"Final" 100% Design Submittal

28 February 2022

A/E CONTRACT NO.: FA890316D0002
BTA Project No.: 144815.21

VOLUME 1 OF 2

SPECIFICATIONS

FOR

XLWU20-8111 Construct LOX Plant B370 Area
XLWU21-4001 Construction B1265 Addition for OSI Move
XLWU21-4002 Move PMEL B462 to AGE B267

TYNDALL AFB, FLORIDA

U.S. AIR FORCE

PREPARED BY:

BTA / ONYX GROUP JV, LLC Pensacola, Florida

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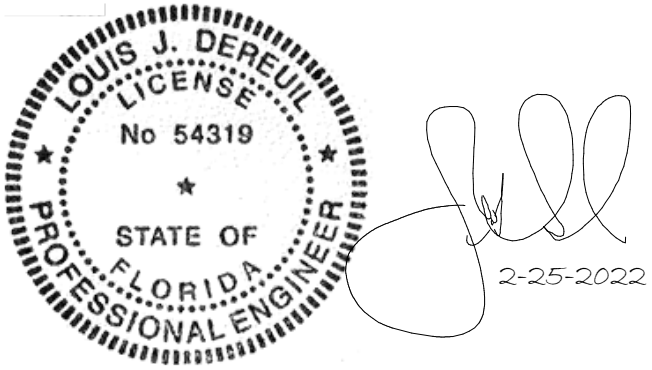
Design Team Sign and Seals

Architecture & Interior Design
BTA / ONYX GROUP JV, LLC
Pensacola, Florida

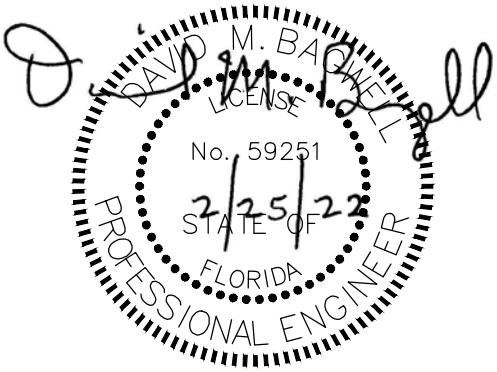
Civil Engineering
Stantec Consulting Services, Inc.
Tallahassee, Florida

Structural Engineering
Joe DeReuil Associates, LLC
Pensacola, Florida



Mechanical & Plumbing Engineering
Peterson Engineering, Inc
Pensacola, Florida

Electrical & Electronic Systems Engineering
Bagwell Engineering, Inc.
Pensacola, Florida



Fire Protection Engineering
Fisher Engineering, Inc.
Johns Creek, GA

SECTION 00 10 00

BIDDING SCHEDULE

BIDDER'S NAME: _____

Item No.	Description	Estimated Quantity	Unit	Unit Price	Estimated Amount
Base Bid:					
1	Construction of New LOX Plant	1	Job	XXX	
2	Construction of New LOX Plant Site Work	1	Job	XXX	
3	Construction of OSI B1265 Addition/Alteration	1	Job	XXX	
4	Construction of OSI B1265 Addition/Alteration Site Work	1	Job	XXX	
5	Construction of PMEL B267 Alteration	1	Job	XXX	
6	Construction of PMEL B267 Alteration Site Work	1	Job	XXX	
			Total Base Bid		

_____ _____

Signature Certification Date of Certification

The offeror's above signature accedes that his firm has included his proposed final MATOC CLIN pricing into his Task Order proposal to arrive at an overall proposed price for this Task Order.

NOTES FOR BIDDING SCHEDULE

NOTE NO. 1. To better facilitate the receipt and proposal process, all modifications to proposals are to be submitted on copies of the latest bid schedules as published in the solicitation or the latest Amendment thereto. In lieu of indicating additions/deductions to contract line items, the bidder should state the revised prices for each item. The company name should be shown on the face of the bidding schedule to preclude being misplaced.

NOTE NO. 2.Bidders must insert a price on all numbered items of the Bidding Schedule. Failure to do so will disqualify the bid.

NOTE NO. 3. If a modification to a bid is submitted and provides for a lump-sum adjustment to the total estimated cost, the application of the lump-sum adjustment to each unit price and/or lump-sum price, in the bid schedule must be stated or, if it is not stated, the bidder agrees that the lump-sum adjustment shall be applied on a prorata basis to every bid item in the bid schedule.

NOTE NO. 4. CONDITIONS GOVERNING EVALUATION OF BIDS AND AWARD OF TASK ORDERS.

In accordance with the source selection criteria established in this solicitation, only one task order will be awarded on the bid schedule, and an award will be made on the Base Bid and selected Options. Evaluation of Base Bid and all Options shall be in accordance with the following clause:

NOTE NO. 5. The programmed amount (PA) for this project is $XXXXXXXX. Please note that the PA includes costs for Government supervision and overhead and amounts set aside by the Government for contingencies.

NOTE NO. 6. ADDITIONAL SUBMISSION REQUIREMENTS:

a. Upon the Government's request, the offeror shall submit a price breakdown of the bid items directly to the Mobile District Office. Details on where and how to send the breakdown will be provided by the requesting official making the request on behalf of the Government. The format of the breakdown will be left up to the offeror. However, as a minimum, the offeror shall provide pricing for the major categories of work under each bid item, for example, site improvements, landscaping, electrical, mechanical, etc. This information will not be needed sooner than three (3) working days after the proposal submission due date.

b. This information may be required for the initial and for any revised proposals if requested.

NOTE NO. 7. CHECKLIST FOR THE BIDDING SCHEDULE:

a. Is it completely filled out? Y___NA___

b. It may not be altered either as to quantities or items offered. Y_____ NA__

c. There can be no language of limitation either as to quantities or items offered. Y_____NA___

d. If you corrected your numbers, have you initialed these corrections? Y___ NA__

e. If the bidding schedule has been changed by Amendment, is the bidding schedule that you are submitting from the most recent Amendment? Y___NA___

f. Do prices for each bid item include all costs, mark-ups, and taxes (if any taxes are imposed)? Y____NA____

g. Is the cost of obtaining your performance and payment bond included in the total bid price specified on the bid schedule? Y___NA___

h. In preparing your bid, remember the Corps does not make advanced payments on its contracts Y___NA___

END OF BIDDING SCHEDULE

EXPLANATION OF BID ITEMS

GENERAL:

This section explains Bid Items 1,2,3,4,5, and 6 identified in the Bidding Schedule. This section is a general scope of work for the bid items described in the Bidding Schedule and is not intended to be all-encompassing in the description. All work specified herein shall be accomplished under the procedures prescribed in the technical provisions of the specifications and the plans/details as shown on the contract drawings. The contractor shall bid each type of work under the applicable bid item. Measurement for payment will not be made. Payment described for the various bid items will be full compensation for all labor, materials, and equipment required to complete the work. Compensation for any item of work described in the contract but not listed in the bid schedule shall be included in the payment for the item of work to which it is made subsidiary.

BASE BID

1. Payment under **the Base Bid Items No. 1, 2, and 3 of the Bidding Schedule** will constitute full compensation for furnishing all materials, plant, tools, labor costs, and other associated incidentals necessary to complete the construction for new work, repairs, alterations to the New LOX Plant Construction, the OSI B1265 Addition/Alteration, and the PMEL B267 Alteration, all required by the contract document drawings and specifications.

2. Payment under the **Base Bid Items No. 4, 5, and 6** will constitute full compensation for furnishing all materials, plant, tools, labor costs, and other associated incidentals necessary to complete the site work required by the contract document drawings and specifications. Work includes but is not limited to clearing, grubbing, and grading the sites, hauling fill material, the installation of exterior utilities shown, sod landscaping, site improvements, and demolition of existing site improvements.

END OF EXPLANATION OF BID ITEMS

SECTION 01 11 00

SUMMARY OF WORK
08/15

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Utility Outage Requests

Utility Connection Requests

Excavation Permits

Welding Permits

1.2 WORK COVERED BY CONTRACT DOCUMENTS

1.2.1 Project Description

This project's scope of work involves constructing a new LOX Plant in the B370 area, an Addition/Alteration to Building 1265, and an Alteration to Building 267. Each of these facilities has specific construction requirements tailored to the user's mission. The following is the project description of each facility.

1. CONSTRUCT NEW LOX PLANT B370 AREA

This work consists of constructing a new one-story LOX Plant for liquid oxygen tanks and carts' maintenance (cleaning and inspection) used by military aircraft on the nearby runway's aprons. The new LOX Plant will encompass a 1,937 SF total building gross area to house three central interior bay areas for the admin office and maintenance of carts and liquid oxygen tanks. Adjacent utility rooms to these areas include mechanical, electrical, and telecom. The building will have a 965 SF covered concrete apron in front of the three interior bays' main entrance on the north. The building will be 50 ft. minimum away from other surrounding structures and ignition sources such as heavy vehicle traffic areas and operating equipment. The typical construction systems and materials for this structure are steel-reinforced concrete masonry for exterior and interior walls, concrete slab on grade, and standing seam metal roofing over steel decking on open web steel joists. Site improvements include but are not limited to new driveways, parking, site lighting, and storm drainage. Utilities to the building will consist of water, sanitary sewer, data/communication, and electrical. The project design and construction for the new LOX Plant facility will meet the projected goals and follow the necessary military criteria defined in the scope of work. These criteria will include applicable

UFCs, building codes, Tyndall AFB Installation Facilities Standards (IFS), and Cat Code: 218712 Aircraft support equipment shop /storage facility (AFMAN 32-1084).

Environmental Restoration Program (ERP) Site:
The LOX project site is located within the boundary of ERP Site TU205. Information on this site is provided on the Environmental Plan (Sheet CE101) in the attached plan drawings. Additionally, Specification Section 01 57 19 and its related attachments provide further information on the specific contaminants, as well as requirements for excavation and dewatering at this project site.

2. CONSTRUCT ADDITION B1265 (CATM) FOR OSI MOVE

The work on this facility is to construct a new 2,098 SF addition and a 4,501 SF alteration of Building 1265 to accommodate the Office of Special Investigations (OSI) agency moving from an existing nearby temporary facility inside the Base. The new addition and building alteration for B1265 includes administrative/training office spaces, secure classified areas, interviews rooms, booking, holding, evidence room to support investigative activities, restrooms, and an outdoor covered concrete area for official events. Typical construction systems and materials will be steel-reinforced concrete masonry exterior walls, metal stud interior partitions, concrete slab on grade, metal roofing over new and existing steel decking on metal trusses. Most of the existing interior rooms and building systems will be demolished to install new walls and systems upgrades for HVAC, plumbing, electrical, telecom, structural, and fire protection. The utility connections to the facility will consist of but are not limited to water, sanitary sewer, data/communication, and electrical power. Site improvements include but are not limited to parking reconfiguration, paving and storm drainage, and others. Building 1265 will not be occupied during construction.

The CI Open Office (Room 121) and Classified Data (Room 121) areas as identified in the drawings for the OSI Addition/Alteration are required to be constructed as Secure Areas with controlled access following the following criteria:

a. Technical Specifications for Construction and Management Sensitive Compartmented Information Facilities (Version 1.5) IC Tec Spec-For ICD/ICS 705 (13 March 2020).

b. UFC 4-010-05 Sensitive Compartmented Information Facilities Planning Design And Construction (1 February 2013, Change 1, 1 October 2013)

For the work of this contract, the Secure Area construction must be performed by U.S. Design and Construction companies with personnel meeting citizenship and permanent residence status criteria. They must comply with the handling and protection of construction plans and related documents under the Construction Security Plan (CSP), information security, access control to the construction site per CSP, and as further required by ICD/ICS 705 and the Construction Security Plan (CSP). The Contractor shall cooperate with the Accrediting Official (AO), Site Security Manager (SSM), and other designated security representatives during the construction contract to provide access to the construction site to observe the work, personnel,

materials being stored, installed, and removed from the job site, vehicles, and shall provide unrestricted access to security representatives for periodic inspections throughout the construction and accreditation inspections

Environmental Restoration Program (ERP) Site:
The OSI project site is located within Environmental Restoration Program (ERP) Site ID FR038, the former Beacon Beach Skeet Range. Contaminants of concern within FR038 include lead shot pellets and clay target fragments, as well as Antimony and B(a)P TEQ. Because it is located within FR038, the project site is subject to land use controls outlined in the document, Land Use Control Implementation Plan, FR038 - Beacon Beach Skeet Range, OCULUS ID: DOD_2_3192, SITE ID: FR038 / OU 15, Version 1, November 2020. The proposed project is consistent with the land use controls identified in this document, since the project is a commercial/office land use and a restricted land use category (residential, school, playground, etc.). The land use restriction most relevant to the project is the requirement for an approved Installation Dig Permit prior to any land disturbance at the site.

Information on this site is provided on the Environmental Plan (Sheet CE101) in the attached plan drawings. Additionally, Specification Section 01 57 19 and its related attachments provide further information on the specific contaminants, as well as requirements for excavation and dewatering at this project site. For instance, excavation at the site will need to follow USACE MILCON Build-Out Environmental Restoration Program (ERP) Guidelines dated 12 November 2019. The ERP Guidelines are included as an appendix to the project specifications.

An ACM/LBP report for verifying existing hazardous materials for B1265 is not available. Therefore, the General Contractor must provide a new ACM/LBP survey to conduct verification of lead, asbestos, and mold at the beginning of the project's construction phase. Suppose ACM/LBP hazardous materials are found at B1265. In that case, the Contractor must inform the Contracting Officer Representative (COR) and prepare required documents (drawings and specifications) for abatement before the commencement of demolition work as shown in the construction documents.

3. MOVE PMEL B462 TO AGE B267

The Precision Measurement Equipment Laboratory (PMEL) at Tyndall AFB provides test, measurement & diagnostic equipment calibration, and repair services. The scope of this task involves constructing a new two-story facility inside a designated interior space of AGE Building 267. This new facility will have an area of 6,994 SF to allocate the existing PMEL mission moving from Building 462. Completed in the year 2000, Building 267 is a 21,873 SF two-story structure currently occupied by the WEG AGE missions. The new PMEL lab facility to be constructed inside Building 267 will have its own dedicated set of rooms and building requirements. The first floor will have an area of 5,808 SF to house the PMEL laboratory, offices, scheduling/shipping areas, storage, equipment cleaning, mechanical, electrical, and telecom rooms. The second floor for the PMEL will have a 1,186 SF area and include men/women restrooms, a janitor's room, and a training/kitchen room. Access to the second floor will be through two existing stairs and an elevator at B267. The walls and ceiling of the PMEL Lab will have noise insulation systems to protect the laboratory's sensitive lab

equipment against high decibel noise and vibration coming from outside sources. The walls around the PMEL lab will have heavy steel reinforced masonry walls with high STC-rating and concrete ceilings systems over an isolated structural concrete floor slab.

The structural slab will have expansion/isolation joints on the walls' outside toe, defining the PMEL Lab area to isolate the floor's thermal mass and reduce vibration transmission. The existing overhead crane on the B267 work area will be re-adjusted to stop short of the new PMEL enclosure at this location. The new PMEL spaces will include architectural systems, structural modifications, electrical, mechanical, plumbing modifications, and a new comm systems infrastructure. Utility connections to the facility will consist of, but not be limited to, data/communication and electrical power. Site improvement will include POV parking and the reconfiguration of existing parking to allow for the addition of 2 handicapped parking stalls on the south entrance to the building. Building 267 will remain in operation during the entire construction period for the PMEL. The Contractor must phase and coordinate work for the PMEL facility to avoid the interruption of activities to existing missions occupying the building during construction.

Environmental Restoration Program (ERP) Site:
The PMEL project site is located within the boundary of ERP Site OW217. Information on this site is provided on the Environmental Plan (Sheet CE101) in the attached plan drawings. Additionally, Specification Section 01 57 19 and its related attachments provide further information on the specific contaminants, as well as requirements for excavation and dewatering at this project site.

1.2.2 Building Sustainability Requirements

According to UFC 1-200-02 Table 1-1; Chapter 2, new buildings under 10,000 GSF, additions, sustainment, modernization, and restoration building improvements must comply with UFC requirements relevant to the scope of the project/work. Therefore, the new LOX, OSI Building 1265 additions/alterations, and the PMEL B267 alterations must meet sustainability requirements. Under this provision, the Contractor is responsible for supplying and submitting for review and approval required sustainable materials specified for all the facilities described under this project.

The scope of sustainability requirements may include but are not limited to commissioning, energy systems optimization, water efficiency and conservation, lighting, building envelope, indoor air quality enhancement, and materials required to reduce environmental impacts. Under the threshold of UFC 1-200-02, Table 1-1, Chapter 4, facilities less than 10,000 gsf do not require sustainable design compliance documentation for the construction phase. The following are specific sustainable requirements for this project:

1.2.2.1 Commissioning

Submit approved Final Commissioning Report required by Section 01 91 00.15 TOTAL BUILDING COMMISSIONING as proof of this tracking requirement.

1.2.2.2 Energy Efficient Products

Provide only energy-using products that are Energy Star rated, or have the Federal Energy Management Program (FEMP) recommended efficiency. Where Energy Star or FEMP recommendations have not been established, provide most efficient products that are life-cycle cost effective. Provide only energy using products that meet FEMP requirements for low standby power consumption. Energy efficient products can be found at: https://energy.gov/eere/femp/federal-energy-management-program and https://www.energystar.gov/. Provide the following documentation:

Proof that products are labeled energy efficient and comply with the cited requirements.

1.2.2.3 Indoor Water Use

Provide only water-consuming products that are EPA WaterSense labeled, or the most efficient water fixtures available that meet the requirements of ASHRAE 189.1 Section 6.3.2, when EPA WaterSense products are not available. Provide the following documentation:

For products available with EPA WaterSense labeling, proof that fixtures are labeled EPA WaterSense or Energy Star; for all other fixtures, proof they comply with the cited efficiency requirements.

1.2.2.4 Reduce Volatile Organic Compounds (VOC) (Low Emitting Materials)

Meet the requirements of UFC 1-200-02. Provide the following documentation:

Provide certifications or labels that demonstrate compliance with cited requirements.

1.2.2.5 Indoor Air Quality During Construction

Prior to construction, create indoor air quality (IAQ) plan. Develop and implement the IAQ construction management plan during construction and flush building air before occupancy.

For new construction indoor air quality plan must meet the requirements of ASHRAE 189.1 Section 10.3.1.4. (Indoor Air Quality (IAQ) Construction Management), with maximum outdoor air consistent with achieving relative humidity no greater than 60 percent.

Provide documentation showing that after construction ends and prior to occupancy, HVAC filters were replaced and building air was flushed out in accordance with the cited standard.

1.2.2.6 Recycled Content

a. Manufacturers' documents stating the recycled content by material, or written justification for claiming one of the exceptions allowed on the cited website.

b. Substitutions: Submit for Government approval, proposed alternative products or systems that provide equivalent performance and appearance and have greater contribution to project recycled content requirements. For all such proposed substitutions, submit with the Sustainability Action Plan accompanied by product data demonstrating

equivalence.

c. In order to complete compliance with FAR 52.223-9 Estimate of Percentage of Recovered Material Content for EPA Designated Items, refer to submittal requirement for recycled/recovered material content in Section 01 78 00.

1.2.2.7 Bio-Based Products

Provide products and material composed of the highest percentage of biobased materials (including rapidly renewable resources and certified sustainably harvested products), consistent with FSRIA 9002 USDA BioPreferred Program, to the maximum extent possible without jeopardizing the intended end use or detracting from the overall quality delivered to the end user. Use only supplies and materials of a type and quality that conform to applicable specifications and standards.

