Electro-deposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

1.3 SUBMITTALS

A. Product data for each toilet accessory item specified, including construction details relative to materials, dimensions, gages, profiles, mounting method, specified options, and finishes.

B. Samples of each toilet accessory item to verify design, operation, and finish requirements. Acceptable full-size samples will be returned and may be used in the Work.
C. Schedule indicating types, quantities, sizes, and installation locations (by room) for each toilet accessory item to be provided for project.

D. Setting drawings where cutouts are required in other work, including templates, substrate preparation instructions, and directions for preparing cutouts and installing anchorage devices.

E. Maintenance instructions including replaceable parts and service recommendations.

1.4 QUALITY ASSURANCE

A. Inserts and Anchorage’s: Furnish accessory manufacturers' standard inserts and anchoring devices that must be set in concrete or built into masonry. Coordinate delivery with other work to avoid delay.

B. Single-Source Responsibility: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise acceptable to COR.

1.5 PROJECT CONDITIONS

A. Coordination: Coordinate accessory locations, installation, and sequencing with other work to avoid interference with and ensure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

1.6 WARRANTY

A. Warranty: Submit a written warranty executed by mirror manufacturer, agreeing to replace any mirrors that develop visible silver spoilage defects within warranty period.

B. Warranty Period: 15 years from date of Final Acceptance by the Government.

C. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering toilet accessories that may be incorporated in the Work include, but are not limited to, the following:
1. A & J Washroom Accessories.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. General Accessory Manufacturing Co.
6. McKinney/Parker.

2.2 MATERIALS, GENERAL

A. Stainless Steel: AISI Type 302/304, with satin finish, 0.034 inch minimum thickness.

B. Sheet Steel: Cold-rolled, commercial quality ASTM A 366, 0.04 inch minimum. Surface preparation and metal pretreatment as required for applied finish.

C. Galvanized Steel Sheet: ASTM A 527 G60.

D. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.

E. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

2.3 **TOILET TISSUE DISPENSERS**

A. Furnish Type II – surface mounted toilet tissue holder with two rolls of standard tissue stacked vertically. Provide stainless steel, satin finish cabinet. **CONTRACTOR SHALL PROVIDE MODEL: BOBRICK, CONTURA B-4288.**

2.4 **COMBINATION TOWEL DISPENSER/WASTE RECEPTACLE UNITS**

A. Provide surface-mounted dispenser/receptacle 18-8 S, type 304, 22 gauge stainless steel with a capacity of 350 C-fold or 475 multifold paper towels. Dispenser shall have flush tumbler lcok. **CONTRACTOR SHALL PROVIDE MODEL: BOBRICK CONTURA B-43699.**

2.5 **GRAB BARS (BOBRICK B-6206).**

A. Stainless Steel Type: Provide grab bars with wall thickness not less than 0.05 inch and as follows:
1. Mounting: Concealed, manufacturer's standard flanges and anchorage's.
2. Clearance: 1-1/2 inch clearance between wall surface and inside face of bar.
3. Gripping Surfaces: Smooth, satin finish.
4. Heavy-Duty Size: Outside diameter of 1-1/2 inches.

2.6 **SANITARY NAPKIN DISPOSAL UNITS**

A. Surface-Mounted Type: Fabricate of stainless steel with seamless exposed walls, tightly self-closing top cover and locking bottom panel with continuous, stainless steel piano hinge. **(BOBRICK B-254).**

2.8 **SOAP DISPENSERS**

A. Provide **KUTOL SOFT AND SILKY 800 Ml DISPENSER**. Black with large push pad. Molded from ABS plastic. No key required to open. Large viewing window. Smooth lines with no dirt traps. One hand operation.

2.9 **UTILITY SHELF** (**BOBRICK B-224** – in Janitor's Closet B-132)

A. Mop and Broom Holder/Utility Shelf: Combination unit with 0.05 inch, Type 304, stainless steel shelf with 1/2 inch returns, 0.062 inch support brackets for wall mounting. Provide 0.062 inch stainless steel hooks for wiping rags on front of shelf, together with spring-loaded, rubber hat, cam-type mop/broom holders; 1/4 inch diameter stainless steel drying rod suspended beneath shelf. Provide unit 36 inches long and complete with four mop/broom holders and three hooks.

2.10 **SEAT COVER DISPENSER**

A. Surface Mounted Type: Fabricate of stainless steel for normal 2 inch depth (Bobrick B-4221).

2.11 FABRICATION

A. General: Only a maximum 1-1/2 inch diameter, unobtrusive stamped manufacturer logo, as approved by COR, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.

B. General: No names or labels are permitted on exposed faces of toilet and bath accessory units. On either interior surface not exposed to view or on back surface, provide identification of each accessory item either by a printed, waterproof label or a stamped nameplate indicating manufacturer's name and product model number.

C. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

D. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.

E. Keys: Provide universal keys for access to toilet accessory units requiring internal access for servicing, resupply, etc. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install toilet accessory units according to manufacturers' instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, according to manufacturer's instructions for type of substrate involved.

C. Install grab bars to withstand a downward load of at least 250 lb., complying with ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

SECTION 221119

PLUMBING SPECIALTIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
NOTE: All Hot Water piping must be insulated with an insulated jacket as the existing hot water piping is, then painted a matching green, and labeled as either Hot Water Supply or Hot Water Return.

1.2 SUMMARY

A. This Section includes the following plumbing specialties:
1. Trap seal primer valves
2. Miscellaneous piping specialties
3. Cleanouts
4. Floor drains
5. Floor sinks

1.3 DEFINITIONS

1.4 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:
1. Sanitary Waste and Vent Piping: 20-foot head of water.

1.5 SUBMITTALS

A. Product Data: Include rated capacities and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following:
1. Water hammer arresters, air vents, and trap seal primer valves and systems.
2. Cleanouts, floor drains, open receptors and floor sinks.
3. Air-admittance valves, vent caps, vent terminals, and roof flashing assemblies.

B. Field test reports.
1. Maintenance Data: For plumbing specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of plumbing specialties and are based on the specific system indicated.

B. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.

C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.

D. NSF Compliance:
1. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 TRAP SEAL PRIMER VALVES

A. Supply-Type Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:
1. Available Manufacturers:
a) E & S Valves.
b) Josam Co.
c) MIFAB Manufacturing, Inc.
d) Precision Plumbing Products, Inc.
e) Smith, Jay R. Mfg. Co.
f) Tyler Pipe; Wade Div.
g) Watts Industries, Inc.; Drainage Products Div.
h) Watts Industries, Inc.; Water Products Div.
i) Zurn Industries, Inc.; Jonespec Div.
j) Zurn Industries, Inc.; Specification Drainage Operation.
2. 125-psig minimum working pressure.
3. Bronze body with atmospheric-vented drain chamber.
4. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
5. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

B. Drainage-Type Trap Seal Primer Valves: ASSE 1044, fixture-trap, waste-drainage-fed type, with the following characteristics:
   1. Available Manufacturers:
      a) Smith, Jay R. Mfg. Co.
   2. Chrome-plated, cast-brass, NPS 1-1/4 minimum, lavatory P-trap with NPS 3/8 minimum, trap makeup connection.