Comply with FSRIA 9002 USDA BioPreferred Program. Refer to https://www.biopreferred.gov/BioPreferred/ for the product categories and BioPreferred Catalog. Selected products must comply with non-proprietary requirements of the Federal Acquisition Regulation, and must meet performance requirements. Provide the following documentation:

a. USDA BioPreferred label for each product; for bio-based products used on project but not listed with BioPreferred program, provide bio-based content and percentage.

b. In order to complete compliance with FAR 52.223-2 Affirmative Procurement of Biobased Products Under Service and Construction Contracts, refer to submittal requirement for biobased products in Section 01 78 00.

1.2.3 High-Velocity Hurricane Zone (HVHZ) Florida Building Code

Tyndall AFB requires all new construction, additions, and renovations to comply with the Florida Building Code (FBC) High-Velocity Hurricane Zone (HVHZ), Section 1602.2 criteria for Miami Dade County, Risk Category III buildings with a windspeed of 165 mph. Per FBC HVHZ provisions, all exterior building envelope materials such as, but not limited to windows, glazing, roofing systems, concrete masonry unit or metal panel walls, and doors and others must have a current Miami-Dade Notice of Acceptance (NOA) and installation of HVHZ standards that match the specified minimum 165mph wind requirement at Tyndall AFB. In addition, the Contractor must submit for review and approval test results of systems meeting the high wind requirements or a set of drawings sealed by a Professional Engineer stating conformance with HVHZ standards in place of materials pre-approved by Miami-Dade County.

1.2.4 Waste Material Management (Recycling – Construction)

Divert construction debris from landfill disposal where markets or on-site recycling exists, and provide documentation in accordance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.2.5 Additional Sustainability Requirements

1.2.5.1 Validation and Certification Restrictions

Purchase of renewable energy certificates (RECs) specifically to meet project sustainability goals is prohibited.

1.2.6 Location

The work is located at the Tyndall AFB, Florida, approximately as indicated. The exact location will be shown by the Contracting Officer.

1.3 OCCUPANCY OF PREMISES

Building B267 will be occupied during performance of work under this Contract. Occupancy notifications will be posted in a prominent location in the work area.

Before work is started, arrange with the Contracting Officer a sequence of procedure, means of access, space for storage of materials and equipment, and use of approaches, corridors, and stairways.

1.4 EXISTING WORK

In addition to FAR 52.236-9 Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements:

a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.

b. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work must be in a condition equal to or better than that which existed before new work started.

1.5 LOCATION OF UNDERGROUND UTILITIES

Obtain digging permits prior to start of excavation, and comply with Installation requirements for locating and marking underground utilities. Contact local utility locating service a minimum of 48 hours prior to excavating, to mark utilities, and within sufficient time required if work occurs on a Monday or after a Holiday. Verify existing utility locations indicated on contract drawings, within area of work.

Identify and mark all other utilities not managed and located by the local utility companies. Scan the construction site with Ground Penetrating Radar (GPR), electromagnetic, or sonic equipment, and mark the surface of the ground, pier deck or paved surface where existing underground utilities are discovered. Verify the elevations of existing piping, utilities,and any type of underground or encased obstruction not indicated, or specified to be removed, that is indicated or discovered during scanning, in locations to be traversed by piping, ducts, and other work to be conducted or installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.5.1 Notification Prior to Excavation

Notify the Contracting Officer at least 48 hours prior to starting excavation work.

1.6 GOVERNMENT-INSTALLED WORK

1.7 SALVAGE MATERIAL AND EQUIPMENT

Items designated by the Contracting Officer to be salvaged remain the property of the Government. Segregate, itemize, deliver and off-load the salvaged property at the Government designated storage area.

Provide a salvage plan, listing material and equipment to be salvaged, and their storage location. Maintain property control records for material or equipment designated as salvage. Use a system of property control that is approved by the Contracting Officer. Store and protect salvaged materials and equipment until disposition by the Contracting Officer.

1.8 GEOTECHNICAL AND ENVIRONMENTAL

No geotechnical report will be provided by the government for the project sites. However, the contractor is responsible for completing a geotechnical investigation by a licensed soils engineer before construction. A licensed geotechnical engineer and licensed environmental engineer must also be employed by the contractor to provide subgrade preparation, foundation design, and slab-on-grade recommendations. After completing the geotechnical and environmental reports, changes may be required to adjust the minimum design criteria listed in this contract documents. In that case, the contracting officer representative in charge must be contacted immediately. Refer to Civil and Structural drawings and specifications for the complete requirements. The contractor's base bid shall include the following as a minimum:

1. Contaminated soils.
2. Foundation preparation.
3. Slab-on-grade preparation.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01 14 00

WORK RESTRICTIONS
11/11

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00.00 06 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

List of Contact Personnel; G

1.2 SPECIAL SCHEDULING REQUIREMENTS

a. The contractor must be ready for operation as approved by Contracting Officer before work is started.

b. OSI Add Alter Building 1265 will not remain in operation during the entire construction period. PMEL Facility B267 will remain in operation during the entire construction period. The Contractor must conduct his operations so as to cause the least possible interference with normal operations of area B5028.

c. Permission to interrupt any Activity roads, railroads, or utility service must be requested in writing a minimum of 15 calendar days prior to the desired date of interruption.

1.3 CONTRACTOR ACCESS AND USE OF PREMISES AND GENERAL WORK RESTRICTIONS

1.3.1 Activity Regulations

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress. Wear hard hats in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. Mark Contractor equipment for identification.

1.3.1.1 Subcontractors and Personnel Contacts

Provide a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

1.3.1.2 Identification Badges

The contractor is required to provide identification badges for their employees. All contractor personnel shall wear these badges while on duty on the government site. Badges are required to identify the individual, company name, and be clearly and distinctly marked as contractor. Size,

color, style, etc. are to be mutually agreed to by contractor and government. The contractor's identification badge will not be used as an entry requirement for installation entry or into any government designated controlled or restricted area.

1.3.1.3 No Smoking Policy

Smoking is prohibited within and outside of all buildings on installation, except in designated smoking areas. This applies to existing buildings, buildings under construction and buildings under renovation. Discarding tobacco materials other than into designated tobacco receptacles is considered littering and is subject to fines. The Contracting Officer will identify designated smoking areas.

1.3.2 Working Hours

Regular working hours must consist of an 8 1/2 hour hour period established by the Contracting Officer, between 7 a.m. and 3:30 p.m., Monday through Friday, and 7 a.m. to 11 p.m. on Saturday, excluding Government holidays.

1.3.3 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application 15 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress, giving the specific dates, hours, location, type of work to be performed, contract number and project title. Based on the justification provided, the Contracting Officer may approve work outside regular hours. During periods of darkness, the different parts of the work must be lighted in a manner approved by the Contracting Officer. Work performed in PMEL Facility B267 must be scheduled during the night hours to avoid utility interruptions when base personnel is in the building during day hours. The contractor must coordinate working hours in PMEL Facility B267 with the contracting officer representative.

1.3.4 Occupied and Existing Building B267

The Contractor shall be working around and inside existing B267 which will be occupied, except for the construction limit's area for the renovations and new construction of the PMEL Facility within B267. Do not enter the building without prior approval of the Contracting Officer.

The existing building 267 and their contents must be kept secure at all times. Provide temporary closures as required to maintain security as directed by the Contracting Officer.

Provide dust covers, protective barriers and enclosures to protect existing work that remains and Government material located in the work area during the construction period. Provide protective barriers to limit access into construction work areas, and for dust control.

Unless noted otherwise, the Government will remove and relocate other Government property in the areas of the building scheduled to receive work.

1.3.5 Utility Cutovers and Interruptions

a. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays. Conform to procedures required in paragraph WORK OUTSIDE REGULAR HOURS.

b. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.

c. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, compressed air are considered utility cutovers pursuant to the paragraph WORK OUTSIDE REGULAR HOURS. Such interruptions are further limited to night hours. This time limit includes time for deactivation and reactivation.

d. Operation of Station Utilities: The Contractor must not operate nor disturb the setting of control devices in the station utilities system, including water, sewer, electrical, and steam services. The Government will operate the control devices as required for normal conduct of the work. The Contractor must notify the Contracting Officer giving reasonable advance notice when such operation is required.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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SECTION 01 32 01.00 10

PROJECT SCHEDULE
02/15

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AACE INTERNATIONAL (AACE)

AACE 29R-03	(2011) Forensic Schedule Analysis
AACE 52R-06	(2006) Time Impact Analysis - As Applied in Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1-1-11	(1995) Administration -- Progress, Schedules, and Network Analysis Systems

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Project Scheduler Qualifications; G

Preliminary Project Schedule; G

Initial Project Schedule; G

Periodic Schedule Update; G

1.3 PROJECT SCHEDULER QUALIFICATIONS

Designate an authorized representative to be responsible for the preparation of the schedule and all required updating and production of reports. The authorized representative must have a minimum of 2-years experience scheduling construction projects similar in size and nature to this project with scheduling software that meets the requirements of this specification. Representative must have a comprehensive knowledge of CPM scheduling principles and application.

PART 2 PRODUCTS

2.1 SOFTWARE

The scheduling software utilized to produce and update the schedules

required herein must be capable of meeting all requirements of this specification.

2.1.1 Government Default Software

The Government intends to use Primavera P6.

2.1.2 Contractor Software

Scheduling software used by the contractor must be commercially available from the software vendor for purchase with vendor software support agreements available. The software routine used to create the required sdef file must be created and supported by the software manufacturer.

2.1.2.1 Primavera

If Primavera P6 is selected for use, provide the "xer" export file in a version of P6 importable by the Government system.

2.1.2.2 Other Than Primavera

If the contractor chooses software other than Primavera P6, that is compliant with this specification, provide for the Government's use two licenses, two computers, and training for two Government employees in the use of the software. These computers will be stand-alone and not connected to Government network. Computers and licenses will be returned at project completion.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Prepare for approval a Project Schedule, as specified herein, pursuant to FAR Clause 52.236-15 Schedules for Construction Contracts. Show in the schedule the proposed sequence to perform the work and dates contemplated for starting and completing all schedule activities. The scheduling of the entire project is required. The scheduling of design and construction is the responsibility of the Contractor. Contractor management personnel must actively participate in its development. Designers, Subcontractors and suppliers working on the project must also contribute in developing and maintaining an accurate Project Schedule. Provide a schedule that is a forward planning as well as a project monitoring tool. Use the Critical Path Method (CPM) of network calculation to generate all Project Schedules. Prepare each Project Schedule using the Precedence Diagram Method (PDM).

3.2 BASIS FOR PAYMENT AND COST LOADING

The schedule is the basis for determining contract earnings during each update period and therefore the amount of each progress payment. The aggregate value of all activities coded to a contract CLIN must equal the value of the CLIN.

3.2.1 Activity Cost Loading

Activity cost loading must be reasonable and without front-end loading. Provide additional documentation to demonstrate reasonableness if requested by the Contracting Officer.

3.2.2 Withholdings / Payment Rejection

Failure to meet the requirements of this specification may result in the disapproval of the preliminary, initial or periodic schedule updates and subsequent rejection of payment requests until compliance is met.

In the event that the Contracting Officer directs schedule revisions and those revisions have not been included in subsequent Project Schedule revisions or updates, the Contracting Officer may withhold 10 percent of pay request amount from each payment period until such revisions to the project schedule have been made.

3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

3.3.1 Level of Detail Required

Develop the Project Schedule to the appropriate level of detail to address major milestones and to allow for satisfactory project planning and execution. Failure to develop the Project Schedule to an appropriate level of detail will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

3.3.2 Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities may have Original Durations (OD) greater than 20 work days or 30 calendar days.

3.3.3 Procurement Activities

Include activities associated with the critical submittals and their approvals, procurement, fabrication, and delivery of long lead materials, equipment, fabricated assemblies, and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days.

3.3.4 Mandatory Tasks

Include the following activities/tasks in the initial project schedule and all updates.

a. Submission, review and acceptance of SD-01 Preconstruction Submittals (individual activity for each).

b. Submission, review and acceptance of features require design completion .

c. Submission of mechanical/electrical/information systems layout drawings.

d. Long procurement activities

e. Submission and approval of O & M manuals.

f. Submission and approval of as-built drawings.

g. Submission and approval of DD1354 data and installed equipment lists.

h. Submission and approval of testing and air balance (TAB).

i. Submission of TAB specialist design review report.

j. Submission and approval of fire protection specialist.

k. Submission and approval of Building Commissioning Plan, test data, and reports: Develop the schedule logic associated with testing and commissioning of mechanical systems to a level of detail consistent with the contract commissioning requirements. All tasks associated with all building testing and commissioning will be completed prior to submission of building commissioning report and subsequent contract completion.

l. Air and water balancing.

m. Building commissioning - Functional Performance Testing.

n. Controls testing plan submission.

o. Controls testing.

p. Performance Verification testing.

q. Other systems testing, if required.

r. Contractor's pre-final inspection.

s. Correction of punch list from Contractor's pre-final inspection.

t. Government's pre-final inspection.

u. Correction of punch list from Government's pre-final inspection.

v. Final inspection.

3.3.5 Government Activities

Show Government and other agency activities that could impact progress. These activities include, but are not limited to: approvals,acceptance, design reviews, environmental permit approvals by State regulators, inspections, utility tie-in, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements.

3.3.6 Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11. This exact structure is mandatory. Develop and assign all Activity Codes to activities as detailed herein. A template SDEF compatible schedule backup file is available on the QCS web site: http://rms.usace.army.mil.

The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per day

Field	Activity Code	Length	Description
2	RESP	4	Responsible party
3	AREA	4	Area of work
4	MODF	6	Modification Number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of work
7	CATW	1	Category of work
8	FOW	20	Feature of work*

*Some systems require that FEATURE OF WORK values be placed in several activity code fields. The notation shown is for Primavera P6. Refer to the specific software guidelines with respect to the FEATURE OF WORK field requirements.

3.3.6.1 Workers Per Day (WRKP)

Assign Workers per Day for all field construction or direct work activities, if directed by the Contracting Officer. Workers per day is based on the average number of workers expected each day to perform a task for the duration of that activity.

3.3.6.2 Responsible Party Coding (RESP)

Assign responsibility code for all activities to the Prime Contractor, Subcontractor(s) or Government agency(ies) responsible for performing the activity.

a. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Property/Equipment (GFP) and Notice to Proceed (NTP) for phasing requirements.

b. Activities cannot have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE).

3.3.6.3 Area of Work Coding (AREA)

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities cannot have more than one Work Area Code.

Not all activities are required to be Work Area coded. A lack of Work Area coding indicates the activity is not resource or space constrained.

3.3.6.4 Modification Number (MODF)

Assign a Modification Number Code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer. Key all Code values to the Government's modification numbering system. An activity can have only one Modification Number Code.

3.3.6.5 Bid Item Coding (BIDI)

Assign a Bid Item Code to all activities using the Contract Line Item Schedule (CLIN) to which the activity belongs, even when an activity is not cost loaded. An activity can have only one BIDI Code.

3.3.6.6 Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities. Examples of phase of work are design phase, procurement phase and construction phase. Each activity can have only one Phase of Work code.

a. Code proposed fast track design and construction phases proposed to allow filtering and organizing the schedule by fast track design and construction packages.

b. If the contract specifies phasing with separately defined performance periods, identify a Phase Code to allow filtering and organizing the schedule accordingly.

3.3.6.7 Category of Work Coding (CATW)

Assign a Category of Work Code to all activities. Category of Work Codes include, but are not limited to design, design submittal, design reviews, review conferences, permits, construction submittal, procurement, fabrication, weather sensitive installation, non-weather sensitive installation, start-up, and testing activities. Each activity can have no more than one Category of Work Code.

3.3.6.8 Feature of Work Coding (FOW)

Assign a Feature of Work Code to appropriate activities based on the Definable Feature of Work to which the activity belongs based on the approved QC plan.

Definable Feature of Work is defined in Section 01 45 00.00 10 QUALITY CONTROL. An activity can have only one Feature of Work Code.

3.3.7 Contract Milestones and Constraints

Milestone activities are to be used for significant project events including, but not limited to, project phasing, project start and end activities, or interim completion dates. The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited.

Mandatory constraints that ignore or effect network logic are prohibited. No constrained dates are allowed in the schedule other than those specified

herein. Submit additional constraints to the Contracting Officer for approval on a case by case basis.

3.3.7.1 Project Start Date Milestone and Constraint

The first activity in the project schedule must be a start milestone titled "NTP Acknowledged," which must have a "Start On" constraint date equal to the date that the NTP is acknowledged.

3.3.7.2 End Project Finish Milestone and Constraint

The last activity in the schedule must be a finish milestone titled "End Project."

Constrain the project schedule to the Contract Completion Date in such a way that if the schedule calculates an early finish, then the float calculation for "End Project" milestone reflects positive float on the longest path. If the project schedule calculates a late finish, then the "End Project" milestone float calculation reflects negative float on the longest path. The Government is under no obligation to accelerate Government activities to support a Contractor's early completion.

3.3.7.3 Interim Completion Dates and Constraints

Constrain contractually specified interim completion dates to show negative float when the calculated late finish date of the last activity in that phase is later than the specified interim completion date.

3.3.7.3.1 Start Phase

Use a start milestone as the first activity for a project phase. Call the start milestone "Start Phase X" where "X" refers to the phase of work.

3.3.7.3.2 End Phase

Use a finish milestone as the last activity for a project phase. Call the finish milestone "End Phase X" where "X" refers to the phase of work.

3.3.8 Calendars

Schedule activities on a Calendar to which the activity logically belongs. Develop calendars to accommodate any contract defined work period such as a 7-day calendar for Government Acceptance activities, concrete cure times, etc. Develop the default Calendar to match the physical work plan with non-work periods identified including weekends and holidays. Develop sSeasonal Calendar(s) and assign to seasonally affected activities as applicable.

If an activity is weather sensitive it should be assigned to a calendar showing non-work days on a monthly basis, with the non-work days selected at random across the weeks of the calendar, using the anticipated adverse weather delay work days provided in the Special Contract Requirements. Assign non-work days over a seven-day week as weather records are compiled on seven-day weeks, which may cause some of the weather related non-work days to fall on weekends.

3.3.9 Open Ended Logic

Only two open ended activities are allowed: the first activity "NTP

Acknowledged" may have no predecessor logic, and the last activity -"End Project" may have no successor logic.

Predecessor open ended logic may be allowed in a time impact analyses upon the Contracting Officer's approval.

3.3.10 Default Progress Data Disallowed

Actual Start and Finish dates must not automatically update with default mechanisms included in the scheduling software. Updating of the percent complete and the remaining duration of any activity must be independent functions. Disable program features that calculate one of these parameters from the other. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process must match those dates provided in the Contractor Quality Control Reports. Failure to document the AS and AF dates in the Daily Quality Control report will result in disapproval of the Contractor's schedule.

3.3.11 Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Address out of sequence progress or logic changes in the Narrative Report and in the periodic schedule update meetings.

3.3.12 Added and Deleted Activities

Do not delete activities from the project schedule or add new activities to the schedule without approval from the Contracting Officer. Activity ID and description changes are considered new activities and cannot be changed without Contracting Officer approval.

3.3.13 Original Durations

Activity Original Durations (OD) must be reasonable to perform the work item. OD changes are prohibited unless justification is provided and approved by the Contracting Officer.

3.3.14 Leads, Lags, and Start to Finish Relationships

Lags must be reasonable as determined by the Government and not used in place of realistic original durations, must not be in place to artificially absorb float, or to replace proper schedule logic.

a. Leads (negative lags) are prohibited.

b. Start to Finish (SF) relationships are prohibited.

3.3.15 Retained Logic

Schedule calculations must retain the logic between predecessors and successors ("retained logic" mode) even when the successor activity(s) starts and the predecessor activity(s) has not finished (out-of-sequence progress). Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") are not be allowed.

3.3.16 Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete to allow for proper schedule management.

3.3.17 Remaining Duration

Update the remaining duration for each activity based on the number of estimated work days it will take to complete the activity. Remaining duration may not mathematically correlate with percentage found under paragraph entitled Percent Complete.

3.3.18 Cost Loading of Closeout Activities

Cost load the "Correction of punch list from Government pre-final inspection" activity(ies) not less than 1 percent of the present contract value. Activity(ies) may be declared 100 percent complete upon the Government's verification of completion and correction of all punch list work identified during Government pre-final inspection(s).

3.3.18.1 As-Built Drawings

If there is no separate contract line item (CLIN) for as-built drawings, cost load the "Submission and approval of as-built drawings" activity not less than $35,000 or 1 percent of the present contract value, which ever is greater, up to $200,000. Activity will be declared 100 percent complete upon the Government's approval.

3.3.18.2 O & M Manuals

Cost load the "Submission and approval of O & M manuals" activity not less than $20,000. Activity will be declared 100 percent complete upon the Government's approval of all O & M manuals.

3.3.19 Early Completion Schedule and the Right to Finish Early

An Early Completion Schedule is an Initial Project Schedule (IPS) that indicates all scope of the required contract work will be completed before the contractually required completion date.

a. No IPS indicating an Early Completion will be accepted without being fully resource-loaded (including crew sizes and manhours) and the Government agreeing that the schedule is reasonable and achievable.

b. The Government is under no obligation to accelerate work items it is responsible for to ensure that the early completion is met nor is it responsible to modify incremental funding (if applicable) for the project to meet the contractor's accelerated work.

3.4 PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD/DVD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS. If the Contractor fails or refuses to furnish the information and schedule updates as set forth herein, then the Contractor

will be deemed not to have provided an estimate upon which a progress payment can be made.

Review comments made by the Government on the schedule(s) do not relieve the Contractor from compliance with requirements of the Contract Documents.

3.4.1 Preliminary Project Schedule Submission

Within 15 calendar days after the NTP is acknowledged submit the Preliminary Project Schedule defining the planned operations detailed for the first 90 calendar days for approval. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. The Preliminary Project Schedule may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required plan and program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, planned submissions of all early design packages, permitting activities, design review conference activities, and other non-construction activities intended to occur within the first 90 calendar days. Government acceptance of the associated design package(s) and all other specified Program and Plan approvals must occur prior to any planned construction activities. Activity code any activities that are summary in nature after the first 90 calendar days with Bid Item (CLIN) code (BIDI), Responsibility Code (RESP) and Feature of Work code (FOW).

3.4.2 Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after notice to proceed is issued. The schedule must demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. No payment will be made for work items not fully detailed in the Project Schedule.

3.4.3 Periodic Schedule Updates

Update the Project Schedule on a regular basis, monthly at a minimum. Provide a draft Periodic Schedule Update for review at the schedule update meetings as prescribed in the paragraph PERIODIC SCHEDULE UPDATE MEETINGS. These updates will enable the Government to assess Contractor's progress.

a. Update information including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete is subject to the approval of the Government at the meeting.

b. AS and AF dates must match the date(s) reported on the Contractor's Quality Control Report for an activity start or finish.

3.5 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.5.1 Data CD/DVDs

Provide two sets of data CD/DVDs containing the current project schedule and all previously submitted schedules in the format of the scheduling software (e.g. .xer). Also include on the data CD/DVDs the Narrative Report and all required Schedule Reports. Label each CD/DVD indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file name. Each schedule must have a unique file name and use project specific settings.

3.5.2 Narrative Report

Provide a Narrative Report with each schedule submission. The Narrative Report is expected to communicate to the Government the thorough analysis of the schedule output and the plans to compensate for any problems, either current or potential, which are revealed through that analysis. Include the following information as minimum in the Narrative Report:

a. Identify and discuss the work scheduled to start in the next update period.

b. A description of activities along the two most critical paths where the total float is less than or equal to 20 work days.

c. A description of current and anticipated problem areas or delaying factors and their impact and an explanation of corrective actions taken or required to be taken.

d. Identify and explain why activities based on their calculated late dates should have either started or finished during the update period but did not.

e. Identify and discuss all schedule changes by activity ID and activity name including what specifically was changed and why the change was needed. Include at a minimum new and deleted activities, logic changes, duration changes, calendar changes, lag changes, resource changes, and actual start and finish date changes.

f. Identify and discuss out-of-sequence work.

3.5.3 Schedule Reports

The format, filtering, organizing and sorting for each schedule report will be as directed by the Contracting Officer. Typically, reports contain Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. Provide the reports electronically in .pdf format. Provide 2 set(s) of hardcopy reports. The following lists typical reports that will be requested:

3.5.3.1 Activity Report

List of all activities sorted according to activity number.

3.5.3.2 Logic Report

List of detailed predecessor and successor activities for every activity in ascending order by activity number.

3.5.3.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

3.5.3.4 Earnings Report by CLIN

A compilation of the Total Earnings on the project from the NTP to the data date, which reflects the earnings of activities based on the agreements made in the schedule update meeting defined herein. Provided a complete schedule update has been furnished, this report serves as the basis of determining progress payments. Group activities by CLIN number and sort by activity number. Provide a total CLIN percent earned value, CLIN percent complete, and project percent complete. The printed report must contain the following for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Earnings to Date, Earnings this period, Total Quantity, Quantity to Date, and Percent Complete (based on cost).

3.5.3.5 Schedule Log

Provide a Scheduling/Leveling Report generated from the current project schedule being submitted.

3.5.4 Network Diagram

The Network Diagram is required for the Preliminary, Initial and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.4.1 Continuous Flow

Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

3.5.4.2 Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.4.3 Critical Path

Show all activities on the critical path. The critical path is defined as the longest path.

3.5.4.4 Banding

Organize activities using the WBS or as otherwise directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by major elements of work, category of work, work area and/or responsibility.

3.5.4.5 Cash Flow / Schedule Variance Control (SVC) Diagram

With each schedule submission, provide a SVC diagram showing 1) Cash Flow S-Curves indicating planned project cost based on projected early and late activity finish dates, and 2) Earned Value to-date.

3.6 PERIODIC SCHEDULE UPDATE

3.6.1 Periodic Schedule Update Meetings

Conduct periodic schedule update meetings for the purpose of reviewing the proposed Periodic Schedule Update, Narrative Report, Schedule Reports, and progress payment. Conduct meetings at least monthly within five days of the proposed schedule data date. Provide a computer with the scheduling software loaded and a projector which allows all meeting participants to view the proposed schedule during the meeting. The Contractor's authorized scheduler must organize, group, sort, filter, perform schedule revisions as needed and review functions as requested by the Contractor and/or Government. The meeting is a working interactive exchange which allows the Government and Contractor the opportunity to review the updated schedule on a real time and interactive basis. The meeting will last no longer than 8 hours. Provide a draft of the proposed narrative report and schedule data file to the Government a minimum of two workdays in advance of the meeting. The Contractor's Project Manager and scheduler must attend the meeting with the authorized representative of the Contracting Officer. Superintendents, foremen and major subcontractors must attend the meeting as required to discuss the project schedule and work. Following the periodic schedule update meeting, make corrections to the draft submission. Include only those changes approved by the Government in the submission and invoice for payment.

3.6.2 Update Submission Following Progress Meeting

Submit the complete Periodic Schedule Update of the Project Schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 work days after the periodic schedule update meeting.

3.7 WEEKLY PROGRESS MEETINGS

Conduct a weekly meeting with the Government (or as otherwise mutually agreed to) between the meetings described in paragraph entitled PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. Use the current approved schedule update for the purposes of this meeting and for the production and review of reports. At the weekly progress meeting, address the status of RFIs, RFPs and Submittals.

3.8 REQUESTS FOR TIME EXTENSIONS

Provide a justification of delay to the Contracting Officer in accordance with the contract provisions and clauses for approval within 10 days of a delay occurring. Also prepare a time impact analysis for each Government request for proposal (RFP) to justify time extensions.

3.8.1 Justification of Delay

Provide a description of the event(s) that caused the delay and/or impact

to the work. As part of the description, identify all schedule activities impacted. Show that the event that caused the delay/impact was the responsibility of the Government. Provide a time impact analysis that demonstrates the effects of the delay or impact on the project completion date or interim completion date(s). Evaluate multiple impacts chronologically; each with its own justification of delay. With multiple impacts consider any concurrency of delay. A time extension and the schedule fragnet becomes part of the project schedule and all future schedule updates upon approval by the Contracting Officer.

3.8.2 Time Impact Analysis (Prospective Analysis)

Prepare a time impact analysis for approval by the Contracting Officer based on industry standard AACE 52R-06. Utilize a copy of the last approved schedule prior to the first day of the impact or delay for the time impact analysis. If Contracting Officer determines the time frame between the last approved schedule and the first day of impact is too great, prepare an interim updated schedule to perform the time impact analysis. Unless approved by the Contracting Officer, no other changes may be incorporated into the schedule being used to justify the time impact.

3.8.3 Forensic Schedule Analysis (Retrospective Analysis)

Prepare an analysis for approval by the Contracting Officer based on industry standard AACE 29R-03.

3.8.4 Fragmentary Network (Fragnet)

Prepare a proposed fragnet for time impact analysis consisting of a sequence of new activities that are proposed to be added to the project schedule to demonstrate the influence of the delay or impact to the project's contractual dates. Clearly show how the proposed fragnet is to be tied into the project schedule including all predecessors and successors to the fragnet activities. The proposed fragnet must be approved by the Contracting Officer prior to incorporation into the project schedule.

3.8.5 Time Extension

The Contracting Officer must approve the Justification of Delay including the time impact analysis before a time extension will be granted. No time extension will be granted unless the delay consumes all available Project Float and extends the projected finish date ("End Project" milestone) beyond the Contract Completion Date. The time extension will be in calendar days.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

3.8.6 Impact to Early Completion Schedule

No extended overhead will be paid for delay prior to the original Contract Completion Date for an Early Completion IPS unless the Contractor actually performed work in accordance with that Early Completion Schedule. The Contractor must show that an early completion was achievable had it not been for the impact.

3.9 FAILURE TO ACHIEVE PROGRESS

Should the progress fall behind the approved project schedule for reasons other than those that are excusable within the terms of the contract, the Contracting Officer may require provision of a written recovery plan for approval. The plan must detail how progress will be made-up to include which activities will be accelerated by adding additional crews, longer work hours, extra work days, etc.

3.9.1 Artificially Improving Progress

Artificially improving progress by means such as, but not limited to, revising the schedule logic, modifying or adding constraints, shortening activity durations, or changing calendars in the project schedule is prohibited. Indicate assumptions made and the basis for any logic, constraint, duration and calendar changes used in the creation of the recovery plan. Any additional resources, manpower, or daily and weekly work hour changes proposed in the recovery plan must be evident at the work site and documented in the daily report along with the Schedule Narrative Report.

3.9.2 Failure to Perform

Failure to perform work and maintain progress in accordance with the supplemental recovery plan may result in an interim and final unsatisfactory performance rating and may result in corrective action directed by the Contracting Officer pursuant to FAR 52.236-15 Schedules for Construction Contracts, FAR 52.249-10 Default (Fixed-Price Construction), and other contract provisions.

3.9.3 Recovery Schedule

Should the Contracting Officer find it necessary, submit a recovery schedule pursuant to FAR 52.236-15 Schedules for Construction Contracts.

3.10 OWNERSHIP OF FLOAT

Except for the provision given in the paragraph IMPACT TO EARLY COMPLETION SCHEDULE, float available in the schedule, at any time, may not be considered for the exclusive use of either the Government or the Contractor including activity and/or project float. Activity float is the number of work days that an activity can be delayed without causing a delay to the "End Project" finish milestone. Project float (if applicable) is the number of work days between the projected early finish and the contract completion date milestone.

3.11 TRANSFER OF SCHEDULE DATA INTO RMS/QCS

Import the schedule data into the Quality Control System (QCS) and export the QCS data to the Government. This data is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 Payments under Fixed-Price Construction Contracts. The receipt of a proper payment request pursuant to FAR 52.232-27 Prompt Payment for Construction Contracts is contingent upon the Government receiving both acceptable and approvable hard copies and matching electronic export from QCS of the application for progress payment.

3.12 PRIMAVERA P6 MANDATORY REQUIREMENTS

If Primavera P6 is being used, request a backup file template (.xer) from the Government, if one is available, prior to building the schedule. The following settings are mandatory and required in all schedule submissions to the Government:

a. Activity Codes must be Project Level, not Global or EPS level.

b. Calendars must be Project Level, not Global or Resource level.

c. Activity Duration Types must be set to "Fixed Duration & Units".

d. Percent Complete Types must be set to "Physical".

e. Time Period Admin Preferences must remain the default "8.0 hr/day, 40 hr/week, 172 hr/month, 2000 hr/year". Set Calendar Work Hours/Day to 8.0 Hour days.

f. Set Schedule Option for defining Critical Activities to "Longest Path".

g. Set Schedule Option for defining progressed activities to "Retained Logic".

h. Set up cost loading using a single lump sum labor resource. The Price/Unit must be $1/hr, Default Units/Time must be "8h/d", and settings "Auto Compute Actuals" and "Calculate costs from units" selected.

i. Activity ID's must not exceed 10 characters.

j. Activity Names must have the most defining and detailed description within the first 30 characters.

-- End of Section --

SECTION 01 33 00

SUBMITTAL PROCEDURES
05/11

PART 1 GENERAL

1.1 SUMMARY

The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

Submittals requiring Government approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

A submittal register showing items of equipment and materials for when submittals are required by the specifications is provided as "Appendix A - Submittal Register".

1.2 DEFINITIONS

1.2.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

SD-01 Preconstruction Submittals

Submittals which are required prior to or the start of the next major phase of the construction on a multi-phase contract, includes schedules, tabular list of data, or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

Certificates of insurance

Surety bonds

List of proposed Subcontractors

List of proposed products

Construction progress schedule

Network Analysis Schedule (NAS)

Submittal register

Schedule of prices or Earned Value Report

Health and safety plan

Work plan

Quality Control(QC) plan

Environmental protection plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. Unless specified in another section, testing must have been within three years of date of contract award for the project.

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that the product, system, or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor. The document purpose is to further promote the orderly progression of a portion of the work by documenting procedures, acceptability of methods, or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (MSDS)concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must be signed by an authorized official of a testing laboratory or agency and

state the test results; and indicate whether the material, product, or system has passed or failed the test.

Factory test reports.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This data is intended to be incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Submittals required for Guiding Principle Validation (GPV) or Third Party Certification (TPC).

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

1.2.2 Approving Authority

Office or designated person authorized to approve submittal.

1.2.3 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, except those SD-01 Pre-Construction Submittals noted above, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal Register; G

1.4 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.4.1 Designer of Record Approved (DA)

Designer of Record (DOR) approval is required for extensions of design, critical materials, any deviations from the solicitation, the accepted proposal, or the completed design, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings." Contractor to provide the Government with the number of copies designated hereinafter of all DOR approved submittals. The Government may review any or all Designer of Record approved submittals for conformance to the Solicitation, Accepted Proposal and the completed design. The Government will review all submittals designated as deviating from the Solicitation or Accepted Proposal, as described below. Design submittals to be in accordance with Section 01 33 16.00 10 DESIGN DATA (DESIGN AFTER AWARD). Generally, design submittals should be identified as SD-05 Design Data submittals.

1.4.2 Government Approved (G)

Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings."

1.4.3 For Information Only

Submittals not requiring Government approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.5 PREPARATION

1.5.1 Transmittal Form

Use the attached sample transmittal form (ENG Form 4025) for submitting both Government approved and information only submittals in accordance with the instructions on the reverse side of the form. These formsare included in the QCS software that the Contractor is required to use for this contract. Properly complete this form by filling out all the heading blank spaces and identifying each item submitted. Exercise special care to ensure proper listing of the specification paragraph and sheet number of the contract drawings pertinent to the data submitted for each item.

1.5.2 Source Drawings for Shop Drawings

The entire set of Source Drawing files (DWG) will not be provided to the Contractor. Only those requested by the Contractor to prepare shop drawings may be provided. Request the specific Drawing Number only for the preparation of Shop Drawings. These drawings may only be provided after award.

1.5.2.1 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the Government.

The Contractor must make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic Source Drawing files are not construction documents. Differences may exist between the Source Drawing files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic Source Drawing files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished Source Drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any conflict exists. Use of these Source Drawing files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic Source Drawing files for use in producing construction data related to this contract, remove all previous indicia of ownership (seals, logos, signatures, initials and dates).

1.5.3 Electronic File Format

Provide submittals in electronic format, with the exception of material samples required for SD-04 Samples items. In addition to the electronic submittal, provide three hard copies of the submittals. Compile the submittal file as a single, complete document, to include the Transmittal Form described within. Name the electronic submittal file specifically according to its contents, coordinate the file naming convention with the Contracting Officer. Electronic files must be of sufficient quality that all information is legible. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer. Generate PDF files from original documents with bookmarks so that the text included in the PDF file is both searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required. Index and bookmark files exceeding 30 pages to allow efficient navigation of the file. When required, the electronic file must include a valid electronic signature, or scan of a signature.

Email electronic submittal documents fewer than 10MB to an email address as directed by the Contracting Officer. Provide electronic documents over 10MB on an optical disc, or through an electronic file sharing system such as the AMRDEC SAFE Web Application located at the following website: https://safe.amrdec.army.mil/safe/.

Provide hard copies of submittals when requested by the Contracting Officer. Up to two additional hard copies of any submittal may be requested at the discretion of the Contracting Officer, at no additional cost to the Government.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of Copies of SD-02 Shop Drawings

Submit six copies of submittals of shop drawings requiring review and approval only by QC organization and seven copies of shop drawings requiring review and approval by Contracting Officer.

1.6.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions

Submit in compliance with quantity requirements specified for shop drawings.

1.6.3 Number of Samples SD-04 Samples

a. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.

b. Submit one sample panel or provide one sample installation where directed. Include components listed in technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of non-solid materials.

1.6.4 Number of Copies SD-05 Design Data and SD-07 Certificates

Submit in compliance with quantity requirements specified for shop drawings.

1.6.5 Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

1.6.6 Number of Copies of SD-10 Operation and Maintenance Data

Submit three copies of O&M Data to the Contracting Officer for review and approval.

1.6.7 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

Unless otherwise specified, submit two sets of administrative submittals.

1.7 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the

Government in those instances where the technical specifications so prescribe.

1.8 SUBMITTAL REGISTER

Prepare and maintain submittal register, as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved. A submittal register showing items of equipment and materials for which submittals are required by the specifications is provided as an attachment. This list may not be all inclusive and additional submittals may be required. Maintain a submittal register for the project in accordance with Section 01 45 00.10 10 QUALITY CONTROL SYSTEM (QCS).

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the Government.

1.8.1 Use of Submittal Register

Submit submittal register. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.8.2 Contractor Use of Submittal Register

Update the following fields with each submittal throughout contract.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

1.8.3 Approving Authority Use of Submittal Register

Update the following fields.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (l) List date of submittal receipt.

Column (m) through (p) List Date related to review actions.

Column (q) List date returned to Contractor.

1.8.4 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request.

1.9 VARIATIONS

Variations from contract requirements require both Designer of Record (DOR) and Government approval pursuant to contract Clause FAR 52.236-21 and will be considered where advantageous to Government.

1.9.1 Considering Variations

Discussion with Contracting Officer prior to submission, after consulting with the DOR, will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

1.9.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government, including the DOR's written analysis and approval. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

Check the column "variation" of ENG Form 4025 for submittals which include proposed deviations requested by the Contractor. Set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.9.3 Warranting that Variations are Compatible

When delivering a variation for approval, Contractor, including its Designer(s) of Record, warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.9.4 Review Schedule Extension

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Government of submittals with variations.