C. Trap Seal Primer System: Factory-fabricated, automatic-operation assembly for wall mounting with the following:
   1. Available Manufacturers:
      a) Precision Plumbing Products, Inc.
   2. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing inlet and manifold with number of NPS 1/2 outlets as indicated.
   3. Cabinet: Steel box with stainless-steel cover.
   4. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
   5. Water Hammer Arrester: ASSE 1010.
   6. Vacuum Breaker: ASSE 1001.

2.3 MISCELLANEOUS PIPING SPECIALTIES

A. Note: Contractor shall determine where and how many water hammer arrestors are required per the latest IPC and submit to the COR for approval.

B. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, metal-bellows type with pressurized metal cushioning chamber. Sizes indicated are based on ASSE 1010 or PDI-WH 201, Sizes A through F.
   1. Available Manufacturers:
      a) Josam Co.
      b) Smith, Jay R. Mfg. Co.
      c) Tyler Pipe; Wade Div.
      d) Zurn Industries, Inc.; Specification Drainage Operation.

C. Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.

D. Vent Terminals: Commercially manufactured, shop- or field-fabricated, frost-proof assembly constructed of galvanized steel or copper. Size to provide 1-inch enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.

E. Conductor Nozzles: Bronze body with threaded inlet for connected conductor size, and bronze wall flange with mounting holes.
   1. Finish: Polished bronze.

2.4 CLEANOUTS

A. Cleanouts, CO : Comply with ASME A112.36.2M.
   1. Application: Floor cleanout, wall cleanout, or for installation in exposed piping.
   2. Available Products:

a) Josam Co.;
b) Josam Co., Blucher-Josam Div.;
c) LSP Products Group.;
d) Smith, Jay R. Mfg. Co.;.
e) Tyler Pipe, Wade Div.;
f) Zurn Industries, Inc., Jonespec Div.;

3. Body or Ferrule Material: Cast iron.
4. Clamping Device: As required.
5. Outlet Connection: Threaded, Inside calk or Spigot as required.
6. Closure: Brass plug with straight threads and gasket.
7. Adjustable Housing Material: Cast iron.
8. Nickel-bronze, copper alloy in finished spaces.
9. Frame and Cover Shape: Square.
10. Top Loading Classification: Medium Duty.

2.5 FLOOR DRAINS

A. Floor Drains: Comply with ASME A112.21.1M
1. Application: Floor drain
2. Available Products:
a) Josam Co.;
b) Josam Co., Blucher-Josam Div.;
c) Sioux Chief Manufacturing Co., Inc.;
d) Smith, Jay R. Mfg. Co.;
e) Tyler Pipe, Wade Div.
f) Zurn Industries, Inc., Jonespec Div.
3. Body Material: Gray iron
4. Seepage Flange: Not required.
5. Clamping Device: Required.
6. Outlet: Bottom.
7. Top or Strainer Material: Satin Nickel
8. Top of Body and Strainer Finish: Satin Nickel
9. Top Shape: 3-3/4" Square
10. Known Soure: Ebbe Satin Nickel Grate, Model E4410. The contractor shall ensure that the new strainer is compatible with the new drain body.

2.6 FLOOR DRAINS

A. Floor Sinks: Comply with ASME 112.6.3
1. Application: Floor drain
2. Available Products:
a) Zurn model Z1960

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install cleanouts in building drain piping according to the following, unless otherwise indicated:
1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.

2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

B. Install cleanout deck plates with top flush with finished floor, for floor cleanouts for piping below floors.

C. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

D. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.

E. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.

F. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

G. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

H. Fasten recessed-type plumbing specialties to reinforcement built into walls.

I. Install wood-blocking reinforcement for wall-mounting and recessed-type plumbing specialties.

J. Install individual shutoff valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve is not indicated. Install shutoff valves in accessible locations

K. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

L. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

A. Connect plumbing specialties to piping specified in other Division 15 Sections.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
1. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

3.4 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each backflow preventer and trap seal primer system.
1. Text: Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled trap seal primer systems and their installation. Report results in writing.
1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

3.6 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

SECTION 221316

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes sanitary waste and vent piping systems within the building. Systems include the following:

1. Sanitary drain piping system.

1.2 REFERENCE STANDARDS

A. American Society of Mechanical Engineers (ASME)

1. B16.22 – Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
2. B31.9 - Building Services Piping.

B. American Society for Testing and Materials (ASTM)

1. A888 – Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
2. B88 - Seamless Copper Water Tube.

C. Cast Iron Soil Pipe Institute (CISPI)

1. CISPI 301 – Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
2. CISPI 310 – No-hub Couplings

1.3 SUBMITTALS

A. Product data for the following sanitary waste and vent piping products:

1. Sanitary drain piping system including all fittings.

B. Coordination drawings, drawn accurately to scale and coordinating penetrations.

1.4 QUALITY ASSURANCE

A. Comply with the provisions of ASME B31.9 for materials, products, and installation.

B. Provide listing/approval stamp, label, or other marking on piping made to specified standards.

PART 2 - PRODUCTS

2.1 PIPES AND TUBES

A. General: The application of pipe, tube, fitting materials, and joining methods required for sanitary waste and vent piping systems are scheduled at the end of this specification.

PART 3 - EXECUTION

3.1 INSTALLATION OF SANITARY DRAIN PIPING SYSTEM

A. Install and support sanitary drain and vent piping in accordance with this specification and the International Plumbing Code.

B. Slope horizontal waste piping: 3" and smaller – match existing; 4" and larger - slope 1/8" per foot, or match existing.

C. Provide offsets and fittings as indicated on the drawings or as required. Use reduction fittings to connect two pipes of different diameter. Change directions by appropriate use of 45 degree wyes, long-sweep quarter bends, sixth, eighth and sixteenth bends. Sanitary tees may be used on vertical stacks. Use long sweeps at the base of risers.

D. Unless otherwise indicated, provide a separate trap at each fixture. Place traps so that the discharge from the fixture will pass through only one trap before reaching the building drain.

E. Install cleanouts of the same size as the soil waste lines in which the cleanouts are placed; however, cleanouts shall not be larger than 4 inches in diameter. Provide cleanouts where soil lines change direction, at the end of each continuous waste line, and at the base of each riser. Cleanouts shown on drawings are shown for schematic purposes. Actual cleanout locations are subject to change based on actual piping installation configuration. The contractor shall coordinate actual cleanout locations with the COR.