1.10 SCHEDULING

Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals. An additional 15 calendar days will be allowed and shown on the register for review and approval of submittals for food service equipment and refrigeration and HVAC control systems.

a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.

b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A."

c. Re-submit register and annotate monthly by the Contractor with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.

d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

1.11 GOVERNMENT APPROVING AUTHORITY

When approving authority is Contracting Officer, the Government will:

a. Note date on which submittal was received.

b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph REVIEW NOTATIONS and with markings appropriate for action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date submittals. Four (4) copies of the submittal will be

retained by the Contracting Officer and two (2) copies of the submittal will be returned to the Contractor. If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be so identified and returned, as described above.

1.11.1 Review Notations

Contracting Officer review will be completed within 30 calendar days after date of submission. Submittals will be returned to the Contractor with the following notations:

a. Submittals marked "approved" or "accepted" authorize the Contractor to proceed with the work covered.

b. Submittals marked "approved as noted" or "approved, except as noted, resubmittal not required," authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections.

c. Submittals marked "not approved" or "disapproved," or "revise and resubmit," indicate noncompliance with the contract requirements or design concept, or that submittal is incomplete. Resubmit with appropriate changes. No work shall proceed for this item until resubmittal is approved.

d. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

1.12 DISAPPROVED OR REJECTED SUBMITTALS

Make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the FAR clause entitled CHANGES, is to be given to the Contracting Officer. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.13 APPROVED/ACCEPTED SUBMITTALS

The Contracting Officer's approval or acceptance of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing and other information are satisfactory.

Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details,

and the satisfactory construction of all work.

After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.14 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, the Contractor to assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. Government reserves the right to disapprove any material or equipment which previously has proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Contractor to replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the Contracting Officer does not relieve the Contractor of his responsibilities under the contract.

1.15 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

1.16 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements is to be similar to the following:

CONTRACTOR (Firm Name)   _____ Approved _____ Approved with corrections as noted on submittal data and/or attached sheets(s)   SIGNATURE: _____ TITLE: _____ DATE: _____

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION

New Lox Plant/OSI B1265 Add/Alter/PMEL B267 Alter

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 11 00	SD-01 Preconstruction Submittals															
			Utility Outage Requests															
			Utility Connection Requests															
			Excavation Permits															
			Welding Permits															
		01 14 00	SD-01 Preconstruction Submittals															
			List of Contact Personnel	1.3.1.1	G													
		01 32 01.00 10	SD-01 Preconstruction Submittals															
			Project Scheduler Qualifications	1.3	G													
			Preliminary Project Schedule	3.4.1	G													
			Initial Project Schedule	3.4.2	G													
			Periodic Schedule Update	3.6.2	G													
		01 33 00	SD-01 Preconstruction Submittals															
			Submittal Register	1.8	G													
		01 35 26	SD-01 Preconstruction Submittals															
			Accident Prevention Plan (APP)	1.8	G													
			SD-06 Test Reports															
			Monthly Exposure Reports	1.4														
			Notifications and Reports	1.13														
			Accident Reports	1.13.2	G													
			LHE Inspection Reports	1.13.3														
			SD-07 Certificates															
			Contractor Safety Self-Evaluation Checklist	1.5														
			Crane Operators/Riggers	1.7.1.6														
			Standard Lift Plan	1.8.2.2	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
New Lox Plant/OSI B1265 Add/Alter/PMEL B267 Alter

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAG# RAPH	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					REMARKS
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		01 35 26	Critical Lift Plan	1.8.2.3	G													
			Activity Hazard Analysis (AHA)	1.9														
			Confined Space Entry Permit	1.10.1														
			Hot Work Permit	1.10.1														
			Certificate of Compliance	1.13.4														
			Third Party Certification of															
			Floating Cranes and															
			Barge-Mounted Mobile Cranes															
			License Certificates															
			Radiography Operation Planning		G													
			Work Sheet															
			Portable Gauge Operations		G													
			Planning Worksheet															
			Machinery & Mechanized	3.7.3														
			Equipment Certification Form															
		01 45 00.00 10	SD-01 Preconstruction Submittals															
			Contractor Quality Control (CQC)	3.2	G													
			Plan															
			SD-06 Test Reports															
			Verification Statement	3.9.2														
		01 45 35	SD-01 Preconstruction Submittals															
			Project Manual	3.1.1	G													
			Project Manual	3.1.1	G													
			Written NDT Practices	3.1.3														
			SD-06 Test Reports															
			Daily Reports	3.1.1														

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		01 45 35	Daily Reports	3.1.3														
			Biweekly Reports	3.1.1														
			Biweekly Reports	3.1.2														
			SD-07 Certificates															
			AISC Certified Steel Fabricator	2.1														
			Steel Truss Plant	2.1														
			Special Inspector of Record	1.5.9	G													
			Special Inspector	1.5	G													
			Qualification Records	3.1.3														
			SD-11 Closeout Submittals															
			Interim Report	3.1.3	G													
			Comprehensive Final Report	3.1.1	G													
			Comprehensive Final Report	3.1.3	G													
		01 57 19	SD-01 Preconstruction Submittals															
			Preconstruction Survey	1.5.1														
			Solid Waste Management Permit	1.9	G													
			Regulatory Notifications	1.5.2														
			Environmental Protection Plan	1.6	G													
			Stormwater Notice of Intent		G													
			and/or Stormwater Pollution															
			Prevention Plan (SWPPP)															
			Dirt and Dust Control Plan	1.6.9.1	G													
			Employee Training Records	1.5.5	G													
			Environmental Manager	1.5.4														
			Qualifications															
			SD-06 Test Reports															

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		01 57 19	Laboratory Analysis	3.8.1.1.2														
			Inspection Reports	3.3.1.3														
			Monthly Solid Waste Disposal															
			Report															
			SD-07 Certificates															
			Employee Training Records	1.5.5														
			Erosion and Sediment Control	1.5.5														
			Inspector															
			SD-11 Closeout Submittals															
			Stormwater Pollution Prevention	3.3.1.4	G													
			Plan Compliance Notebook															
			Stormwater Notice of Termination	3.3.1.5	G													
			Waste Determination	3.8.1	G													
			Documentation															
			Disposal Documentation for	3.8.3.6	G													
			Hazardous and Regulated Waste															
			Assembled Employee Training	1.5.5	G													
			Records															
			Solid Waste Management Permit	1.9	G													
			Hazardous Waste/Debris	3.8.3.1														
			Management															
			Regulatory Notifications	1.5.2	G													
			Sales Documentation	3.8.2.1	G													
			Contractor Certification	3.8.2.1														
		01 74 19	SD-01 Preconstruction Submittals															

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		01 74 19	Construction Waste Management	1.7	G													
			Plan															
			SD-06 Test Reports															
			Quarterly Reports	1.9.2														
			Annual Report	1.9.3														
			SD-11 Closeout Submittals															
			Final Construction Waste	1.10	S													
			Diversion Report															
		01 78 23	SD-10 Operation and Maintenance															
			Data															
			O&M Database	1.4	G													
			Training Plan	3.1.1	G													
			Training Outline	3.1.3	G													
			Training Content	3.1.2	G													
			SD-11 Closeout Submittals															
			Training Video Recording	3.1.4	G													
			Validation of Training Completion	3.1.6	G													
		01 91 00.15	SD-01 Preconstruction Submittals															
			Commissioning Firm	1.7	G	DO												
			Lead Commissioning Specialist	1.7.1	G	DO												
			Technical Commissioning	1.7.2	G	DO												
			Specialists															
			SD-06 Test Reports															
			Interim Construction Phase	3.1.2.1	G	DO												
			Commissioning Plan															

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		01 91 00.15	Final Construction Phase	3.1.2.2	G	DO												
			Commissioning Plan															
			Pre-Functional Checklists	3.1.4.2	G	DO												
			Issues Log	1.9														
			Commissioning Report	3.2	G	DO												
			Post-Construction Trend Log	3.3.1	G	DO												
			Report															
			SD-07 Certificates															
			Certificate of Readiness	1.10	G	DO												
			SD-10 Operation and Maintenance															
			Data															
			Training Plan	3.1.5	G	RO												
			Training Attendance Rosters	3.1.5	G	RO												
			Systems Manual	3.1.6	G	DO												
			Systems Manual	3.1.6	G	DO												
			Maintenance and Service Life	3.1.7	G	DO												
			Plans															
			SD-11 Closeout Submittals															
			Final Commissioning Report	3.2	S	DO												
		01 91 00.15 10	SD-01 Preconstruction Submittals															
			Commissioning Firm	1.7	G													
			Lead Commissioning Specialist	1.7.1	G													
			Technical Commissioning	1.7.2	G													
			Specialists															
			SD-06 Test Reports															
			Design Review Report	3.1.3	G													

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		01 91 00.15 10	Interim Construction Phase	3.1.2.1	G													
			Commissioning Plan															
			Final Construction Phase	3.1.2.2	G													
			Commissioning Plan															
			Pre-Functional Checklists	3.1.5.2	G													
			Issues Log	1.8														
			Commissioning Report	3.2	G													
			SD-07 Certificates															
			Certificate of Readiness	1.9	G													
			SD-10 Operation and Maintenance															
			Data															
			Training Plan	3.1.6	G													
			Training Attendance Rosters	3.1.6	G													
			SD-11 Closeout Submittals															
			Final Commissioning Report	3.2	G													
		02 41 00	SD-01 Preconstruction Submittals															
			Demolition Plan	1.2.2	G													
			Deconstruction Plan		G													
			Existing Conditions	1.10														
			SD-07 Certificates															
			Notification	1.6	G													
			SD-11 Closeout Submittals															
			Receipts	3.3.4														
		02 61 13	SD-01 Preconstruction Submittals															
			Work Plan	1.2	G													
			SD-02 Shop Drawings															

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		02 61 13	Surveys	3.1														
			SD-06 Test Reports															
			Compaction	3.9.2														
			Closure Report	3.11	G													
		02 81 00	SD-03 Product Data															
			Packaging Notifications	2.1.1														
			Hazardous Waste Management	3.1	G													
			Plan															
			Onsite Hazardous Waste	3.2	G													
			Management															
			Notices of Non-Compliance and	3.3														
			Notices of Violation															
			SD-06 Test Reports															
			Recordkeeping	3.6	G													
			Exception Report	3.6	G													
			Spill Response	3.7														
			SD-07 Certificates															
			Transportation and Disposal	1.4.1	G													
			Coordinator															
			Training	1.4.2	G													
			Certification	1.4.3														
			Shipping Documents and	3.3.3	G													
			Packagings Certification															
			Security Plan	3.3.4														
			Certificates of Disposal	3.3.5														
			Waste Minimization	3.5														

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		03 30 00	SD-01 Preconstruction Submittals															
			Concrete Curing Plan	1.6.3.1														
			Quality Control Plan	1.6.5	G													
			Quality Control Personnel	1.6.6	G													
			Certifications															
			Quality Control Organizational	1.6.6														
			Chart															
			Laboratory Accreditation	1.6.8	G													
			Maturity Method Data	3.3.8														
			SD-02 Shop Drawings															
			Reinforcing Steel	1.6.2.1	G													
			SD-03 Product Data															
			Joint Sealants	2.4.5														
			Joint Filler	2.4.4														
			Formwork Materials	2.1														
			Recycled Aggregate Materials															
			Cementitious Materials	2.3.1														
			Vapor Barrier System															
			Concrete Curing Materials	2.4.1														
			Reinforcement	2.6														
			Liquid Chemical Floor Hardeners	2.4.3.1														
			and Sealers															
			Admixtures	2.3.4														
			Nonshrink Grout	2.4.2														
			SD-05 Design Data															
			Concrete Mix Design	1.6.1.1	G													

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		03 30 00	SD-06 Test Reports															
			Concrete Mix Design	1.6.1.1	G													
			Fly Ash	1.6.4.1														
			Pozzolan	1.6.4.1														
			Slag Cement	1.6.4.2														
			Aggregates															
			Compressive Strength Tests	3.12.2.3	G													
			Chloride Ion Concentration															
			Air Content	3.12.2.4														
			Slump Tests	3.12.2.1														
			Water	2.3.2														
			SD-07 Certificates															
			Reinforcing Bars	2.6.1														
			Field Testing Technician and	1.6.6.2														
			Testing Agency															
			SD-08 Manufacturer’s Instructions															
			Curing Compound	2.4.1														
		04 20 00	SD-02 Shop Drawings															
			Cut CMU	3.3.4.1	G													
			Detail Drawings	3.4.1.1	G													
			SD-03 Product Data															
			Hot Weather Procedures	1.5.1	G													
			Cold Weather Procedures	1.5.2	G													
			Cement	2.2.3.2.1														
			Cementitious Materials	2.4.1.1														
			SD-05 Design Data															

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		04 20 00	Masonry Compressive Strength	2.1.2														
			Bracing Calculations	3.2.5														
			SD-06 Test Reports															
			Efflorescence	3.7.2														
			Fire-Rated Concrete Masonry	2.2.3.3														
			Units															
			Field Testing of Mortar	3.6.1.1														
			Field Testing of Grout	3.6.1.2														
			Prism Tests															
			Single-Wythe Masonry Wall	3.6.1.3														
			Water Penetration Test															
			SD-07 Certificates															
			Special Masonry Inspector	1.3.2														
			Qualifications															
			Clay or Shale Brick	2.2.2														
			Concrete Masonry Units (CMU)	2.2.3.2														
			Cementitious Materials	2.4.1.1														
			Admixtures for Masonry Mortar	2.4.1.3														
			Admixtures for Grout	2.4.2.2														
			Anchors, Ties, and Bar	2.6.2														
			Positioners															
			Joint Reinforcement	2.6.3														
			SD-08 Manufacturer’s Instructions															
			Admixtures for Masonry Mortar	2.4.1.3														
			Admixtures for Grout	2.4.2.2														
		05 12 00	SD-01 Preconstruction Submittals															

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		05 12 00	Erection Drawings	1.4.1.1	G													
			SD-02 Shop Drawings															
			Fabrication Drawings	1.4.2	G													
			SD-03 Product Data															
			Shop Primer	2.6.2														
			Welding Electrodes and Rods	2.4.1														
			Direct Tension Indicator Washers	2.3.2.3														
			Non-Shrink Grout	2.4.2														
			Tension Control Bolts	2.3.3														
			Recycled Content for Structural Steel	2.2.1	S													
			Recycled Content for Structural Steel Tubing	2.2.2	S													
			SD-05 Design Data															
			Design Calculations for Steel Connections	1.4.3	G													
			SD-06 Test Reports															
			Class B Coating	2.6.2														
			Bolts, Nuts, and Washers	2.3														
			Weld Inspection Reports	3.7.1.2														
			Direct Tension Indicator Washer Inspection Reports	3.7.2.1														
			Bolt Testing Reports	3.7.3.1														
			SD-07 Certificates															
			Steel	2.2														
			Bolts, Nuts, and Washers	2.3														

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		05 12 00	AISC Structural Steel Fabricator	1.3														
			Quality Certification															
			Welding Procedures and	1.4.4.1														
			Qualifications															
			Welding Electrodes and Rods	2.4.1														
			Certified Welding Inspector	3.7.1.1														
			NDT Technician	3.7.1.2														
			Welding Procedure Specifications	3.4														
			(WPS)															
		05 30 00	SD-02 Shop Drawings															
			Fabrication Drawings	1.3.5	G													
			SD-03 Product Data															
			Accessories	2.2														
			Deck Units	2.1														
			Galvanizing Repair Paint	2.1.4														
			Mechanical Fasteners	2.2.15														
			Touch-Up Paint	2.1.4														
			Welding Equipment	1.3.3														
			Welding Rods and Accessories	1.3.3														
			Recycled Content of Steel	2.1	S													
			Products															
			SD-05 Design Data															
			Deck Units	2.1	G													
			SD-07 Certificates															
			Powder-Actuated Tool Operator	1.3.2														
			Welder Qualifications	1.3.3														

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		05 30 00	Welding Procedures	1.3.3														
			Fire Safety	1.3.4.1														
			Wind Storm Resistance	1.3.4.2														
			Manufacturer's Certificate	1.3.1														
			Stud Manufacture's Certification	2.2.10														
			Stud Manufacture's Test Reports	2.2.10														
		05 40 00	SD-02 Shop Drawings															
			Framing Components	1.5.1	G													
			Cold Formed Trusses		G													
			SD-03 Product Data															
			Studs, Joists	2.1														
			SD-05 Design Data															
			Metal Framing Calculations	1.5.2	G													
			Cold Formed Truss Calculations	1.5.2	G													
			and their connections															
			SD-07 Certificates															
			Exterior Cold-Formed Metal															
			Framing															
			Welds	3.2.1														
			SD-11 Closeout Submittals															
			Recycled Content of Steel	2.1	S													
			Products															
		05 50 13	SD-02 Shop Drawings															
			Bollards/Pipe Guards	2.4	G													
			Roof Hatches	2.8	G													
			SD-03 Product Data															

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		05 50 13	Corner Guards															
			Wheel Guards															
			Roof Hatches	2.8	G													
			Downspout Terminations	2.5	G													
			Recycled Content	2.1	S													
			Certificates of Compliance		G													
			Certified Mill		G													
		05 51 33	SD-02 Shop Drawings															
			Ladders	2.3														
			SD-03 Product Data															
			Ladders	2.3														
			Ladder Safety Devices															
			SD-07 Certificates															
			Fabricator Certification for Ladder	1.3														
			Assembly															
		06 10 00	SD-03 Product Data															
			Fire-retardant Treatment	1.8														
			Adhesives	2.5.2														
			SD-06 Test Reports															
			Preservative-treated	1.4.3														
			SD-07 Certificates															
			Certificates of Grade	1.11.1														
			Certified Sustainably Harvested	2.1.1	S													
			Virgin Lumber															

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		06 10 00	Certified Sustainably Harvested		S													
			Structural-use and OSB Panels for															
			Other Uses															
			Certified Sustainably Harvested		S													
			Plywood Underlayment															
			Preservative Treatment	1.7														
			Indoor Air Quality for		S													
			Particleboard Underlayment															
			Indoor Air Quality for Fiberboard		S													
			Underlayment															
			Indoor Air Quality for Strawboard		S													
			Panels															
			Indoor Air Quality for Fiberboard		S													
			Wall Sheathing															
			Indoor Air Quality for Aerosol		S													
			Adhesives															
			Indoor Air Quality for Non-aerosol		S													
			Adhesives															
			SD-10 Operation and Maintenance															
			Data															
			Plastic															
			Take-back Program															
		06 41 16.00 10	SD-02 Shop Drawings															
			Shop Drawings	2.10														
			Installation	3.1														
			SD-03 Product Data															

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		06 41 16.00 10	Wood Materials	2.1														
			Wood Finishes															
			Finish Schedule	2.10.7.3														
			Certification	1.5.2														
			SD-04 Samples															
			Plastic Laminates	2.3														
			Cabinet Hardware	2.6														
			SD-07 Certificates															
			Quality Assurance	1.5														
			Laminate Clad Casework	3.1														
			SD-11 Closeout Submittals															
			LEED Documentation															
		06 61 16	SD-02 Shop Drawings															
			Detail Drawings		G													
			Installation	3.1	G													
			SD-03 Product Data															
			Solid Polymer Material	2.1														
			Qualifications	1.5.1														
			Fabrications	2.3														
			Indoor air quality for solid surface	2.2.4	S													
			seam and sealant products															
			SD-04 Samples															
			Material	2.1	G													
			Counter and Vanity Tops	2.3.5	G													
			SD-06 Test Reports															
			Solid Polymer Material	2.1														

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		06 61 16	SD-07 Certificates															
			Fabrications	2.3														
			Qualifications	1.5.1														
			Indoor Air Quality for solid	2.1	S													
			surface fabrication products															
			SD-10 Operation and Maintenance															
			Data															
			Clean-up	3.2														
		07 21 13	SD-03 Product Data															
			Manufacturer's Standard Details	1.3	G													
			Block or Board Insulation	2.1	G													
			Vapor Retarder	2.2	G													
			Pressure Sensitive Tape	2.3	G													
			Protection Board or Coatings	1.4	G													
			Accessories	2.5	G													
			Recycled Content for Block or		S													
			Board Insulation															
			SD-07 Certificates															
			Block or Board Insulation	2.1	G													
			Vapor Retarder	2.2	G													
			Protection Board or Coating	2.4	G													
			Protection Board or Coating	3.4.3	G													
			Special Warranties	1.7	G													
			Special Warranties	1.7	G													
			SD-08 Manufacturer’s Instructions															
			Block or Board Insulation	2.1														

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		07 21 13	Adhesive	2.5.1														
		07 21 16	SD-03 Product Data															
			Blanket Insulation	2.1														
			Recycled Content for Insulation Materials	2.1.2	S													
			Sill Sealer Insulation	2.2														
			Vapor Retarder	2.4														
			Accessories	2.5														
			SD-07 Certificates															
			Indoor Air Quality for Insulation Materials		S													
			Indoor Air Quality for Adhesives	2.5.1	S													
			SD-08 Manufacturer’s Instructions															
			Insulation	3.3.1														
		07 22 00	SD-02 Shop Drawings															
			Insulation Board Layout	1.3	G													
			Verification of Existing Conditions	1.3	G													
			SD-03 Product Data															
			Insulation	2.1	G													
			Cover Board	1.4	G													
			Fasteners	2.3	G													
			Sheathing Paper		G													
			Moisture Control		G													
			Asphalt		G													
			Recycled Content For Insulation	2.1.3	S													
			SD-06 Test Reports															

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		07 22 00	Flame Spread Rating	1.8.1	G													
			SD-07 Certificates															
			Installer Qualifications	1.6	G													
			Certificates Of Compliance For	1.6	G													
			Felt Materials															
			Indoor Air Quality For Insulation	2.1.4	S													
			SD-08 Manufacturer’s Instructions															
			Fasteners	2.3	G													
			Insulation	2.1	G													
		07 27 26	SD-01 Preconstruction Submittals															
			Qualifications of Manufacturer	1.7.1	G													
			Qualifications of Installer	1.7.2	G													
			SD-02 Shop Drawings															
			Fluid-Applied Membrane Air	1.3	G													
			Barrier															
			SD-03 Product Data															
			Fluid-Applied Membrane Air	1.3	G													
			Barrier															
			Transition Membrane	2.3	G													
			Primers, Adhesives, and Mastics	2.2	G													
			Reinforcement	2.6	G													
			Safety Data Sheets	1.3.2	G													
			SD-04 Samples															
			Mockup	1.3.3	G													
			SD-06 Test Reports															
			Capillary Moisture Test	1.5	G													

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		07 27 26	Field Peel Adhesion Test	1.3.4	G													
			Flame Propagation of Wall	1.3.4	G													
			Assemblies															
			Flame Spread and Smoke	1.3.4	G													
			Developed Index Ratings															
			Site Inspections	3.4.1	G													
			SD-07 Certificates															
			Fluid-Applied Membrane Air	1.3	G													
			Barrier															
			Transition Membrane	2.3	G													
			Qualifications of Manufacturer	1.7.1	G													
			Qualifications of Installer	1.7.2	G													
			SD-08 Manufacturer’s Instructions															
			Fluid-Applied Membrane Air	1.3	G													
			Barrier															
			Transition Membrane	2.3	G													
			Primers, Adhesives, and Mastics	2.2	G													
		07 41 13	SD-02 Shop Drawings															
			Flashing and Accessories	1.4.5	G													
			Gutter/Downspout Assembly	1.4.5	G													
			SD-03 Product Data															
			Factory-Applied Color Finish	1.4.5	G													
			Accessories	2.4	G													
			Fasteners	1.4.5	G													
			Pressure Sensitive Tape	1.4.5	G													
			Underlayments	2.7	G													

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		07 41 13	Gaskets and Sealing/Insulating	2.8	G													
			Compounds															
			Coil Stock	1.4.5	G													
			Galvanizing Repair Paint	1.4.5	G													
			SD-04 Samples															
			Roof Panels	2.1	G													
			Factory-applied Color Finish	1.4.5	G													
			Accessories	2.4	G													
			Fasteners	1.4.5	G													
			Gaskets and Sealant/Insulating	1.4.5	G													
			Compounds															
			SD-05 Design Data															
			Wind Uplift Resistance	1.2.1.2	G													
			SD-06 Test Reports															
			Leakage Test Report	1.2.1.1	G													
			Wind Uplift Test Report	1.2.1.2	G													
			Factory Finish and Color	2.2	G													
			Performance Requirements															
			SD-07 Certificates															
			Roof Panels	2.1	G													
			Coil stock compatibility	1.4.5	G													
			Self-Adhering Modified Bitumen	2.7.1	G													
			Underlayment															
			Qualification of Manufacturer	1.4.1	G													
			Qualification of Applicator	1.4.2	G													
			SD-08 Manufacturer’s Instructions															

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		07 41 13	INSULATION	2.6	G													
			Installation Manual	1.4.5	G													
			SD-09 Manufacturer's Field															
			Reports															
			Manufacturer's Field Inspection	3.10.1	G													
			Reports															
			SD-11 Closeout Submittals															
			Warranties	1.8	G													
			Information Card	3.11	G													
			Date Of Installation Wall-Mounted	3.12	G													
			Placard															
		07 60 00	SD-02 Shop Drawings															
			Exposed Sheet Metal	2.2.1	G													
			Gutters	3.1.12														
			Downspouts	3.1.13														
			Expansion Joints															
			Gravel Stops and fascia	2.2.1														
			Splash Pans	3.1.14														
			Flashing for Roof Drains															
			Base Flashing															
			Counterflashing	3.1.10														
			Flashing at Roof Penetrations															
			and Equipment Supports															
			Reglets	2.2.11														
			Copings	3.1.20														
			Drip Edges															

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		07 60 00	Open Valley Flashing	3.1.15														
			Eave Flashing	3.1.16														
			Recycled Content	2.1														
			SD-04 Samples															
			Finish Samples	1.4.2														
			SD-08 Manufacturer's Instructions															
			Instructions for Installation	1.4.3														
			Quality Control Plan	3.5														
		07 84 00	SD-02 Shop Drawings															
			Firestopping System	2.1	G													
			SD-06 Test Reports															
			Inspection	3.3	G													
			SD-07 Certificates															
			Inspector Qualifications															
			Firestopping Materials	2.2														
			Installer Qualifications	1.5.1	G													
		07 92 00	SD-03 Product Data															
			Sealants	2.1	G													
			Primers	2.2	G													
			Bond Breakers	2.3	G													
			Backstops	2.4	G													
			Field Adhesion	3.1	G													
			SD-07 Certificates															
			Indoor Air Quality For Interior Sealants	2.1.1	S													

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		07 92 00	Indoor Air Quality For Interior	2.1.3	S													
			Floor Joint Sealants															
			Indoor Air Quality For Interior	2.1.4	S													
			Acoustical Sealants															
			Indoor Air Quality For Interior		S													
			Caulking															
		08 11 13	SD-02 Shop Drawings															
			Doors	2.1	G													
			Doors	2.1	G													
			Recycled Content for Steel Door	2.1	S													
			Product															
			Frames	2.6	G													
			Frames	2.6	G													
			Recycled Content for Steel	2.6	S													
			Frame Product															
			Accessories	2.4														
			SD-03 Product Data															
			Doors	2.1	G													
			Frames	2.6	G													
			Accessories	2.4														
		08 14 00	SD-02 Shop Drawings															
			Doors	2.1	G													
			SD-03 Product Data															
			Doors	2.1	G													
			Accessories	2.2														
			Water-resistant Sealer	2.3.7														

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ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		08 14 00	Warranty	1.5														
			Sound Transmission Class	2.1.2	G													
			Rating															
			Fire Resistance Rating	2.1.3	G													
			SD-04 Samples															
			Doors	2.1														
			Door Finish Colors	2.3.6.3	G													
			SD-06 Test Reports															
			Cycle-Slam	2.4														
			Hinge Loading Resistance	2.4														
			SD-07 Certificates															
			Certificates of Grade	1.3.1														
			SD-11 Closeout Submittals															
			Warranty	1.5														
		08 33 23	SD-02 Shop Drawings															
			Overhead Coiling Doors	2.2.1	G													
			Counterbalancing Mechanism	2.2.3	G													
			Manual Door Operators	2.2.4	G													
			Electric Door Operators	2.2.5	G													
			Bottom Bars	2.2.1.3	G													
			Guides	2.1.1.1	G													
			Mounting Brackets	2.2.3.1	G													
			Hood	2.2.2.2	G													
			Installation Drawings	2.1.1.1	G													
			SD-03 Product Data															
			Overhead Coiling Doors	2.2.1	G													

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		08 33 23	Hardware	2.2.2	G													
			Counterbalancing Mechanism	2.2.3	G													
			Manual Door Operators	2.2.4	G													
			Electric Door Operators	2.2.5	G													
			SD-05 Design Data															
			Overhead Coiling Doors	2.2.1	G													
			Hardware	2.2.2	G													
			Counterbalancing Mechanism	2.2.3	G													
			Manual Door Operators	2.2.4	G													
			Electric Door Operators	2.2.5	G													
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.3.2	G													
			Manuals															
			Materials	3.3.2	G													
			Devices	3.3.2	G													
			Procedures	3.3.2	G													
			Manufacturer's Brochures	3.3.2	G													
			Parts Lists	3.3.2	G													
			SD-11 Closeout Submittals															
			Warranty	3.3.1	G													
		08 34 02	SD-02 Shop Drawings															
			Installation	3.3	G													
			SD-03 Product Data															
			Bullet Resistant Components	1.4														
			SD-07 Certificates															

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		08 34 02	Bullet Resistant Components	1.4														
			SD-10 Operation and Maintenance															
			Data															
			Bullet Resistant Components	1.4	G													
		08 34 73	SD-02 Shop Drawings															
			Fabrication Drawings	2.1														
			SD-03 Product Data															
			Hollow Metal Sound Retardant	2.1	G													
			Doors															
			Wood Sound Retardant Doors	2.1	G													
			Door Frames	2.1	G													
			Door Hardware	2.1	G													
			Door Frame Sound Infill	2.3.2	G													
			Vision Panels	2.1	G													
			Intumescent Seals and Gasketing	2.1	G													
			Thresholds	2.1	G													
			Astragals	2.1	G													
			SD-06 Test Reports															
			Wind Loading Tests	2.4.4	G													
			Water Leakage Tests	2.4.4	G													
			Acoustical Tests	2.4.4	G													
			Air Infiltration Tests	2.4.4	G													
			Positive Pressure Tests	2.4.4	G													
			SD-07 Certificates															
			Hollow Metal Sound Retardant	2.1	G													
			Doors															

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		08 34 73	Wood Sound Retardant Doors	2.1	G													
			Door Frames	2.1	G													
			Door Hardware	2.1	G													
			Vision Panels	2.1	G													
			Intumescent Seals,Gasketing and	1.3.1.3	G													
			Door Bottoms															
			Thresholds	2.1	G													
			Astragals	2.1	G													
			Assembly Test Reports	3.3.1														
		08 41 13	SD-01 Preconstruction Submittals															
			Sample Warranty	1.2.1	G													
			SD-02 Shop Drawings															
			Installation Drawings	3.3	G													
			Fabrication Drawings	2.2	G													
			SD-03 Product Data															
			Manufacturer's Catalog Data	1.2.1	G													
			Finish	2.2.3	G													
			SD-04 Samples															
			Finish and Color Samples	1.2.1	G													
			SD-06 Test Reports															
			Certified Test Reports	1.2.1	G													
			Deflection	3.4.3														
			Air Infiltration	3.4.1														
			Condensation Resistance and	3.4.4														
			Thermal Transmittance															
			Water Infiltration	3.4.5														

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		08 41 13	SD-08 Manufacturer's Instructions															
			Manufacturer's Instructions	3.3														
			SD-11 Closeout Submittals															
			Manufacturer's Product Warranty	3.6														
		08 44 00	SD-02 Shop Drawings															
			Glazed Curtain Wall System	1.4	G													
			Installation Drawings	1.4														
			SD-03 Product Data															
			Glazed Curtain Wall System	1.4	G													
			Metals For Fabrication	2.2	G													
			Nonskinning Sealing Compound	2.3	G													
			Metal Accessories	2.4.1	G													
			Curtain-Wall Framing Members	2.5	G													
			Aluminum Doors and Frames		G													
			Thermal Insulation Materials		G													
			Masonry Anchorage Devices		G													
			Warranties	1.6.1	G													
			SD-05 Design Data															
			Anodic Finish	2.4.5	G													
			Exposed-to-View Aluminum	2.4.5	G													
			Finish															
			Structural Calculations for	1.3.6.1	G													
			Deflection															
			Design Analysis		G													
			SD-06 Test Reports															
			NFPA 285															

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		08 44 00	Factory Test Results		G													
			Standard Airblast Test		G													
			Field Water Spray Test Results		G													
			Air Infiltration Test Results		G													
			Water Penetration Test Results		G													
			SD-07 Certificates															
			Energy Performance Certificates	1.3.6.5	G													
			Engineer Qualifications	1.3.1	G													
			Qualifications for the Curtain-Wall Installer	1.3.3	G													
			SD-08 Manufacturer’s Instructions															
			Glazed Curtain Wall System	1.4	G													
			Insulating Glass		G													
			Preventive Maintenance and Inspection	3.6.2	G													
			SD-11 Closeout Submittals															
			Warranty	1.6	G													
		08 71 00	SD-02 Shop Drawings															
			Manufacturer's Detail Drawings	1.3	G													
			Hardware Schedule	1.5	G													
			Keying System	2.3.7	G													
			SD-03 Product Data															
			Hardware Items	2.3	G													
			SD-08 Manufacturer’s Instructions															
			Installation	3.1														

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		08 71 00	SD-10 Operation and Maintenance															
			Data															
			Hardware Schedule	1.5	G													
			SD-11 Closeout Submittals															
			Key Bitting	1.6.1														
		08 81 00	SD-03 Product Data															
			Insulating Glass	2.2														
			Plastic Glazing															
			Glazing Accessories															
			Sealants	2.3.3.1														
			Joint Backer	2.3.4														
			SD-04 Samples															
			Insulating Glass	2.2														
			Plastic Sheet	3.2.7														
			Glazing Compound	2.3.2														
			Tape	2.3.6														
			Sealing Tapes	2.3.6														
			SD-07 Certificates															
			Insulating Glass	2.2														
			Plastic Glazing															
			SD-08 Manufacturer’s Instructions															
			Setting and Sealing Materials	2.3														
			Glass Setting	3.2														
			SD-11 Closeout Submittals															
			Insulated Glass Units	1.6.1														

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		08 81 00	Warranty for Polycarbonate															
			Sheet															
			Monolithic Reflective Glass															
		08 91 00	SD-02 Shop Drawings															
			Wall louvers	1.4														
			Wall louvers	1.5														
			SD-03 Product Data															
			Metal Wall Louvers	2.2														
			SD-04 Samples															
			Wall louvers	1.4														
			Wall louvers	1.5														
		09 22 00	SD-02 Shop Drawings															
			Metal support systems	2.1														
		09 29 00	SD-03 Product Data															
			Cementitious Backer Units															
			Glass Mat Water-Resistant	2.1.4														
			Gypsum Tile Backing Board															
			Water-Resistant Gypsum	2.1.3														
			Backing Board															
			Accessories	2.1.11														
			Gypsum Board	2.1.1														
			SD-07 Certificates															
			Asbestos Free Materials	2.1	G													
			Indoor Air Quality for Gypsum	2.1.1	G													
			Board															
			SD-08 Manufacturer’s Instructions															

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		09 29 00	Safety Data Sheets	2.1														
			SD-10 Operation and Maintenance															
			Data															
			Manufacturer Maintenance	2.1														
			Instructions															
		09 30 10	SD-02 Shop Drawings															
			Detail Drawings	3.2	G													
			SD-03 Product Data															
			Porcelain Tile	2.1.1	G													
			Recycled Content for Porcelain	2.1.1	S													
			Tile															
			Setting-Bed	2.2	G													
			Mortar, Grout, and Adhesive		G													
			Reinforcing Wire Fabric	2.2.6														
			SD-04 Samples															
			Tile	2.1	G													
			Accessories	2.1	G													
			Transition Strips	2.1	G													
			Transition Strips	2.6	G													
			Grout	2.4.3	G													
			SD-07 Certificates															
			Indoor Air Quality for Sealants	2.4.4	S													
			SD-08 Manufacturer’s Instructions															
			Maintenance Instructions	3.7														
			SD-10 Operation and Maintenance															
			Data															

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		09 30 10	Installation	3.2	G													
		09 51 00	SD-02 Shop Drawings															
			Approved Detail Drawings	2.1	G													
			SD-03 Product Data															
			Acoustical Ceiling Systems		G													
			Recycled Content for Type XII		S													
			Ceiling Tiles															
			Recycled Content for Suspension	2.3	S													
			Systems															
			SD-04 Samples															
			Acoustical Units	2.2	G													
			Acoustical Ceiling Tiles		G													
			SD-06 Test Reports															
			Ceiling Attenuation Class and	2.1.1	G													
			Test															
			SD-07 Certificates															
			Indoor Air Quality for Type XII		S													
			Ceiling Tiles															
			Indoor Air Quality for		S													
			Impact/Abrasion Resistant Ceiling															
			Tiles															
			Indoor Air Quality for Humidity		S													
			Resistant Ceiling Tiles															
			Indoor Air Quality for Adhesives	2.5	S													
			Indoor Air Quality for Sealants	2.8	S													
		09 65 00	SD-02 Shop Drawings															

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		09 65 00	Resilient Flooring and	2.11	G													
			Accessories															
			SD-03 Product Data															
			Resilient Flooring and	2.11	G													
			Accessories															
			Adhesives	2.7														
			Vinyl Composition Tile	2.1														
			Recycled content for Vinyl	2.1	S													
			Composition Tile															
			Sheet Vinyl Flooring															
			Luxury Vinyl Tile															
			Recycled content for Luxury Vinyl	2.3	S													
			Tile															
			Rubber Sheet Flooring	2.2														
			Static Dissipative Vinyl Tile	2.4														
			Wall Base	2.5														
			SD-04 Samples															
			Resilient Flooring and	2.11	G													
			Accessories															
			SD-06 Test Reports															
			Moisture, Alkalinity and Bond	3.3	G													
			Tests															
			SD-07 Certificates															
			Indoor Air Quality for Vinyl	2.1	S													
			Composition Tile															

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		09 65 00	Indoor Air Quality for Rubber	2.2	S													
			Sheet Flooring															
			Indoor Air Quality for Luxury Vinyl	2.3	S													
			Tile															
			Indoor Air Quality for Static		S													
			Dissipative Vinyl Tile															
			Indoor Air Quality for Wall Base	2.5	S													
			Indoor Air Quality for Adhesives	2.7	S													
			SD-08 Manufacturer's Instructions															
			Surface Preparation	3.2	G													
			Installation	3.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Resilient Flooring and	2.11	G													
			Accessories															
		09 68 00	SD-02 Shop Drawings															
			Installation Drawings	3.4	G													
			SD-03 Product Data															
			Carpet	2.1	G													
			Recycled Content for Carpeting	2.1.1	S													
			Moldings	2.5	G													
			Indoor Air Quality for Aerosol	2.4	S													
			Adhesives															
			Indoor Air Quality for	2.4	S													
			Non-Aerosol Adhesives															