F. Install vent piping as indicated on the drawings or as required. Flash penetrations through the roof with 6 pound lead flashing approximately 24 inches square. Flange the flashing to the lead sleeve. Extend the flashing up and around the vent pipe. Turn the flashing down inside the pipe at least 2 inches to make an absolutely watertight joint. Coordinate requirements with architectural details.

3.4 FIELD QUALITY CONTROL

A. Inspect drainage piping as follows:

1. Do not enclose, cover, or put into operation drainage piping system until it has been inspected and approved by the COR.

2. During progress of installation, notify the COR at least 24 hours prior to time such inspection must be made. Perform tests specified below in presence of the COR.

    a. Roughing-In Inspection: Arrange for inspection of piping system after system roughing-in, before concealing, and prior to setting drains.
    b. Final Inspection: Arrange for final inspection by COR to observe tests specified below and to ensure compliance with requirements of plumbing code.

3. Reinspections: Make required corrections and arrange for reinspection by COR when piping system fails to pass test or inspection.
4. Reports: Prepare inspection reports signed by the COR.

B. Drainage Piping System Tests: Test drainage systems as follows:

1. Test for leaks and defects in new drainage piping systems and parts of existing systems that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
2. Leave uncovered and unconcealed in new, altered, extended, or replaced drainage piping until it has been tested and approved. Expose for testing work that has been covered or concealed before it has been tested and approved.
3. Rough Plumbing Test Procedure: Test piping of plumbing drainage systems on completion of roughing-in piping installation. Tightly close all openings in piping system and fill with water to point of overflow, but not less than 10 feet head of water. Water level shall not drop during the period from 15 minutes before inspection starts through completion of inspection. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After drains have been set, test connections and prove gastight and watertight. Plug stack openings on roof and building drain where it leaves the building and introduce air into the system equal to pressure of 1 inch water column. Air pressure shall remain constant without introducing additional air throughout period of inspection.
5. Repair leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.5 CLEANING

A. Clean interior of piping system. Remove dirt and debris as work progresses.

3.6 COMMISSIONING

A. Fill water systems.

B. Before operating systems, perform these steps:

1. Close drain valves and hose bibbs.
2. Open shutoff valves to full open position.
3. Remove plugs used during testing of piping systems and plugs used for temporary sealing of piping during installation.
4. Close drain valves and replace drain plugs.

C. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.7 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from construction work.

B. Place plugs in ends of uncompleted piping at end of day or when work stops.

3.8 SANITARY WASTE AND VENT PIPE AND FITTINGS SCHEDULE

Item	Size (Inches)	Description
Sanitary sewer and vent pipe, and fittings	All sizes	Cast iron hubless pipe (ASTM A 888 and CISPI 301); Fittings: Coupling (ASTM C 1277 and ASTM C 564), heavy duty stainless steel shield, stainless-steel bands, and sleeves (ASTM A 666 Type 304) 1) NPS 1-1/2 to NPS 4: 3-inch wide shield with 4 bands 2) NPS 5 to NPS 10: 4-inch wide shield with 6 bands. Heavy duty, cast iron couplings: ASTM A48, 2 piece, cast iron housing; stainless steel bolts and nuts; and sleeve.

END OF TABLE

*** * * END OF SECTION * * ***

SECTION 224200

PLUMBING FIXTURES

1.1 SUMMARY

A. This Section includes the following conventional plumbing fixtures and related components:

1. Flushometers.
2. Water closets.
3. Urinals.
4. Fixture Supports
5. Janitor's Service Sink – Room B-132

1.3 SUBMITTALS

A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.

C. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

D. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

F. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
2. Water-Closet, Flushometer Tank Trim: ASSE 1037.

G. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

1. Atmospheric Vacuum Breakers: ASSE 1001.
2. Brass and Copper Supplies: ASME A112.18.1.
3. Manual-Operation Flushometers: ASSE 1037.
4. Plastic Tubular Fittings: ASTM F 409.
5. Brass Waste Fittings: ASME A112.18.2.
6. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.

K. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Plastic Toilet Seats: ANSI Z124.5.

1.5 WARRANTY

1. Failures include, but are not limited to, the following:
   a. Structural failures of unit shell.
   b. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period for Commercial Applications: One year from date of Joint Acceptance Inspection.

PART 2 - PRODUCTS

2.1 FLUSHOMETERS

A. Flushometers:

1. Known acceptable source subject to compliance with requirements, manufactures offering products that may be incorporated. Work includes, but is not limited to the following:
   a. Coyne & Delany Co. .
   b. Delta Faucet Company.
   c. Sloan Valve Company.
   d. Zurn Plumbing Products Group; Commercial Brass Operation.
   e. Hydrotek International, Inc.
   f. TOTO USA, Inc.

2. Description: Flushometer for urinal and water-closet-type fixture. Include brass body with corrosion-resistant internal components, non-hold-open feature, control stop with check valve, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts.
   a. Internal Design: Diaphragm operation.
   b. Style: Exposed.
   c. Inlet Size: NPS 3/4 and NPS 1.

d. Trip Mechanism: Hard-wired, electric-sensor actuator.
e. Consumption: 0.5 gal./flush and 1.6 gal./flush.

2.2 WATER CLOSET SEATS

Water Closet Seats:

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Standard Companies, Inc.
   b. Bemis Manufacturing Company.
   c. Centoco Manufacturing Corp.
   d. Church Seats.
   e. Eljer.
   f. Kohler Co.
   g. Olsonite Corp.
   h. Sanderson Plumbing Products, Inc.; Beneke Div.
   i. Sper

2. Description: Toilet seat for water-closet-type fixture.
   a. Material: Molded, solid plastic with antimicrobial agent.
   b. Configuration: Open front without cover.
   c. Size: Elongated.
   d. Hinge Type: SC, self-sustaining, check.
   e. Class: Standard commercial.
   f. Color: White.

2.3 FIXTURE SUPPORTS

A. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Josam Company.
   2. MIFAB Manufacturing Inc.
   3. Smith, Jay R. Mfg. Co.
   4. Tyler Pipe; Wade Div.
   5. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
   6. Zurn Plumbing Products Group; Specification Drainage Operation.

B. Water-Closet Supports,:

1. Description: Combination carrier designed for accessible and standard mounting height of wall-mounting, water-closet-type fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

C. Urinal Supports,:

1. Description: Type II, urinal carrier with hanger and bearing plates for wall-mounting, urinal-type fixture. Include steel uprights with feet.

2. Accessible-Fixture Support: Include rectangular steel uprights.

2.4 Water Closets

1.1 WALL-MOUNTED WATER CLOSETS

A. Water Closets Wall mounted, top spud accessible.

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
b. Material: Vitreous china.
c. Type: Siphon jet.
d. Style: Flushometer valve.
e. Height: Standard.
f. Rim Contour: Elongated.
g. Water Consumption: 1.28 gal per flush.
h. Spud Size and Location: NPS 1-1/2 (DN 40); top.

2. Flushometer Valve:
3. Toilet Seat:
4. Support:

a. Standard: ASME A112.6.1M.
b. Description: Waste-fitting assembly as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture.
c. Water-Closet Mounting Height: Standard.

Insert number to complete drawing designation. Use these designations on Drawings to identify each water closet.

2.5 Urinals

A. Urinals

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Standard Companies, Inc.
   b. Briggs Plumbing Products, Inc.
   c. Capizzi.
   d. Crane Plumbing, L.L.C./Fiat Products.
   e. Duravit USA, Inc.
   f. Eljer.
   g. Kohler Co.
   h. Mansfield Plumbing Products, Inc.
   i. Peerless Pottery, Inc.
   j. Sanitarios Azteca, S.A. de C.V.

k. St. Thomas Creations.
l. TOTO USA, Inc.

2. Description: Wall-mounting, back-outlet, vitreous-china fixture designed for flushometer valve operation.
   a. Type: Washout with extended shields.
   b. Strainer or Trapway: Open trapway with integral trap.
   c. Design Consumption: 0.5 gal./flush.
   d. Color: White.
   e. Supply Spud Size: NPS 3/4.
   f. Outlet Size: NPS 2.
   g. Flushometer: Hard wired sensor.
   h. Fixture Support: Urinal chair carrier.

2.6 Janitor's Service Sink

d. Fixture:Standard: ASME A112.19.1/CSA B45.2.
e. Type: Service sink with back.
f. Back: **Two faucet holes**
g. Nominal Size: **24 by 20 inches**.
h. Color: White.
i. Mounting: P-trap standard with grid strainer inlet, cleanout, and floor flange.
j. Rim Guard: On front and sides.

5. Faucet: Hot and Cold Water.

6. Support: ASME A112.6.1M, Type II, sink carrier.

2.7 EXAMINATION

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

2.8 INSTALLATION

A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
   1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
   2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
   3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

C. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

D. Install wall-mounting fixtures with tubular waste piping attached to supports.

E. Install counter-mounting fixtures in and attached to casework.

F. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

G. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

H. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

I. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

J. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

K. Install toilet seats on water closets.

L. Install trap-seal liquid in dry urinals.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

M. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings.

2.8 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping where applicable. Use size fittings required to match fixtures.

2.9 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

C. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

D. Install fresh batteries in sensor-operated mechanisms.

2.10 ADJUSTING

A. Adjust water pressure at flushometer valves to produce proper flow and stream.

B. Replace washers and seals of leaking and dripping faucets and stops.

C. Install fresh batteries in sensor-operated mechanisms.

2.11 CLEANING

A. Clean fixtures, fittings with manufacturers' recommended cleaning methods and materials. Do the following:

B. After completing installation of exposed, factory-finished fixtures and fittings, inspect exposed finishes and repair damaged finishes.

2.12 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

SECTION 230593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

    a. Constant-volume air system.

2. Testing, adjusting, and balancing existing systems and equipment.
3. Sound tests.
4. Vibration tests.
5. Duct leakage tests.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. BAS: Building automation systems.

C. NEBB: National Environmental Balancing Bureau.

D. TAB: Testing, adjusting, and balancing.

E. TABB: Testing, Adjusting, and Balancing Bureau.

F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

G. TDH: Total dynamic head.

1.4 PREINSTALLATION MEETINGS

A. TAB Conference: Conduct a TAB conference at ZOA ARTCC after approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Provide a minimum of 4 days' advance notice of scheduled meeting time and location.

1. Minimum Agenda Items:

    a. The Contract Documents examination report.
    b. The TAB plan.
    c. Needs for coordination and cooperation of trades and subcontractors.
    d. Proposed procedures for documentation and communication flow.

1.5 ACTION SUBMITTALS: Not used

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within **20** days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 2**0** days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within 20 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

D. System Readiness Checklists: Within 20 days of Contractor's Notice to Proceed, submit system readiness checklists as specified in "Preparation" Article.

E. Examination Report: Submit a summary report of the examination review required in "Examination" Article.

F. Certified TAB reports.

G. Sample report forms.

H. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.7 QUALITY ASSURANCE

A. TAB Specialists Qualifications: Certified by **AABC or NEBB**.

1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC or NEBB
2. TAB Technician: Employee of the TAB specialist and certified by AABC, NEBB or as a TAB technician.

B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.8 FIELD CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TAB SPECIALISTS

A. Subject to compliance with requirements: Certified TAB company

3.2 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment..

B. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output.

C. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

D. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

A. Prepare a TAB plan that includes the following:

B.

1. Strategies and step-by-step procedures for balancing the systems.
2. Instrumentation to be used.

3. Sample forms with specific identifications for air distribution system.

C. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
b. Duct systems are complete with terminals installed.
c. Volume and fire dampers are open and functional.
d. Clean filters are installed
e. Automatic temperature-control systems are operational.
f. Ceilings are installed.
g. Windows and doors are installed.
h. Suitable access to balancing devices and equipment is provided.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

B. Cut insulation and ducts for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," "

C. Mark balancing devices, including damper-control positions, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

D. Check dampers for proper position to achieve desired airflow path.

E. Check for airflow blockages.

F. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.6 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

B. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

C. Verify final system conditions.

1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
2. Re-measure and confirm that total airflow is within design.
3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation and adjust if necessary.
6. Measure and record all operating data.
7. Record final fan-performance data.

3.7 SOUND TESTS

A. After the systems are balanced and construction is Substantially Complete, measure and record sound levels at locations as designated by the COR.

B. Instrumentation:

1. The sound-testing meter shall be a portable, general-purpose testing meter consisting of a microphone, processing unit, and readout.

2. The sound-testing meter shall be capable of showing fluctuations at minimum and maximum levels, and measuring the equivalent continuous sound pressure level (LEQ).
3. The sound-testing meter must be capable of using 1/3 octave band filters to measure mid-frequencies from 31.5 Hz to 8000 Hz.
4. The accuracy of the sound-testing meter shall be plus or minus one decibel.

C. Reporting:

1. Report shall record the following:

   a. Location.
   b. System tested.
   c. dBA reading.
   d. Sound pressure level in each octave band with equipment on and off.

2. Plot sound pressure levels on NC worksheet with equipment on and off.

3.8 DUCT LEAKAGE TESTS

A. Witness the duct pressure testing performed by Installer.

B. Verify that proper test methods are used and that leakage rates are within specified tolerances.

C. Report deficiencies observed.

3.9 CONTROLS VERIFICATION: Not Applicable

3.10 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan.
2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
3. Check the refrigerant charge.
4. Check the condition of filters.
5. Check the condition of coils.
6. Check the operation of the drain pan and condensate-drain trap.
7. Check bearings and other lubricated parts for proper lubrication.
8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:

1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.

4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the airflow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.

3.11 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent
2. Air Outlets and Inlets: Plus or minus 10 percent.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.12 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.