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		09 68 00	Indoor Air Quality for Concrete	2.4	S													
			Primer															
			SD-04 Samples															
			Carpet	2.1	G													
			Moldings	2.5	G													
			Carpet Cushion		G													
			SD-06 Test Reports															
			Moisture and Alkalinity Tests	3.2	G													
			SD-07 Certificates															
			Indoor Air Quality for Carpet	2.1.1	S													
			Indoor Air Quality for Carpet	2.1.2	S													
			SD-08 Manufacturer’s Instructions															
			Surface Preparation	3.1														
			SD-10 Operation and Maintenance															
			Data															
			Cleaning and Protection	3.5														
			Maintenance Service	3.7.2														
			SD-11 Closeout Submittals															
			Warranty	1.6														
		09 90 00	SD-02 Shop Drawings															
			Piping Identification	3.10														
			SD-03 Product Data															
			Coating	2.1														
			Sealant															
			SD-04 Samples															
			Color		G													

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ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					REMARKS
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		09 90 00	SD-07 Certificates															
			Qualification Testing	1.4.1.2	G													
			Indoor Air Quality for Paints and	2.1														
			Primers															
			SD-08 Manufacturer’s Instructions															
			Application Instructions															
			Mixing	3.6.2														
			Manufacturer's Safety Data	1.7.2														
			Sheets															
			SD-10 Operation and Maintenance															
			Data															
			Coatings	2.1	G													
		10 14 00.10	SD-02 Shop Drawings															
			Approved Detail Drawings	3.1	G													
			SD-03 Product Data															
			Modular Exterior Signage System	2.1														
			Installation	3.1														
			Exterior Signage	1.2	G													
			Wind Load Requirements	1.2.1														
			SD-04 Samples															
			Exterior Signage	1.2	G													
			SD-10 Operation and Maintenance															
			Data															
			Protection and Cleaning	3.1.2	G													
		10 14 02	SD-02 Shop Drawings															
			Detail Drawings	1.2	G													

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		10 14 02	Sign Schedule		G													
			SD-03 Product Data															
			Installation	3.1														
			SD-04 Samples															
			Interior Signage	1.2														
			SD-10 Operation and Maintenance															
			Data															
			Approved Manufacturer's	3.1														
			Instructions															
			Protection and Cleaning	3.1.2														
		10 21 13	SD-02 Shop Drawings															
			Fabrication Drawings	1.2														
			Installation Drawings	3.2	G													
			SD-03 Product Data															
			Cleaning and Maintenance	1.2														
			Instructions															
			Colors And Finishes	2.7														
			Galvanized Steel Sheet	2.1.1														
			Sound-Deadening Cores	2.1.2														
			Anchoring Devices and	2.1.3														
			Fasteners															
			Hardware and Fittings	2.1.5														
			Brackets	2.1.4														
			Door Hardware	2.1.6														
			Local/Regional Materials	1.2.1.1														
			Documentation															

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		10 21 13	Environmental Data	1.2.1.2														
			Toilet Enclosures	2.2.1														
			Urinal Screens	2.2.2														
			Pilaster Shoes	2.5														
			SD-04 Samples															
			Colors and Finishes	2.7	G													
			Hardware and Fittings	2.1.5														
			Anchoring Devices and	2.1.3														
			Fasteners															
			SD-07 Certificates															
			Warranty	1.7														
			SD-10 Operation and Maintenance															
			Data															
			Plastic Identification	1.2.2														
			SD-11 Closeout Submittals															
			LEED Documentation															
			Local/Regional Materials	1.2.1.1														
			Documentation															
			Toilet Enclosures	2.2.1														
			Urinal Screens	2.2.2														
			Pilaster Shoes	2.5														
		10 28 13	SD-03 Product Data															
			Finishes	2.1.2	G													
			Accessory Items	2.2	G													
			Recycled content for stainless	2.1	S													
			steel toilet accessories															

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		10 28 13	SD-04 Samples															
			Finishes	2.1.2	G													
			Accessory Items	2.2														
			SD-07 Certificates															
			Accessory Items	2.2														
			Baby Changing Stations															
		10 44 16	SD-01 Preconstruction Submittals															
			Manufacturer's Data	2.1.1	G													
			SD-03 Product Data															
			Fire Extinguishers	2.1.1	G													
			Accessories		G													
			Cabinets		G													
			Wall Brackets	1.3.1	G													
			Replacement Parts List		G													
			SD-07 Certificates															
			Fire Extinguishers	2.1.1	G													
			Manufacturer's Warranty with	2.1.1	G													
			Inspection Tag															
		12 24 13	SD-02 Shop Drawings															
			Installation	3.3	G													
			SD-03 Product Data															
			Window Shades	2.1	G													
			SD-04 Samples															
			Window Shades	2.1	G													
			SD-06 Test Reports															
			Window Shades	2.1														

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		12 24 13	SD-07 Certificates															
			Indoor Air Quality	1.4.1														
			SD-08 Manufacturer's Instructions															
			Window Shades	2.1														
			SD-10 Operation and Maintenance															
			Data															
			Window Shades	2.1														
			SD-11 Closeout Submittals															
			Recycled Content for various	2.1	S													
			fiber components															
			Indoor Air Quality for roller		S													
			window shades															
			Warranty	1.7	G													
		21 13 13	SD-01 Preconstruction Submittals															
			Qualified Fire Protection	1.2.3	G													
			Engineer (QFPE)															
			Sprinkler System Designer	1.4.2.1	G													
			Sprinkler System Installer	1.4.2.2	G													
			SD-02 Shop Drawings															
			Shop Drawing	1.2.1.1	G													
			SD-03 Product Data															
			Pipe		G													
			Fittings	2.3.1.2	G													
			Valves	2.3.4	G													
			Alarm Valves		G													
			Relief Valves	2.9.5	G													

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		21 13 13	Sprinklers	2.8	G													
			Pipe Hangers and Supports	2.3.3	G													
			Sprinkler Alarm Switch	2.5.1	G													
			Valve Supervisory (Tamper)	2.5.2	G													
			Switch															
			Fire Department Connection	2.7	G													
			Backflow Prevention Assembly	2.6	G													
			Air Vent	2.9.6	G													
			Hose Valve	2.6.1	G													
			Seismic Bracing	2.3.3	G													
			Nameplates	2.1.2	G													
			SD-05 Design Data															
			Seismic Bracing	2.3.3	G													
			Hydraulic Calculations	1.2.1.2	G													
			SD-06 Test Reports															
			Test Procedures	3.6.1	G													
			SD-07 Certificates															
			Verification of Compliant	3.6.2.1	G													
			Installation															
			Request for Government Final	3.6.2.2	G													
			Test															
			SD-10 Operation and Maintenance															
			Data															
			Operating and Maintenance	3.8	G													
			(O&M) Instructions															
			Spare Parts	1.6	G													

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		21 13 13	SD-11 Closeout Submittals															
			As-built drawings	3.8														
		22 00 00	SD-02 Shop Drawings															
			Plumbing System	3.8.1	G													
			SD-03 Product Data															
			Fixtures	2.4														
			Flush Valve Water Closets	2.4.3														
			Countertop Lavatories	2.4.5														
			Kitchen Sinks	2.4.6														
			Service Sinks	2.4.7														
			Drinking-Water Coolers	2.4.8	G													
			Plastic Shower Stalls	2.4.10														
			Water Heaters	2.9	G													
			Pumps	2.10	G													
			Backflow Prevention Assemblies	3.8.1.1	G													
			Shower Faucets	2.6.2	G													
			Welding	1.5.1														
			Vibration-Absorbing Features	3.4	G													
			Plumbing System	3.8.1														
			SD-06 Test Reports															
			Tests, Flushing and Disinfection	3.8														
			Test of Backflow Prevention	3.8.1.1	G													
			Assemblies															
			SD-07 Certificates															
			Materials and Equipment	1.3														
			Bolts	2.1.1														

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		22 00 00	SD-10 Operation and Maintenance															
			Data															
			Plumbing System	3.8.1	G													
		23 05 93	SD-01 Preconstruction Submittals															
			TAB Firm	1.5.3.1	G													
			TAB team assistants	1.2	G													
			TAB team engineer	1.2	G													
			TAB Specialist	1.5.3.2	G													
			TAB team field leader	1.2	G													
			SD-02 Shop Drawings															
			TAB Schematic Drawings and	1.3.3	G													
			Report Forms															
			SD-03 Product Data															
			Equipment and Performance	1.3	G													
			Data															
			TAB Related HVAC Submittals	1.5.3.4	G													
			TAB Procedures	1.5.2	G													
			Calibration	1.5.2	G													
			Systems Readiness Check	1.3.3	G													
			TAB Execution	1.5.4	G													
			SD-06 Test Reports															
			Design review report	1.6.1.1	G													
			Pre-Final DALT report	3.2.5	G													
			Final DALT report	3.2.7	G													
			TAB report	1.5.5.2	G													
			SD-07 Certificates															

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		23 05 93	Advance notice of Pre-Final	3.2.2	G														
			DALT field work																
			TAB Firm	1.5.3.1	G														
			Independent TAB Agency and	1.5.1	G														
			Personnel Qualifications																
			DALT and TAB Submittal and	1.6.1	G														
			Work Schedule																
			Design review report	1.6.1.1	G														
			Pre-field TAB engineering report	1.6.1.2	G														
			Advanced notice for TAB field	1.6.1	G														
			work																
			Prerequisite HVAC Work Check	1.6.1	G														
			Out List																
		23 07 00	SD-02 Shop Drawings																
			Pipe Insulation Systems	2.3															
			Duct Insulation Systems	3.3															
			Equipment Insulation Systems	3.4															
			SD-03 Product Data																
			Pipe Insulation Systems	2.3	G														
			Duct Insulation Systems	3.3	G														
			Equipment Insulation Systems	3.4															
			SD-08 Manufacturer’s Instructions																
			Pipe Insulation Systems	2.3															
			Duct Insulation Systems	3.3															
			Equipment Insulation Systems	3.4															
		23 09 00	SD-02 Shop Drawings																

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		23 09 00	DDC Contractor Design Drawings	3.2	G													
			Draft As-Built Drawings	3.2	G													
			Final As-Built Drawings	3.2	G													
			SD-03 Product Data															
			Programming Software	1.8.3	G													
			Controller Application Programs	1.8.4	G													
			Configuration Software	1.8.1	G													
			Controller Configuration Settings	1.8.2	G													
			Manufacturer's Product Data	2.2	G													
			Niagara Framework Supervisory	1.8.5	G													
			Gateway Backups															
			Niagara Framework Engineering	1.8.6	G													
			Tool															
			SD-05 Design Data															
			Boiler Or Chiller Plant Gateway	1.9														
			Request															
			SD-06 Test Reports															
			Start-Up Testing Report	3.4.2	G													
			PVT Procedures	3.5.1	G													
			PVT Report	3.5.3	G													
			Pre-Construction Quality Control	1.10.1	G													
			(QC) Checklist															
			Post-Construction Quality Control	1.10.2	G													
			(QC) Checklist															
			SD-10 Operation and Maintenance															
			Data															

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		23 09 00	Operation and Maintenance	3.6	G													
			(O&M) Instructions															
			Training Documentation	3.7.1	G													
			SD-11 Closeout Submittals															
			Enclosure Keys	2.5	G													
			Password Summary Report	3.1.6.1	G													
			Closeout Quality Control (QC)	1.10.3	G													
			Checklist															
		23 23 00	SD-02 Shop Drawings															
			Refrigerant Piping System	2.3	G													
			SD-03 Product Data															
			Refrigerant Piping System	2.3														
			Qualifications	1.3.1														
			Refrigerant Piping Tests	3.5														
			SD-06 Test Reports															
			Refrigerant Piping Tests	3.5														
			SD-10 Operation and Maintenance															
			Data															
			Maintenance	1.5	G													
			Operation and Maintenance	3.4	G													
			Manuals															
		23 30 00	SD-02 Shop Drawings															
			Detail Drawings	1.4.4	G													
			SD-03 Product Data															
			Duct Access Doors	2.9.2	G													
			Fire Dampers	2.9.3														

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		23 30 00	Automatic Smoke-Fire Dampers	2.9.5														
			Diffusers	2.9.9.1														
			Registers and Grilles	2.9.9.2														
			Louvers	2.9.10														
			Air Vents, Penthouses, and	2.9.11														
			Goosenecks															
			Centrifugal Fans															
			In-Line Centrifugal Fans	2.10.1.1														
			Ceiling Exhaust Fans	2.10.1.3														
			Air Handling Units	2.11	G													
			Room Fan-Coil Units	2.12.1	G													
			Test Procedures	1.4.5														
			SD-06 Test Reports															
			Performance Tests	3.11	G													
			SD-08 Manufacturer’s Instructions															
			Manufacturer's Installation	3.2														
			Instructions															
			Operation and Maintenance	3.13.2														
			Training															
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.13.1	G													
			Manuals															
			Fire Dampers	2.9.3	G													
			Automatic Smoke-Fire Dampers	2.9.5	G													
			In-Line Centrifugal Fans	2.10.1.1	G													

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		23 30 00	Ceiling Exhaust Fans	2.10.1.3	G													
			Air Handling Units	2.11	G													
			Room Fan-Coil Units	2.12.1	G													
		23 64 10	SD-03 Product Data															
			Water Chiller	2.4	G													
			Refrigeration System	3.1.1	G													
			Posted Instructions	3.5														
			Verification of Dimensions	1.5.1														
			System Performance Tests	3.4	G													
			Demonstrations	3.5														
			SD-06 Test Reports															
			Water Chiller	2.4	G													
			SD-08 Manufacturer’s Instructions															
			Water Chiller	2.4	G													
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.5	G													
			Manuals															
			SD-11 Closeout Submittals															
			Warranty	1.6	G													
		23 64 26	SD-03 Product Data															
			Grooved Mechanical	2.2.2.4	G													
			Connections For Steel															
			Grooved Mechanical	2.3.3	G													
			Connections For Copper															
			Calibrated Balancing Valves	2.4.8	G													

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		23 64 26	Automatic Flow Control Valves	2.4.9	G													
			Pump Discharge Valve	2.4.10	G													
			Water Temperature Mixing Valve	2.4.11	G													
			Water Temperature Regulating	2.4.12	G													
			Valves															
			Water Pressure Reducing Valve	2.4.13	G													
			Pressure Relief Valve	2.4.14	G													
			Combination Pressure and	2.4.15	G													
			Temperature Relief Valves															
			Expansion Joints	2.5.9	G													
			Pumps	2.6	G													
			Combination Strainer and Pump	2.5.3	G													
			Suction Diffuser															
			Expansion Tanks	2.7	G													
			Air Separator Tanks	2.8	G													
			SD-06 Test Reports															
			Piping welds NDE report	3.1.1.1														
			Pressure tests reports	3.4.2	G													
			SD-10 Operation and Maintenance															
			Data															
			Calibrated Balancing Valves	2.4.8	G													
			Automatic Flow Control Valves	2.4.9	G													
			Pump Discharge Valve	2.4.10	G													
			Water Temperature Mixing Valve	2.4.11	G													
			Water Temperature Regulating	2.4.12	G													
			Valves															

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		23 64 26	Water Pressure Reducing Valve	2.4.13	G													
			Pressure Relief Valve	2.4.14	G													
			Combination Pressure and	2.4.15	G													
			Temperature Relief Valves															
			Expansion Joints	2.5.9	G													
			Pumps	2.6	G													
			Combination Strainer and Pump	2.5.3	G													
			Suction Diffuser															
			Expansion Tanks	2.7	G													
			Air Separator Tanks	2.8	G													
		23 73 13.00 40	SD-02 Shop Drawings															
			Installation Drawings	3.1	G													
			SD-03 Product Data															
			Equipment and Performance	2.1														
			Data															
			Final Test Reports	3.2.2														
			SD-07 Certificates															
			Listing of Product Installations	1.3	G													
			Certificates of Conformance	1.3.1	G													
			Unit Cabinet	2.2.2	G													
			Fan	2.2.3	G													
			Drain Pans	2.2.4	G													
			Insulation	2.2.5	G													
			Plenums	2.2.6	G													
			Spare Parts	2.1	G													

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		23 73 13.00 40	SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.3.1														
			Manuals															
			SD-11 Closeout Submittals															
			Warranty	1.5														
		23 81 00	SD-03 Product Data															
			Coil Corrosion Protection	2.6.1														
			System Performance Tests															
			Training	3.4	G													
			SD-06 Test Reports															
			Refrigerant Tests, Charging, and	3.5	G													
			Start-Up															
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.4	G													
			Manuals															
		25 10 10	SD-02 Shop Drawings															
			UMCS Contractor Design	3.2.2														
			Drawings															
			Draft As-Built Drawings	3.2.3														
			Final As-Built Drawings	3.2.3														
			SD-03 Product Data															
			Product Data Sheets	2.1.5														
			Computer Software	2.4														
			Enclosure Keys	2.6.1														

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		25 10 10	SD-05 Design Data															
			UMCS IP Network Bandwidth	3.2.1														
			Usage Estimate															
			SD-06 Test Reports															
			Pre-Construction QC Checklist	1.6														
			Post-Construction QC Checklist	1.6														
			Existing Conditions Report	3.1														
			Start-Up and Start-Up Testing	3.6	G													
			Report															
			PVT Phase I Procedures	3.7.1														
			PVT Phase I Report	3.7.2	G													
			PVT Phase II Report	3.7.3	G													
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	1.7														
			(O&M) Instructions															
			Preventive Maintenance Work	3.8.6.1														
			Plan															
			Basic Training Documentation	3.9.1														
			Advanced Training	3.9.1														
			Documentation															
			Refresher Training	3.9.1														
			Documentation															
			SD-11 Closeout Submittals															
			Closeout QC Checklist	1.6														
		26 20 00	SD-02 Shop Drawings															

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		26 20 00	Panelboards	2.11	G													
			Transformers	2.13	G													
			Cable Trays	2.3	G													
			Wireways	2.26	G													
			SD-03 Product Data															
			Receptacles	2.10	G													
			Circuit Breakers	2.11.3	G													
			Switches	2.9	G													
			Transformers	2.13	G													
			Motor Controllers	2.15	G													
			Manual Motor Starters	2.16	G													
			Metering	2.27	G													
			CATV Outlets	2.19.1	G													
			Grounding Busbar	2.20.3	G													
			Surge Protective Devices	2.28	G													
			SD-06 Test Reports															
			600-volt Wiring Test	3.5.2	G													
			Grounding System Test	3.5.6	G													
			Transformer Tests	3.5.3	G													
			Ground-fault Receptacle Test	3.5.4	G													
			Arc-fault Receptacle Test	3.5.5	G													
			SD-09 Manufacturer’s Field															
			Reports															
			Transformer Factory Tests	2.30.1														
			SD-10 Operation and Maintenance															
			Data															

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		26 20 00	Electrical Systems	1.5.1	G													
		26 24 13	SD-02 Shop Drawings															
			Switchboard Drawings	1.5.2	G													
			SD-03 Product Data															
			Switchboard	2.2	G													
			SD-06 Test Reports															
			Switchboard Design Tests	2.5.2	G													
			Switchboard Production Tests	2.5.3	G													
			Acceptance Checks and Tests	3.5.1	G													
			SD-07 Certificates															
			Cybersecurity Equipment	2.5.4	G													
			Certification															
			Cybersecurity Installation	3.5.1.7	G													
			Certification															
			SD-10 Operation and Maintenance															
			Data															
			Switchboard Operation and	1.6.1	G													
			Maintenance															
			SD-11 Closeout Submittals															
			Assembled Operation and	1.6.2	G													
			Maintenance Manuals															
			Equipment Test Schedule	2.5.1	G													
			Service Entrance Available Fault	2.8	G													
			Current Label															
		26 32 15.00	SD-02 Shop Drawings															