10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

C. System Diagrams: Include schematic layouts of air distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of supply and exhaust airflows.
2. Duct, outlet, and inlet sizes.

3. Test Data (Indicated and Actual Values):

    a. Total airflow rate in CFM.
    b. Total system static pressure in inches wg.
    c. Discharge static pressure in inches wg .
    d. Supply-air damper position.
    e. Exhaust-air damper position.
    f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
    g. Number, make, and size of belts.

4. Test Data (Indicated and Actual Values):

    a. Total airflow rate in cfm (L/s).
    b. Total system static pressure in inches wg (Pa).
    c. Fan rpm.
    d. Discharge static pressure in inches wg (Pa).
    e. Suction static pressure in inches wg (Pa).

D. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft.
g. Indicated airflow rate in cfm.
h. Indicated velocity in fpm.
i. Actual airflow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

E. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft.

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Air velocity in fpm.
c. Preliminary airflow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final airflow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

F. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.13 VERIFICATION OF TAB REPORT

A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of FAA personnel of COR.

B. COR shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

E. If TAB work fails, proceed as follows:

1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.

F. Prepare test and inspection reports.

3.14 ADDITIONAL TESTS

A. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230713

DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor, concealed supply.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

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

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
3. Detail application at linkages of control devices.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers as specified in “Duct Construction Standards” of SMACNA.

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and for space required for maintenance.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. 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.

2.2 FIRE-RATED INSULATION SYSTEMS

A. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 2-hour fire rating by an NRTL acceptable to authorities having jurisdiction.

2.3 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. 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).
2. 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."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.
1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.
1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.03 metric perm) at 35-mil (0.9-mm) dry film thickness.
2. Service Temperature Range: 0 to 180 deg F (Minus 18 to plus 82 deg C).
3. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
4. Color: White.

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2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
   1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
   3. Service Temperature Range: 0 to plus 180 deg F.
   4. Color: White.

2.6 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:
   1. Materials shall be compatible with insulation materials, jackets, and substrates.
   2. Fire- and water-resistant, flexible, elastomeric sealant.
   3. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
   4. Color: Aluminum.
   5. 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).
   6. 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."

2.7 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. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.

2.8 TAPES

A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
   1. Width: 3 inches.
   2. Thickness: 6.5 mils.
   3. Adhesion: 90 ounces force/inch in width.
   4. Elongation: 2 percent.
   5. Tensile Strength: 40 lbf/inch in width.
   6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
   1. Width: 2 inches .
   2. Thickness: 3.7 mils.
   3. Adhesion: 100 ounces force/inch in width.
   4. Elongation: 5 percent.
   5. Tensile Strength: 34 lbf/inch in width.

2.9 SECUREMENTS

A. Bands:
1. Aluminum: ASTM B 209 , Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.
2. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

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. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   b. Spindle: zinc-coated, low-carbon steel, fully annealed, 0.106-inch diameter shank, length to suit depth of insulation indicated.
   c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
2. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened 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. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
   b. Spindle: Nylon, 0.106-inch diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
   c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
3. Self-Sticking-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. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   b. Spindle: zinc-coated, low-carbon steel, fully annealed, 0.106-inch diameter shank, length to suit depth of insulation indicated.
   c. Adhesive-backed base with a peel-off protective cover.
4. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

   a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

5. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch wide, stainless steel or Monel.

2.10 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: .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 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

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

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inche 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 4 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.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 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 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. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    c. Do not over-compress insulation during installation.
    d. Impale insulation over pins and attach speed washers.
    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. 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-inchwide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.6 FIELD-APPLIED JACKET INSTALLATION: Not Applicable

3.7 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

B. Insulate duct access panels and doors to achieve same fire rating as duct.

C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified.

3.8 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: [**Two**] <2> finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

C. Do not field paint aluminum or stainless-steel jackets.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. 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 for each duct system defined in the "Duct Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply air.

3.11 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, round and flat-oval, supply-air duct insulation shall be as follows:

1. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density.

B. Concealed, rectangular, supply-air duct insulation shall be as follows:

1. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density.

END OF SECTION 230713

SECTION 233113

METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.
6. Seismic-restraint devices.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7**.** SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Wrap insulation and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.
4. Duct tapes

B. Submittals:

1. Product Data 1: Documentation indicating that duct systems comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
2. Leakage Test Report: Comply with SMACNA HVAC Air Duct Leakage test Manual."

C. 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, liner material, 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. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
11. Hangers and supports, including methods for duct and building attachment**,** seismic restraints.
12. Reflected ceiling plan

D. 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 and seismic restraints.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of access panel.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:

    a. Lighting fixtures.
    b. Air outlets and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Access panels.
    f. Perimeter moldings.

B. Welding certificates.

C. Field quality-control reports.

1.6 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 D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 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.

1. Galvanized Coating Designation: G90
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Factory- or Shop-Applied Antimicrobial Coating:

1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating shall be applied to the exterior surface.
2. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Coating containing the antimicrobial compound shall have a hardness of 2H, minimum, when tested according to ASTM D 3363.
4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
5. Shop-Applied Coating Color: Black or white

D. Reinforcement Shapes and Plates: ASTM A 36, 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.

F. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

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. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 3 inches, 4 inches, 6 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch WG, positive and negative.
7. Service: Indoor and outdoor.

8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch WG, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
9. VOC: Maximum 395 g/L.
10. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
11. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
12. Service: Indoor or outdoor.
13. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

G. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch WG and shall be rated for10-inch WG static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electro-galvanized, 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," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

F. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

G. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.6 SEISMIC-RESTRAINT DEVICES

A. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by a Registered Professional engineer in California.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

B. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment

to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

C. Restraint Cables: ASTM A 603, galvanized-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.

D. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or reinforcing steel angle clamped to hanger rod.

E. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

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. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.

K. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

A. 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. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
3. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
4. Conditioned Space, Exhaust Ducts: Seal Class B.

3.4 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.

3.5 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems". ASCE/SEI 7.

1. Space lateral supports a maximum of 40 feet O.C., and longitudinal supports a maximum of 80 feet O.C.
2. Brace a change of direction longer than 12 feet.

B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install cable restraints on ducts that are suspended with vibration isolators.

E. Install seismic-restraint devices using methods approved by the a Registered Professional Engineer in California

F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

G. Drilling for and Setting Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid pre-stressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.

3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.6 CONNECTIONS

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:

    a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections**,** selected by the COR from sections installed**,** totaling no less than 25 percent of total installed duct area for each designated pressure class.
    b. Supply Ducts with a Pressure Class of 2-Inch wg, or higher: Test representative duct sections**,** selected by the COR from sections installed**,** totaling no less than 50 percent of total installed duct area for each designated pressure class.
    c. Exhaust Ducts with a Pressure Class of 2-Inch wg, or Higher: Test representative duct sections[**,** selected by the COR from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.

3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give five (5) days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.9 DUCT CLEANING

A. Clean new and existing duct systems before testing, adjusting, and balancing. Cleaning shall include the connected existing ducts of up to 30 inches from new joints.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
3. Supply-air ducts, dampers, actuators, and turning vanes.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.10 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.11 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

B. Supply Ducts:

1. Ducts Connected to Constant-Volume Air-Handling Units

a. Pressure Class: Positive 2-inch wg.
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

2. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 2) Air:

a. Pressure Class: Negative 1-inch.
b. Minimum SMACNA Seal Class: C
c. SMACNA Leakage Class for Rectangular: 24.
d. SMACNA Leakage Class for Round and Flat Oval: 12.

C. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.
2. PVC-Coated Ducts:

D. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Velocity 1000 fpm or Lower:

1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
2) Mitered Type RE 4 without vanes.

b. Velocity 1000 to 1500 fpm:

1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
3) 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."

c. Velocity 1500 fpm or Higher:

1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
3) 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."

2. 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."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
2) Velocity 1000 to 1500 fpm : 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
4) Radius-to Diameter Ratio: 1.5.

b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.

E. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

a. Rectangular Main to Rectangular Branch: 45-degree entry.
b. Rectangular Main to Round Branch: Spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

a. Velocity 1000 fpmor Lower: 90-degree tap.
b. Velocity 1000 to 1500 fpm : Conical tap.
c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 233113

SECTION 233300

AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manual volume dampers.
2. Flange connectors.
3. Turning vanes
4. Duct-mounted access doors.
5. Flexible ducts.
6. Duct accessory hardware.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals: Not applicable

C. 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.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS: Not applicable

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Exposed-Surface Finish: Mill phosphatized.

B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers.

1. Standard leakage rating. with linkage outside airstream.
2. Suitable for horizontal or vertical applications.
3. Frames:

a. Frame: Hat-shaped, 0.094-inch thick, galvanized sheet steel 0.05-inch thick.
b. Mitered and welded corners.
c. Flanges for attaching to walls and flangeless frames for installing in ducts.

4. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Stiffen damper blades for stability.

d. Galvanized steel, 0.064 inch thick.

5. Blade Axles: Galvanized steel.
6. Bearings:

   a. Oil-impregnated stainless-steel sleeve.
   b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axle full length of damper blades and bearings at both ends of operating shaft.

7. Tie Bars and Brackets: Galvanized steel.

B. Jackshaft:

1. Size: 0.5-inch 1-inch diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

C. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.4 FIRE DAMPERS: Not Applicable

2.5 SMOKE DAMPERS: Not Applicable

2.6 COMBINATION FIRE AND SMOKE DAMPERS: Not Applicable.

2.7 FLANGE CONNECTORS

A. Description: Factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

B. Material: Galvanized steel.

C. Gage and Shape: Match connecting ductwork.

2.8 TURNING VANES:

A. 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.

B. 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."

C. Vane Construction: Single wall.

D. Vane Construction: Single wall for ducts up to 48 inches wide.

2.9 DUCT-MOUNTED ACCESS DOORS

A. 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.

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: Continuous and two sash locks.

2.10 FLEXIBLE DUCTS

A. Insulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; [**polyethylene**] [**aluminized**] vapor-barrier film.

1. Pressure Rating: 4-inch wg positive and 0.5-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 175 deg F .
4. Insulation R-Value: 3.5.

B. Flexible Duct Connectors:

1. Clamps: [**Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action**] [**Nylon strap**] in sizes 3 through 18 inches (75 through 460 mm), to suit duct size.
2. Non-Clamp Connectors: [**Adhesive**] [**Liquid adhesive plus tape**] [**Adhesive plus sheet metal screws**].

2.11 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts.

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.

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 fire and smoke dampers according to UL listing.

G. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. Downstream from manual volume damper.
2. Upstream or downstream from turning vanes.
3. Elsewhere as indicated.

H. Install access doors with swing against duct static pressure.

I. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.

J. Label access doors according accordingly

K. Connect terminal units to supply ducts directly or with maximum 18-inch lengths of flexible duct. Do not use flexible ducts to change directions.

L. Connect flexible ducts to metal ducts with draw bands.

M. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.

2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Inspect turning vanes for proper and secure installation.

END OF SECTION 233300

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

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.

B. FAA-C-1217F, Electrical Work, Interior.

1.2 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1. Alcan Products Corporation; Alcan Cable Division.
2. Alpha Wire.

3. Belden Inc.
4. Encore Wire Corporation.
5. General Cable Technologies Corporation.
6. Southwire Incorporated.

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.

2.2 CONNECTORS AND SPLICES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1. AFC Cable System, Inc.
2. Gardner Bender.
3. Hubbell Power Systems, Inc.
4. Ideal Industries, Inc.
5. Ilsco; a branch of Bardes Corporation.
6. O-Z/Gedney; a brand of the EGS Electrical Group.
7. 3M; Electrical Markets Division.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

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. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

3.2 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."

G. Complete cable tray systems installation according to Section 260536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

3.3 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.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.4 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.5 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test conductors feeding the following critical equipment and services for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

    a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
    b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

D. Test and Inspection Reports: Prepare a written report to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

E. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. FAA-C-1217F, Electrical Work Interior.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes, enclosures, and cabinets.
7. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

C. Samples: For wireways, nonmetallic wireways and surface raceways and for each color and texture specified, 12 inches long.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

B. Qualification Data: For professional engineer.

C. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.

D. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1. Alflex Inc.
2. Allied Tube & Conduits; a Tyco International Ltd. Co.
3. Anamet Electrical, Inc.; Anaconda Metal Hose.
4. Electri-Flex Co.
5. Manhattan/CDI/Cole-Flex.
6. Maverick Tube Corporation.
7. O-Z/Gedney; a unit of General Signal.
8. Wheatland Tube Company.

B. 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.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. ARC: Comply with ANSI C80.5 and UL 6A.

E. IMC: Comply with ANSI C80.6 and UL 1242.

F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch minimum.

G. EMT: Comply with ANSI C80.3 and UL 797.

H. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

1. Material: Steel.
2. Type: compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch with overlapping sleeves protecting threaded joints.

J. Joint Compound for IMC, GRC, or ARC: 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 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1. Hoffamn.
2. Square D; Schneider Electric.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Screw-cover type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1. EGS/Appleton Electric.
2. Erickson Electrical Equipment Company.
3. Hoffamn.
4. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
5. O-/Gedney; a unit of General Signal.
6. RACO; Hubbell Company.
7. Robroy Industries, Inc.; Enclosure Division.
8. Scott Fetzer Co.; Adalet Division.
9. Spring City Electrical Manufacturing Company.
10. Thomas & Betts Corporation.
11. Walker Systems, Inc.; Wiremold Company.
12. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

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, Type FD, with gasketed cover.