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		26 32 15.00	Engine-Generator Set and	2.1.1	G													
			Auxiliary Equipment															
			Auxiliary Systems	1.4.9	G													
			Detailed Drawings	1.4.8	G													
			Acceptance	3.17	G													
			SD-03 Product Data															
			Harmonic Requirements	2.1.8	G													
			Engine-Generator Set	2.1.1	G													
			Efficiencies															
			Emissions	2.12	G													
			filters	2.7.2	G													
			special tools	2.14	G													
			Remote Alarm Annunciator	2.13.4	G													
			Engine-Generator Parameter	2.1.1														
			Schedule															
			Heat Exchanger	2.8.2														
			Generator	2.15														
			Manufacturer's Catalog	2.5														
			Site Welding	1.4.2														
			Spare Parts	1.7.2														
			Onsite Training	3.12														
			Vibration-Isolation	2.1.7														
			Posted Data and Instructions	3.16	G													
			Instructions	3.6.7.1	G													
			Experience	1.4.6														
			Field Engineer	1.4.7														

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		26 32 15.00	General Installation	3.2														
			Exciter	2.16														
			SD-05 Design Data															
			Performance Criteria	2.15														
			Sound Limitations	2.9	G													
			Integral Main Fuel Storage Tank	2.6.4														
			Day Tank															
			Power Factor	3.6.1.2														
			Heat Exchanger	2.8.2														
			Time-Delay on Alarms	2.19.5														
			Cooling System	2.8														
			Vibration Isolation	2.1.7														
			Battery Charger	2.13.3.2														
			Capacity Calculations for	2.1.1	G													
			Engine-Generator Set															
			SD-06 Test Reports															
			Performance Tests	3.6.9														
			Factory Inspection and Tests	2.27														
			Factory Tests	2.27.2														
			Onsite Inspection and Tests	3.6	G													
			Acceptance Checks and Tests	3.9.2	G													
			Functional Acceptance Tests	3.10.2	G													
			Maintenance Procedures	3.12	G													
			Operation and Maintenance	3.12	G													
			Manuals															
			Inspections	3.6.3	G													

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		26 32 15.00	Functional Acceptance Test	3.9.6	G													
			Procedure															
			SD-07 Certificates															
			Cooling System	2.8														
			Vibration Isolation	2.1.7														
			Prototype Test	2.27.2														
			Reliability and Durability	2.1.5														
			Fuel System Certification	1.4.12	G													
			Start-Up Engineer	3.8	G													
			Sound Limitations	2.9														
			Site Visit	3.1														
			Current Balance	2.15.1														
			Materials and Equipment	2.4														
			Factory Inspection and Tests	2.27														
			Engine Tests	3.6.4	G													
			Generator Tests	3.6.5	G													
			Assembled Engine-Generator Set	3.6.6	G													
			Tests															
			SD-10 Operation and Maintenance															
			Data															
			Preliminary Assembled Operation	3.9.5	G													
			and Maintenance Manuals															
			Posted Data and Instructions	3.16	G													
			Training Plan	3.11.2	G													
		26 36 23	SD-02 Shop Drawings															

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		26 36 23	Automatic Transfer Switch	1.5.2	G													
			Drawings															
			SD-03 Product Data															
			Automatic Transfer Switches	2.1	G													
			BY-PASS/ISOLATION SWITCH	2.2	G													
			(BP/IS)															
			Remote Annunciator Panel		G													
			REMOTE ANNUNCIATOR AND		G													
			CONTROL SYSTEM PANEL															
			SD-06 Test Reports															
			Acceptance Checks and Tests	3.3.1	G													
			Functional Acceptance Tests	3.3.2	G													
			Factory Testing	2.4	G													
			Factory Test Reports	2.4.2	G													
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	1.4	G													
			Manual															
		26 41 00	SD-02 Shop Drawings															
			Overall lightning protection	1.4.1.1	G													
			system															
			Each major component	1.4.1.2	G													
			SD-06 Test Reports															
			Lightning Protection and	1.4.3	G													
			Grounding System Test Plan															

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		26 41 00	Lightning Protection and	3.4.1	G													
			Grounding System Test															
			SD-07 Certificates															
			Lightning Protection System	1.2.3	G													
			Installers Documentation															
			Component UL Listed and	1.4.2	G													
			Labeled															
			Lightning protection system	1.4.4	G													
			inspection certificate															
			Roof manufacturer's warranty	3.1.1	G													
		26 51 00	SD-02 Shop Drawings															
			Luminaire Drawings	1.5.1	G													
			Sequence of Operation for	2.5.1	G													
			Lighting Control System															
			SD-03 Product Data															
			Luminaires	2.2	G													
			Light Sources	2.3	G													
			LED Drivers	2.4	G													
			Luminaire Warranty	1.6.1	G													
			Lighting Controls Warranty	1.6.2	G													
			Switches	2.5.2.1	G													
			Wall Box Dimmers	2.5.2.2	G													
			Occupancy/Vacancy Sensors	2.5.2.4	G													
			Power Packs	2.5.2.4.4	G													
			Exit Signs	2.6.1	G													
			Emergency Drivers	2.6.2	G													

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		26 51 00	SD-06 Test Reports															
			IES LM-79 Test Report	1.5.3	G													
			IES LM-80 Test Report	1.5.4	G													
			IES TM-21 Test Report	1.5.5	G													
			IES TM-30 Test Report	1.5.6	G													
			Occupancy/Vacancy Sensor	3.2.1.1	G													
			Verification Test															
			SD-07 Certificates															
			LED Driver and Dimming Switch	1.5.7	G													
			Compatibility Certificate															
			SD-10 Operation and Maintenance															
			Data															
			Lighting System	1.7.1	G													
			Lighting Control System	1.7.2														
			Maintenance Staff Training Plan	3.3.2.1	G													
			End-User Training Plan	3.3.2.2	G													
		27 10 00	SD-02 Shop Drawings															
			Telecommunications drawings	1.6.1.1	G													
			Telecommunications Space	1.6.1.2	G													
			Drawings															
			SD-03 Product Data															
			Telecommunications cabling	2.3	G													
			Patch panels	2.4.4	G													
			Telecommunications	2.5	G													
			outlet/connector assemblies															
			Equipment support frame	2.4.1	G													

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		27 10 00	SD-06 Test Reports															
			Telecommunications cabling	3.5.1	G													
			testing															
			SD-07 Certificates															
			Telecommunications Contractor	1.6.2.1	G													
			Key Personnel	1.6.2.2	G													
			Manufacturer Qualifications	1.6.2.3	G													
			Test plan	1.6.3	G													
			SD-09 Manufacturer's Field															
			Reports															
			Factory reel tests	2.10.1	G													
			SD-10 Operation and Maintenance															
			Data															
			Telecommunications cabling and	1.10.1	G													
			pathway system															
			SD-11 Closeout Submittals															
			Record Documentation	1.10.2	G													
		28 08 10	SD-05 Design Data															
			Test Plan	3.1	G													
			SD-06 Test Reports															
			Draft Test Report	3.2.2														
			Final Test Report	3.4	G													
			SD-07 Certificates															
			Qualifications	1.4.1														
		28 10 05	SD-02 Shop Drawings															
			ESS Components	1.3.3.1	G													

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		28 10 05	Overall System Schematic	1.3.3.2	G													
			SD-03 Product Data															
			Premise Control Unit	2.3.6	G													
			Detection Sensors	2.3.7	G													
			Access Control Unit	2.4.5	G													
			Access Control Devices	2.4.6	G													
			IPAS		G													
			Batteries	2.5.1	G													
			Component Enclosure	2.7	G													
			Equipment Rack		G													
			SD-05 Design Data															
			Backup Battery Capacity	1.5.1	G													
			Calculations															
			Throughput Rates	2.4.3	G													
			SD-07 Certificates															
			Contractor Qualifications	1.3.4.1	G													
			Instructor Qualifications	1.3.4.2	G													
			Data Encryption		G													
			SD-10 Operation and Maintenance															
			Data															
			Training Plan	3.6.1	G													
			Training Content	3.6	G													
			ESS Components	1.3.3.1	G													
			ESS Software	1.6	G													
			SD-11 Closeout Submittals															
			As-Built Drawings	1.7	G													

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		28 31 76	SD-01 Preconstruction Submittals															
			Qualified Fire Protection	1.3.2	G													
			Engineer (QFPE)															
			Fire alarm system designer	1.8.2.1	G													
			Supervisor	1.8.2.2	G													
			Technician	1.8.2.3	G													
			Installer	1.8.2.4	G													
			Test Technician	1.8.2.5	G													
			Fire Alarm System Site-Specific	1.7	G													
			Software Acknowledgement															
			SD-02 Shop Drawings															
			Nameplates	1.8.1.3	G													
			Instructions	2.2.4	G													
			Wiring Diagrams	1.8.1.4	G													
			System Layout	1.8.1.5	G													
			Notification Appliances	1.8.1.6	G													
			Initiating devices	1.8.1.7	G													
			Amplifiers	1.8.1.8	G													
			Battery Power	1.8.1.9	G													
			Voltage Drop Calculations	1.8.1.10	G													
			SD-03 Product Data															
			Fire Alarm and Mass Notification	2.3	G													
			Control Unit (FMCU)															
			Local Operating Console (LOC)	1.4.4	G													
			Amplifiers	1.8.1.8	G													
			Tone Generators	2.5	G													

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		28 31 76	Digitalized voice generators	2.5	G														
			LCD Annunciator	2.6.1	G														
			Manual Stations	2.7	G														
			Smoke Detectors	2.8	G														
			Duct Smoke Detectors	2.8.2	G														
			Carbon monoxide detector	2.9	G														
			Addressable Interface Devices	2.10	G														
			Addressable Control Modules	2.11	G														
			Isolation Modules	2.12	G														
			Notification Appliances	1.8.1.6	G														
			Textual Display Sign Control		G														
			Panel																
			Textual Display Signs	2.13.3	G														
			Batteries	2.15.1	G														
			Battery Chargers	2.15.2	G														
			Supplemental Notification	2.15.1.1	G														
			Appliance Circuit Panels																
			Auxiliary Power Supply Panels	2.15.1.1	G														
			Surge Protective Devices	2.16	G														
			Alarm Wiring	2.16	G														
			Back Boxes and Conduit	3.3.4	G														
			Ceiling Bridges	3.2.9	G														
			Terminal Cabinets	3.3.2	G														
			Automatic Fire Alarm	2.19	G														
			Transmitters																
			Mass Notification Transceiver		G														

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		28 31 76	Environmental Enclosures or	2.21	G													
			Guards															
			Document Storage Cabinet	3.12.3	G													
			SD-06 Test Reports															
			Test Procedures	3.8.1														
			SD-07 Certificates															
			Verification of Compliant	3.8.2.1	G													
			Installation															
			Request for Government Final	3.8.2.2	G													
			Test															
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	3.10	G													
			(O&M) Instructions															
			Instruction of Government	3.11	G													
			Employees															
			SD-11 Closeout Submittals															
			As-Built Drawings	1.8.1.13														
			Spare Parts	1.10.1														
		31 00 00	SD-01 Preconstruction Submittals															
			Dewatering Work Plan	1.4.2	G													
			SD-03 Product Data															
			Utilization of Excavated Materials	3.9	G													
			Shoulder Construction	3.15														
			SD-06 Test Reports															
			Testing	3.18														

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		31 00 00	SD-07 Certificates															
			Testing	3.18														
		31 11 00	SD-01 Preconstruction Submittals															
			Herbicide Application Plan	3.1.1														
			SD-03 Product Data															
			Tree Wound Paint	2.1.1														
			Herbicides	1.3.2	G													
			SD-07 Certificates															
			Qualifications	1.3.2	G													
			SD-11 Closeout Submittals															
			Pest Management Report	3.5.1														
		31 31 16.13	SD-01 Preconstruction Submittals															
			Termiticide Application Plan	3.1.5	G													
			SD-03 Product Data															
			Termiticides	2.2.1														
			SD-05 Design Data															
			Mixing Formulation	3.2.2														
			SD-06 Test Reports															
			Soil Moisture	1.6.1														
			Calibration Test	3.2.1														
			SD-07 Certificates															
			Qualifications	1.4.2	G													
			Foundation Exterior	3.1.2														
			Utilities and Vents	3.1.3														
			Crawl and Plenum Air Spaces	3.1.4														
			List of Equipment	3.2.1														

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		31 31 16.13	SD-08 Manufacturer's Instructions															
			Termiticides	2.2.1														
			SD-11 Closeout Submittals															
			Verification of Measurement	3.3.1														
			Warranty	1.7														
			Pest Management Report	3.4														
		32 11 23	SD-03 Product Data															
			Plant, Equipment, and Tools	1.5	G													
			Waybills and Delivery Tickets															
			SD-06 Test Reports															
			Initial Tests	2.3.1	G													
			In-Place Tests	3.13.1	G													
		32 13 13.06	SD-03 Product Data															
			Curing Materials	2.1.6														
			Reinforcement	2.1.5.3														
			Epoxy Resin	2.1.9														
			Epoxy Resin	2.1.9														
			Cementitious Materials	2.1.1	G													
			Cementitious Materials	2.1.1	G													
			Dowel Bars	2.1.5.1														
			Expansion Joint Filler	2.1.10.1														
			SD-04 Samples															
			Test Section	1.6.2	G													
			SD-05 Design Data															
			Mix Design Report	2.2.2	G													
			SD-06 Test Reports															

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		32 13 13.06	Concrete Slump Tests	3.7.2														
			Concrete Uniformity	2.3.1														
			Flexural Strength	3.7.3														
			Air Content	3.7.4														
			SD-07 Certificates															
			Batch Tickets	1.4.3														
			NRMCA Certificate Of	1.4.1														
			Conformance															
			SD-08 Manufacturer’s Instructions															
			Diamond Grinding Plan	3.7.5.4														
		32 13 73.19	SD-03 Product Data															
			Equipment	2.1														
			Manufacturer's Instructions	3.1.1														
			SD-04 Samples															
			Compression Seals	2.2	G													
			SD-06 Test Reports															
			Test Requirements	2.1.3	G													
		32 16 19	SD-03 Product Data															
			Concrete	2.1														
			Biodegradable Form Release	2.6.5														
			Agent															
			Biodegradable Form Release	3.2														
			Agent															
			SD-06 Test Reports															
			Field Quality Control	3.8														
		32 17 23	SD-03 Product Data															

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		32 17 23	Surface Preparation Equipment	2.1.1.2	G														
			List																
			Application Equipment List	2.1.2	G														
			Exterior Surface Preparation	3.2															
			Safety Data Sheets	1.3.1	G														
			Waterborne Paint	2.2.1	G														
			Solventborne Paint		G														
			SD-06 Test Reports																
			Waterborne Paint	2.2.1	G														
			Solventborne Paint		G														
			Test Reports	3.4.1															
			SD-07 Certificates																
			Qualifications	1.3.2	G														
			Waterborne Paint	2.2.1															
			Solventborne Paint																
			SD-08 Manufacturer’s Instructions																
			Waterborne Paint	2.2.1	G														
			Solventborne Paint		G														
		32 92 23	SD-03 Product Data																
			Fertilizer	2.4															
			SD-06 Test Reports																
			Topsoil composition tests	2.2.3															
			SD-07 Certificates																
			sods	2.1															
		33 11 00	SD-01 Preconstruction Submittals																
			Connections	3.1.1	G														

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		33 11 00	SD-03 Product Data															
			Pipe, Fittings, Joints and	2.1.1	G													
			Couplings															
			Ball And Socket Joint		G													
			Valves	2.1.2	G													
			Valve Boxes	2.1.2.7	G													
			Fire Hydrants	2.1.4.1	G													
			Pipe Restraint	2.2.1	G													
			Tapping Sleeves		G													
			Corporation Stops	2.2.6.1	G													
			Backflow Preventer	1.5.2.1.1	G													
			Railroad Crossing Casing Pipe		G													
			Precast Concrete Thrust Blocks	2.2.1.2	G													
			Disinfection Procedures	3.2.4	G													
			SD-06 Test Reports															
			Backflow Preventer Tests	3.3.1.4	G													
			Bacteriological Samples	3.3.1.3	G													
			Post-Construction Fusion Report		G													
			Leakage Test	3.3.1.2														
			Hydrostatic Test	3.3.1.1														
			SD-07 Certificates															
			Pipe, Fittings, Joints and	2.1.1														
			Couplings															
			Lining															
			Lining for Fittings	2.1.1.1.1.2														
			Valves	2.1.2														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
New Lox Plant/OSI B1265 Add/Alter/PMEL B267 Alter

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		33 11 00	Fire Hydrants	2.1.4.1														
			Backflow Prevention Training	1.5.2.1.1.2														
			Certificate															
			Backflow Tester	1.5.2.1.1.1														
			Fusion Technician Qualifications	1.5.2.2	G													
			Turbine Type Meters															
			Propeller Type Meters															
			Displacement Type Meters															
			Compound Type Meters															
			Fire Service Type Meters															
			Backflow Certificate	2.1.5														
			SD-08 Manufacturer’s Instructions															
			Ductile Iron Piping															
			PVC Piping	2.1.1.1.1.1														
			PVCO Piping															
			Polyethylene (PE) Pipe	2.1.1.1.3														
			Fiberglass Pipe, Fittings, Joints															
			And Joint Materials															
			Concrete Pressure Pipe															
			Prestressed Concrete Pressure															
			Pipe															
			Reinforced Concrete Cylinder															
			Pipe															
			PVC Piping For Service Lines	2.1.1.1.2														
			Copper Pipe For Service Lines	2.1.1.2														
		33 30 00	SD-01 Preconstruction Submittals															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION

New Lox Plant/OSI B1265 Add/Alter/PMEL B267 Alter

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAG# RAPH	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		33 30 00	Contractor's License	1.3.1	G													
			SD-02 Shop Drawings															
			Installation Drawings	3.1.1	G													
			SD-03 Product Data															
			Frames, Covers, and Gratings	2.2.11														
			Gravity Pipe	2.2.1														
			Pressure Pipe	2.2.2														
			SD-06 Test Reports															
			Negative Air Pressure Test	3.3.1.1.1	G													
			Low-Pressure Air Tests	3.3.1.1.2	G													
			Deflection Testing	3.3.1.2														
			SD-07 Certificates															
			Portland Cement	2.2.5														
		33 40 00	SD-04 Samples															
			Pipe for Culverts and Storm	2.1														
			Drains															
			SD-07 Certificates															
			Resin Certification	2.1.4														
			Resin Certification	2.1.5														
			Oil Resistant Gasket	2.3.8.1														
			Leakage Test	3.9.1.2														
			Hydrostatic Test on Watertight	3.9.1.1														
			Joints															
			Determination of Density	3.9.1.3														
			Frame and Cover for Gratings	2.3.7														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION

New Lox Plant/OSI B1265 Add/Alter/PMEL B267 Alter

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		33 40 00	Post-Installation Inspection	3.9.2.1.3														
			Report															
			Placing Pipe	3.3														
		33 71 02	SD-02 Shop Drawings															
			Precast underground structures	1.4.1	G	DA												
			SD-03 Product Data															
			Precast concrete structures	2.6.1.1	G													
			Sealing Material	2.6.1.4														
			Pulling-In Irons	3.2.2														
			Manhole frames and covers	2.6.2	G													
			Handhole frames and covers	2.6.3	G													
			Cable supports	2.7	G													
			Field Acceptance Checks and	3.8.1	G													
			Tests															
			Certificate of Conformance	1.4.2	G													