E. Cabinets:

1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

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: EMT.
3. Underground Conduit: RNC, Type EPC-80-PVC.
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: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:

    1. Loading dock.
    2. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    3. Mechanical rooms.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: GRC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 3/4-inchtrade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. 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.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches of enclosures to which attached.

H. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

I. 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.

J. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

K. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

L. 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-inchtrade size and insulated throat metal bushings on 1-1/2-inchtrade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

M. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

O. Cut conduit perpendicular to the length. For conduits 2-inchtrade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

P. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lbtensile 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.

Q. Surface Raceways:

1. Install surface raceway with a minimum 2-inchadius 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.

R. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

S. 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. Where otherwise required by NFPA 70.

T. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

U. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

V. 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 top of box unless otherwise indicated.

W. 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 rain tight connection between box and cover plate or supported equipment and box.

X. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Y. Locate boxes so that cover or plate will not span different building finishes.

Z. 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.

AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

BB. Set metal floor boxes level and flush with finished floor surface.

CC. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12

inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."

4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    1. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    2. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inchsieve to No. 4sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install handholes with bottom below frost line, Insert depth of frost line below grade at Project site below grade.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.7 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 PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

A. Comply with FAA-STD-1217f.

B. Comply with ANSI A13.1 and IEEE C2.

C. Comply with NFPA 70.

D. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

E. Comply with ANSI Z535.4 for safety signs and labels.

F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

C. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.

B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil-thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.

D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

E. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

F. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

G. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

H. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil-thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.

C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.

D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.

E. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around conductor it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

F. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

G. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Labels for Tags: Self-adhesive label, machine-printed with permanent, waterproof, black ink recommended by printer manufacturer, sized for attachment to tag.

2.4 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.5 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.7 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.

G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

I. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

J. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label. Install labels at 10-foot maximum intervals.

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Power.

C. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

D. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
b. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
b. Enclosures and electrical cabinets.
c. Access doors and panels for concealed electrical items.
d. Enclosed switches.
e. Enclosed circuit breakers.
f. Remote-controlled switches, dimmer modules, and control devices.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

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. Indoor occupancy sensors.

B. Related Requirements:

1. Section 262726 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 INDOOR OCCUPANCY SENSORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1. Cooper Industries, Inc.
2. Hubbell Building Automation, Inc.
3. Leviton Manufacturing Co., Inc.
4. Lutron Electronics Co., Inc.
5. Philips Lighting Controls.

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.

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

B. 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.

3.2 CONTACTOR INSTALLATION

A. 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.

3.3 WIRING INSTALLATION

A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. 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.

D. Lighting control devices will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. 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.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.7 DEMONSTRATION

A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Section 260943.13 "Addressable-Fixture Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls."

END OF SECTION 260923

SECTION 262726 - WIRING DEVICES

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. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Snap switches and wall-box dimmers.
3. Communications outlets.
4. Cord and plug sets.
5. Floor service outlets and poke-through assemblies.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

D. RFI: Radio-frequency interference.

E. TVSS: Transient voltage surge suppressor.

F. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1. Copper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell)
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand (Pass & Seymour).

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 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 application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

a. Cooper; 5351 (single), CR5362 (duplex).
b. Hubbell; HBL5351 (single), HBL5352 (duplex).
c. Leviton; 5891 (single), 5352 (duplex).
d. Pass & Seymour; 5361 (single), 5362 (duplex).

GFCI RECEPTACLES

B. General Description:

1. Straight blade, non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

C. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Cooper Wiring Devices, Inc.; Division of Cooper Industries, Inc**;** VGF20**.**
2. Hubbell Incorporated; Wiring Device-Kellems; GFR5352L.
3. Leviton Manufacturing Co., Inc; 7590.
4. Pass & Seymour/Legrand (Pass & Seymour)**;** 2095**.**

2.4 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Single Pole:

1) Cooper; AH1221.
2) Hubbell; HBL1221.
3) Leviton; 1221-2.
4) Pass & Seymour; CSB20AC1.

b. Three Way:

1) Cooper; AH1223.
2) Hubbell; HBL1223.
3) Leviton; 1223-2.

2.6 WALL PLATES

A. 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: 0.05-inch-thick, anodized brushed aluminum.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.7 FLOOR SERVICE FITTINGS

A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Service Plate: Round, die-cast aluminum with satin finish.

D. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

E. Voice and Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 jacks for UTP cable complying with requirements in Section 271500 "Communications Horizontal Cabling."

2.8 POKE-THROUGH ASSEMBLIES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1. Hubbell Incorporated; Wiring Device-Kellems.
2. Pass & Seymour/Legrand (Pass & Seymour).
3. Square D; by Schneider Electric.
4. Thomas & Betts Corporation, A Member of the ABB Group.
5. Wiremold / Legrand.

B. Description:

1. Factory-fabricated and -wired assembly of below-floor junction box with multi-channeled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.
2. Comply with UL 514 scrub water exclusion requirements.

3. Service-Outlet Assembly Flush type with four simplex receptacles and space for four RJ-45 jacks complying with requirements in Section 271500 "Communications Horizontal Cabling."
4. Size: Selected to fit nominal 4-inch cored holes in floor and matched to floor thickness.
5. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
6. Closure Plug: Arranged to close unused 4-inch cored openings and reestablish fire rating of floor.
7. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of two, four-pair cables that comply with requirements in Section 271500 "Communications Horizontal Cabling."

2.9 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: Gray unless otherwise indicated or required by NFPA 70 or device listing.

B. Wall Plate: Brushed Aluminum.

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. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. 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.
3. 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.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

a. Cut back and pigtail, or replace all damaged conductors.
b. Straighten conductors that remain and remove corrosion and foreign matter.
c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down.

F. 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.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical. Group adjacent switches under single, multigang wall plates.

H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.
3. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 265100 - INTERIOR 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.

B. FAA-C-1217F, Electrical Work, Interior.

1.2 SUMMARY

A. Section Includes:

1. Interior lighting fixtures, lamps, and ballasts.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.
5. Retrofit kits for fluorescent lighting fixtures.

B. Related Sections:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
2. Section 262726 "Wiring Devices" for manual wall-box dimmers for incandescent lamps.

1.3 DEFINITIONS

A. BF: Ballast factor.

B. CCT: Correlated color temperature.

C. CRI: Color-rendering index.

D. HID: High-intensity discharge.

E. LER: Luminaire efficacy rating.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.4 SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of lighting fixture including dimensions.
2. Emergency lighting units including battery and charger.
3. Ballast, including BF.
4. Energy-efficiency data.
5. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.

    a. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.
    b. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Installation instructions.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Lighting fixtures.
2. Suspended ceiling components.
3. Partitions and millwork that penetrate the ceiling or extends to within 12 inches of the plane of the luminaires.
4. Ceiling-mounted projectors.
5. Structural members to which suspension systems for lighting fixtures will be attached.
6. Other items in finished ceiling including the following:

    a. Air outlets and inlets.
    b. Speakers.
    c. Sprinklers.
    d. Smoke and fire detectors.
    e. Occupancy sensors.
    f. Access panels.

7. Perimeter moldings.

B. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.

C. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.

D. Field quality-control reports.

E. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting equipment and fixtures 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. Plastic Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
3. Fluorescent-fixture-mounted, emergency battery pack: One for every 20 emergency lighting unit.
4. Ballasts: One for every 100 of each type and rating installed. Furnish at least one of each type.
5. 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: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program 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, complying with the IESNA Lighting Measurements Testing & Calculation Guides.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NFPA 70.

E. FM Global Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

F. Mockups: Provide interior lighting fixtures for room or module mockups, complete with power and control connections.

1. Obtain Architect's approval of fixtures for mockups before starting installations.
2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
3. Approved fixtures in mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.10 WARRANTY

A. 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 Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
2. Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: Seven years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide product indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Incandescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5A.

C. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.

D. Metal Parts: Free of burrs and sharp corners and edges.

E. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

F. 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.

G. Diffusers and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

   a. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
   b. UV stabilized.

2. Glass: Annealed crystal glass unless otherwise indicated.

H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located 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 and ballast characteristics:

   a. "USE ONLY" and include specific lamp type.
   b. Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad, triple, etc.), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
   c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
   d. Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact fluorescent luminaires.
   e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
   f. CCT and CRI for all luminaires.

2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

A. General Requirements for Electronic Ballasts:

1. Comply with UL 935 and with ANSI C82.11.
2. Designed for type and quantity of lamps served.
3. Ballasts shall be designed for full light output unless another BF, dimmer, or bi-level control is indicated.
4. Sound Rating: Class A.
5. Total Harmonic Distortion Rating: Less than 10 percent.
6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
7. Operating Frequency: 42 kHz or higher.
8. Lamp Current Crest Factor: 1.7 or less.
9. BF: 0.88 or higher.
10. Power Factor: 0.95 or higher.

11. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.

B. Ballasts for Dimmer-Controlled Lighting Fixtures: Electronic type.

1. Dimming Range: 100 to 5 percent of rated lamp lumens.
2. Ballast Input Watts: Can be reduced to 20 percent of normal.
3. Compatibility: Certified by manufacturer for use with specific dimming control system and lamp type indicated.
4. Control: Coordinate wiring from ballast to control device to ensure that the ballast, controller, and connecting wiring are compatible.

2.4 BALLASTS FOR COMPACT FLUORESCENT LAMPS

A. Description: Electronic-programmed rapid-start type, complying with UL 935 and with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated:

1. Lamp end-of-life detection and shutdown circuit.
2. Automatic lamp starting after lamp replacement.
3. Sound Rating: Class A.
4. Total Harmonic Distortion Rating: Less than 20 percent.
5. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
6. Operating Frequency: 20 kHz or higher.
7. Lamp Current Crest Factor: 1.7 or less.
8. BF: 0.95 or higher unless otherwise indicated.
9. Power Factor: 0.95 or higher.
10. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.

2.5 EMERGENCY FLUORESCENT POWER UNIT

A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.

1. Emergency Connection: Operate one fluorescent lamp(s) continuously at an output of 1100 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Nightlight Connection: Operate one fluorescent lamp continuously.
3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.

    a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

4. Battery: Sealed, maintenance-free, nickel-cadmium type.

5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
6. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
7. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

B. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more fluorescent lamps, remote mounted from lighting fixture. Comply with UL 924.

1. Emergency Connection: Operate one fluorescent lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Nightlight Connection: Operate one fluorescent lamp in a remote fixture continuously.
3. Battery: Sealed, maintenance-free, nickel-cadmium type.
4. Charger: Fully automatic, solid-state, constant-current type.
5. Housing: NEMA 250, Type 1 enclosure.
6. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
7. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
8. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.6 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. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours of rated lamp life.
2. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

    a. Battery: Sealed, maintenance-free, nickel-cadmium type.
    b. Charger: Fully automatic, solid-state type with sealed transfer relay.
    c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
f. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
g. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

4. Master/Remote Sign Configurations:

a. Master Unit: Comply with requirements above for self-powered exit signs, and provide additional capacity in LED power supply for power connection to remote unit.
b. Remote Unit: Comply with requirements above for self-powered exit signs, except omit power supply, battery, and test features. Arrange to receive full power requirements from master unit. Connect for testing concurrently with master unit as a unified system.

C. Self-Luminous Signs: Powered by tritium gas, with universal bracket for flush-ceiling, wall, or end mounting. Signs shall be guaranteed by manufacturer to maintain the minimum brightness requirements in UL 924 for 10 years.

D. Self-Luminous Signs: Using strontium oxide aluminate compound to store ambient light and release the stored energy when the light is removed. Provide with universal bracket for flush-ceiling, wall, or end mounting.

2.7 FLUORESCENT LAMPS

A. T8 rapid-start lamps, rated 32 W maximum, nominal length of 48 inches, 2800 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life 20,000 hours unless otherwise indicated.

B. T8 rapid-start lamps, rated 17 W maximum, nominal length of 24 inches, 1300 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life of 20,000 hours unless otherwise indicated.

C. Compact Fluorescent Lamps: 4-Pin, CRI 80 (minimum), color temperature 3500 K, average rated life of 10,000 hours at three hours operation per start, and suitable for use with dimming ballasts unless otherwise indicated.

1. 13 W: T4, double or triple tube, rated 900 initial lumens (minimum).
2. 18 W: T4, double or triple tube, rated 1200 initial lumens (minimum).
3. 26 W: T4, double or triple tube, rated 1800 initial lumens (minimum).
4. 32 W: T4, triple tube, rated 2400 initial lumens (minimum).
5. 42 W: T4, triple tube, rated 3200 initial lumens (minimum).
6. 57 W: T4, triple tube, rated 4300 initial lumens (minimum).

7. 70 W: T4, triple tube, rated 5200 initial lumens (minimum).

2.8 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with 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 steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.

E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.

F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures:

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
2. Install lamps in each luminaire.

B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.

C. Remote Mounting of Ballasts: Distance between the ballast and fixture shall not exceed that recommended by ballast manufacturer. Verify, with ballast manufacturers, maximum distance between ballast and luminaire.

D. Lay-in Ceiling Lighting Fixtures Supports: Use grid as a support element.

1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each fixture. Locate not more than 6 inches from lighting fixture corners.
2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.

3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.

E. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

F. Air-Handling Lighting Fixtures: Install with dampers closed and ready for adjustment.

G. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 IDENTIFICATION

A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

B. Verify that self-luminous exit signs are installed according to their listing and the requirements in NFPA 101.

C. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.4 STARTUP SERVICE

A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.

1. Adjust aimable luminaires in the presence of Architect.

END OF SECTION 265100