SECTION 01 35 26

GOVERNMENTAL SAFETY REQUIREMENTS
11/15

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B30.3	(2016) Tower Cranes
ASME B30.5	(2018) Mobile and Locomotive Cranes
ASME B30.7	(2011) Winches
ASME B30.8	(2015) Floating Cranes and Floating Derricks
ASME B30.9	(2018) Slings
ASME B30.20	(2018) Below-the-Hook Lifting Devices
ASME B30.22	(2016) Articulating Boom Cranes
ASME B30.23	(2011) Personnel Lifting Systems Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings
ASME B30.26	(2015; INT Jun 2010 - Jun 2014) Rigging Hardware

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.22	(2007; R 2017) Safety Requirements for Rope-Guided and Non-Guided Workers' Hoists
ASSP A10.34	(2001; R 2012) Protection of the Public on or Adjacent to Construction Sites
ASSP A10.44	(2014) Control of Energy Sources (Lockout/Tagout) for Construction and Demolition Operations
ASSP Z244.1	(2016) The Control of Hazardous Energy Lockout, Tagout and Alternative Methods
ASSP Z359.0	(2012) Definitions and Nomenclature Used for Fall Protection and Fall Arrest
ASSP Z359.1	(2016) The Fall Protection Code
ASSP Z359.2	(2017) Minimum Requirements for a

	Comprehensive Managed Fall Protection Program
ASSP Z359.3	(2017) Safety Requirements for Lanyards and Positioning Lanyards
ASSP Z359.4	(2013) Safety Requirements for Assisted-Rescue and Self-Rescue Systems, Subsystems and Components
ASSP Z359.6	(2016) Specifications and Design Requirements for Active Fall Protection Systems
ASSP Z359.7	(2011) Qualification and Verification Testing of Fall Protection Products
ASSP Z359.11	(2014) Safety Requirements for Full Body Harnesses
ASSP Z359.12	(2009) Connecting Components for Personal Fall Arrest Systems
ASSP Z359.13	(2013) Personal Energy Absorbers and Energy Absorbing Lanyards
ASSP Z359.14	(2014) Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems
ASSP Z359.15	(2014) Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems
ASSP Z359.16	(2016) Safety Requirements for Climbing Ladder Fall Arrest Systems
ASSP Z359.18	(2017) Safety Requirements for Anchorage Connectors for Active Fall Protection Systems
ASSP Z490.1	(2016) Criteria for Accepted Practices in Safety, Health, and Environmental Training

ASTM INTERNATIONAL (ASTM)

ASTM F855	(2015) Standard Specifications for Temporary Protective Grounds to Be Used on De-energized Electric Power Lines and Equipment

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 1048	(2003) Guide for Protective Grounding of Power Lines
IEEE C2	(2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2018; TIA 18-1) Standard for Portable Fire Extinguishers
NFPA 51B	(2014) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code
NFPA 70E	(2021; TIA 18-1; TIA 81-2) Standard for Electrical Safety in the Workplace
NFPA 241	(2019) Standard for Safeguarding Construction, Alteration, and Demolition Operations

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-222	(2005G; Add 1 2007; Add 2 2009; Add 3 2014; Add 4 2014; R 2014; R 2016) Structural Standards for Steel Antenna Towers and Antenna Supporting Structures
TIA-1019	(2012; R 2016) Standard for Installation, Alteration and Maintenance of Antenna Supporting Structures and Antennas

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1910.147	The Control of Hazardous Energy (Lock Out/Tag Out)
29 CFR 1910.333	Selection and Use of Work Practices
29 CFR 1915	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
29 CFR 1915.89	Control of Hazardous Energy (Lockout/Tags-Plus)
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.16	Rules of Construction
29 CFR 1926.450	Scaffolds

29 CFR 1926.500	Fall Protection
29 CFR 1926.552	Material Hoists, Personal Hoists, and Elevators
29 CFR 1926.553	Base-Mounted Drum Hoists
29 CFR 1926.1400	Cranes and Derricks in Construction
CPL 02-01-056	(2014) Inspection Procedures for Accessing Communication Towers by Hoist
CPL 2.100	(1995) Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146

1.2 DEFINITIONS

1.2.1 Competent Person (CP)

The CP is a person designated in writing, who, through training, knowledge and experience, is capable of identifying, evaluating, and addressing existing and predictable hazards in the working environment or working conditions that are dangerous to personnel, and who has authorization to take prompt corrective measures with regards to such hazards.

1.2.2 Competent Person, Confined Space

The CP, Confined Space, is a person meeting the competent person requirements as defined EM 385-1-1 Appendix Q, with thorough knowledge of OSHA’s Confined Space Standard, 29 CFR 1910.146, and designated in writing to be responsible for the immediate supervision, implementation and monitoring of the confined space program, who through training, knowledge and experience in confined space entry is capable of identifying, evaluating and addressing existing and potential confined space hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.3 Competent Person, Cranes and Rigging

The CP, Cranes and Rigging, as defined in EM 385-1-1 Appendix Q, is a person meeting the competent person, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the Crane and Rigging Program, who through training, knowledge and experience in crane and rigging is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.4 Competent Person, Excavation/Trenching

A CP, Excavation/Trenching, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and 29 CFR 1926, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the excavation/trenching program, who through training, knowledge and experience in excavation/trenching is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.5 Competent Person, Fall Protection

The CP, Fall Protection, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and in accordance with ASSP Z359.0, who has been designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the fall protection program, who through training, knowledge and experience in fall protection and rescue systems and equipment, is capable of identifying, evaluating and addressing existing and potential fall hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.6 Competent Person, Scaffolding

The CP, Scaffolding is a person meeting the competent person requirements in EM 385-1-1 Appendix Q, and designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the scaffolding program. The CP for Scaffolding has enough training, knowledge and experience in scaffolding to correctly identify, evaluate and address existing and potential hazards and also has the authority to take prompt corrective measures with regard to these hazards. CP qualifications must be documented and include experience on the specific scaffolding systems/types being used, assessment of the base material that the scaffold will be erected upon, load calculations for materials and personnel, and erection and dismantling. The CP for scaffolding must have a documented, minimum of 8-hours of scaffold training to include training on the specific type of scaffold being used (e.g. mast-climbing, adjustable, tubular frame), in accordance with EM 385-1-1 Section 22.B.02.

1.2.7 Competent Person (CP) Trainer

A competent person trainer as defined in EM 385-1-1 Appendix Q, who is qualified in the training material presented, and who possesses a working knowledge of applicable technical regulations, standards, equipment and systems related to the subject matter on which they are training Competent Persons. A competent person trainer must be familiar with the typical hazards and the equipment used in the industry they are instructing. The training provided by the competent person trainer must be appropriate to that specific industry. The competent person trainer must evaluate the knowledge and skills of the competent persons as part of the training process.

1.2.8 High Risk Activities

High Risk Activities are activities that involve work at heights, crane and rigging, excavations and trenching, scaffolding, electrical work, and confined space entry.

1.2.9 High Visibility Accident

A High Visibility Accident is any mishap which may generate publicity or high visibility.

1.2.10 Load Handling Equipment (LHE)

LHE is a term used to describe cranes, hoists and all other hoisting equipment (hoisting equipment means equipment, including crane, derricks, hoists and power operated equipment used with rigging to raise, lower or

horizontally move a load).

1.2.11 Medical Treatment

Medical Treatment is treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even when provided by a physician or registered personnel.

1.2.12 Near Miss

A Near Miss is a mishap resulting in no personal injury and zero property damage, but given a shift in time or position, damage or injury may have occurred (e.g., a worker falls off a scaffold and is not injured; a crane swings around to move the load and narrowly misses a parked vehicle).

1.2.13 Operating Envelope

The Operating Envelope is the area surrounding any crane or load handling equipment. Inside this "envelope" is the crane, the operator, riggers and crane walkers, other personnel involved in the operation, rigging gear between the hook, the load, the crane's supporting structure (i.e. ground or rail), the load's rigging path, the lift and rigging procedure.

1.2.14 Qualified Person (QP)

The QP is a person designated in writing, who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems related to the subject matter, the work, or the project.

1.2.15 Qualified Person, Fall Protection (QP for FP)

A QP for FP is a person meeting the definition requirements of EM 385-1-1 Appendix Q, and ASSP Z359.2 standard, having a recognized degree or professional certificate and with extensive knowledge, training and experience in the fall protection and rescue field who is capable of designing, analyzing, and evaluating and specifying fall protection and rescue systems.

1.2.16 USACE Property and Equipment

Interpret "USACE" property and equipment specified in USACE EM 385-1-1 as Government property and equipment.

1.2.17 Load Handling Equipment (LHE) Accident or Load Handling Equipment Mishap

A LHE accident occurs when any one or more of the eight elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; or collision, including unplanned contact between the load, crane, or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents, even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure

results in damage to other components (e.g., dropped boom, dropped load, or roll over). Document an LHE mishap using the Crane High Hazard working group mishap reporting form.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G

SD-06 Test Reports

Monthly Exposure Reports

Notifications and Reports

Accident Reports; G

LHE Inspection Reports

SD-07 Certificates

Contractor Safety Self-Evaluation Checklist

Crane Operators/Riggers

Standard Lift Plan; G

Critical Lift Plan ; G

Activity Hazard Analysis (AHA)

Confined Space Entry Permit

Hot Work Permit

Certificate of Compliance

Third Party Certification of Floating Cranes and Barge-Mounted Mobile Cranes

License Certificates

Radiography Operation Planning Work Sheet; G

Portable Gauge Operations Planning Worksheet; G

Machinery & Mechanized Equipment Certification Form

1.4 MONTHLY EXPOSURE REPORTS

Provide a Monthly Exposure Report and attach to the monthly billing

request. This report is a compilation of employee-hours worked each month for all site workers, both Prime and subcontractor. Failure to submit the report may result in retention of up to 10 percent of the voucher.

1.5 CONTRACTOR SAFETY SELF-EVALUATION CHECKLIST

Contracting Officer will provide a "Contractor Safety Self-Evaluation checklist" to the Contractor at the pre-construction conference. Complete the checklist monthly and submit with each request for payment voucher. An acceptable score of 90 or greater is required. Failure to submit the completed safety self-evaluation checklist or achieve a score of at least 90 may result in retention of up to 10 percent of the voucher. The Contractor Safety Self-Evaluation checklist can be found on the Whole Building Design Guide website at https://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/ufgs-01-35-26

1.6 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, comply with the most recent edition of USACE EM 385-1-1, and the following federal, state, and local laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

1.6.1 Subcontractor Safety Requirements

For this contract, neither Contractor nor any subcontractor may enter into contract with any subcontractor that fails to meet the following requirements. The term subcontractor in this and the following paragraphs means any entity holding a contract with the Contractor or with a subcontractor at any tier.

1.6.1.1 Experience Modification Rate (EMR)

Subcontractors on this contract must have an effective EMR less than or equal to 1.10, as computed by the National Council on Compensation Insurance (NCCI) or if not available, as computed by the state agency's rating bureau in the state where the subcontractor is registered, when entering into a subcontract agreement with the Prime Contractor or a subcontractor at any tier. The Prime Contractor may submit a written request for additional consideration to the Contracting Officer where the specified acceptable EMR range cannot be achieved. Relaxation of the EMR range will only be considered for approval on a case-by-case basis for special conditions and must not be anticipated as tacit approval. Contractor's Site Safety and Health Officer (SSHO) must collect and maintain the certified EMR ratings for all subcontractors on the project and make them available to the Government at the Government's request.

1.6.1.2 OSHA Days Away from Work, Restricted Duty, or Job Transfer (DART) Rate

Subcontractors on this contract must have a DART rate, calculated from the most recent, complete calendar year, less than or equal to 3.4 when entering into a subcontract agreement with the Prime Contractor or a subcontractor at any tier. The OSHA Dart Rate is calculated using the following formula:

(N/EH) x 200,000

where:

N = number of injuries and illnesses with days away, restricted work, or job transfer

EH = total hours worked by all employees during most recent, complete calendar year

200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year)

The Prime Contractor may submit a written request for additional consideration to the Contracting Officer where the specified acceptable OSHA Dart rate range cannot be achieved for a particular subcontractor. Relaxation of the OSHA DART rate range will only be considered for approval on a case-by-case basis for special conditions and must not be anticipated as tacit approval. Contractor's Site Safety and Health Officer (SSHO) must collect and maintain self-certified OSHA DART rates for all subcontractors on the project and make them available to the Government at the Government's request.

1.7 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

1.7.1 Personnel Qualifications

1.7.1.1 Site Safety and Health Officer (SSHO)

Provide an SSHO that meets the requirements of EM 385-1-1 Section 1. The SSHO must ensure that the requirements of 29 CFR 1926.16 are met for the project. Provide a Safety oversight team that includes a minimum of one (1) person at each project site to function as the Site Safety and Health Officer (SSHO). The SSHO or an equally-qualified Alternate SSHO must be at the work site at all times to implement and administer the Contractor's safety program and government-accepted Accident Prevention Plan. The SSHO and Alternate SSHO must have the required training, experience, and qualifications in accordance with EM 385-1-1 Section 01.A.17, and all associated sub-paragraphs.

If the SSHO is off-site for a period longer than 24 hours, an equally-qualified alternate SSHO must be provided and must fulfill the same roles and responsibilities as the primary SSHO. When the SSHO is temporarily (up to 24 hours) off-site, a Designated Representative (DR), as identified in the AHA may be used in lieu of an Alternate SSHO, and must be on the project site at all times when work is being performed. Note that the DR is a collateral duty safety position, with safety duties in addition to their full time occupation.

1.7.1.1.1 Additional Site Safety and Health Officer (SSHO) Requirements and Duties

The SSHO may also serve as the Quality Control Manager. The SSHO may not serve as the Superintendent.

The SSHO must have completed a 40 hour contract safety awareness course based on the content and principles of EM 385-1-1, and instructed in accordance with the guidelines of ASSP Z490.1, by a trainer meeting the

qualifications of paragraph QUALIFIED TRAINER REQUIREMENTS. If the SSHO does not have a current certification, certification must be obtained within 60 days, maximum, of contract award.

1.7.1.2 Competent Person Qualifications

Provide Competent Persons in accordance with EM 385-1-1, Appendix Q and herein. Competent Persons for high risk activities include confined space, cranes and rigging, excavation/trenching, fall protection, and electrical work. The CP for these activities must be designated in writing, and meet the requirements for the specific activity (i.e. competent person, fall protection).

The Competent Person identified in the Contractor's Safety and Health Program and accepted Accident Prevention Plan, must be on-site at all times when the work that presents the hazards associated with their professional expertise is being performed. Provide the credentials of the Competent Persons(s) to the the Contracting Officer for information in consultation with the Safety Office.

1.7.1.2.1 Competent Person for Confined Space Entry

Provide a Confined Space (CP) Competent Person who meets the requirements of EM 385-1-1, Appendix Q, and herein. The CP for Confined Space Entry must supervise the entry into each confined space in accordance with EM 385-1-1, Section 34.

1.7.1.2.2 Competent Person for Scaffolding

Provide a Competent Person for Scaffolding who meets the requirements of EM 385-1-1, Section 22.B.02 and herein.

1.7.1.2.3 Competent Person for Fall Protection

Provide a Competent Person for Fall Protection who meets the requirements of EM 385-1-1, Section 21.C.04, 21.B.03, and herein.

1.7.1.3 Qualified Trainer Requirements

Individuals qualified to instruct the 40 hour contract safety awareness course, or portions thereof, must meet the definition of a Competent Person Trainer, and, at a minimum, possess a working knowledge of the following subject areas: EM 385-1-1, Electrical Standards,Lockout/Tagout, Fall Protection, Confined Space Entry for Construction; Excavation, Trenching and Soil Mechanics, and Scaffolds in accordance with 29 CFR 1926.450, Subpart L.

Instructors are required to:

a. Prepare class presentations that cover construction-related safety requirements and includes topics covered in the NAVFAC Construction Safety Hazard Awareness Course for Contractors.

b. Ensure that all attendees attend all sessions by using a class roster signed daily by each attendee. Maintain copies of the roster for at least five (5) years. This is a certification class and must be attended 100 percent. In cases of emergency where an attendee cannot make it to a session, the attendee can make it up in another class session for the same subject.

c. Update training course materials whenever an update of the EM 385-1-1 becomes available.

d. Provide a written exam of at least 50 questions. Students are required to answer 80 percent correctly to pass.

e. Request, review and incorporate student feedback into a continuous course improvement program.

1.7.1.4 Requirements for all Contractor Jobsite Personnel Holding H-1B or H-2B Visas:

All Contractor jobsite workers holding an H-1B or H-2B visa must complete a minimum 16 hours of classroom training on the requirements of the latest version of EM 385-1-1 prior to their first day on the jobsite to include but not limited to the following topics: Sanitation; Medical and First Aid Requirements; Temporary Facilities; Personal Protective Equipment; Electrical; Hand and Power Tools; Material Handling and Storage; Motor Vehicles; Fall Protection; Work Platforms and Scaffoldings; Demolition; Safe Access, Ladders, Floor & Wall Openings, Stairs and Railing Systems; Excavations and Trenching; and Confined Spaces, prior to reporting to the jobsite.

Provide a list of workers who have completed the training on the jobsite and have readily available upon request by the Contracting Officer. Maintain and update the list as additional workers are available. Include the name and qualifications of the qualified trainer(s) who provided the training. Personnel who have taken the 40 Hour Construction Safety Hazard Awareness Training Course for Contractors or similar course that includes emphasis on EM 385-1-1 compliance, are not required to take the 16 hours of classroom training on the requirements of the latest version of the EM 385-1-1. The 16 hours classroom training may be provided by the Guam Contractors Association (GCA), the Guam Trades Academy, or other qualified trainers as outlined in paragraph QUALIFIED TRAINER REQUIREMENTS.

1.7.1.5 Dredging Contract Requirements

1.7.1.5.1 SSHO Requirements for Dredging

a. In addition to requirements stated elsewhere in this specification, an individual serving as a SSHO must be present at the project site, located so that they have full mobility and reasonable access to all major work operations, for at least one shift in each 24 hour period when work is being performed. The SSHO must be available during their shift for immediate verbal consultation and notification, either by phone or radio.

b. The SSHO is a full-time, dedicated position, except as noted above, who must report to a senior project (or corporate) official. When the SSHO is permitted to be a collateral duty, the SSHO is not permitted to be in another position requiring continuous mechanical or equipment operations, such as equipment operators.

c. The SSHO must inspect all work areas and operations during initial set-up and at least monthly observe and provide personal oversight on each shift during dredging operations for projects with many work sites, more often for those with less work sites.

d. If the SSHO is off-site for a period longer than 24 hours, another qualified SSHO must be provided and fulfill the same roles and responsibilities as the SSHO during their absence.

1.7.1.5.2 Collateral Duty Safety Officer (CDSO) Requirements for Dredging

a. A CDSO is an individual who is assigned collateral duty safety responsibilities in addition to their full-time occupation, and who supports and supplements the SSHO efforts in managing, implementing and enforcing the Contractor's Safety and Health Program. The assigned CDSO must be an individual(s) with work oversight responsibilities, such as master, mate, fill foreman, or superintendent. A CDSO must not be an employee responsible for continuous mechanical or equipment operations, such as an equipment operator.

b. A CDSO performs safety program tasks as assigned by the SSHO and must report safety findings to the SSHO. The SSHO must document results of safety findings and provide information for inclusion in the CQC reports to the Contracting Officer.

1.7.1.5.3 Safety Personnel Training Requirements for Dredging

A SSHO and a CDSO for dredging contracts must take either a formal classroom or online OSHA 30-hour Construction Safety Course, or an equivalent 30 hours of formal classroom or online safety and health training covering the subjects of the OSHA 30-hour Course in accordance with EM 385-1-1 Appendix A, paragraph 3.d.(3), applicable to dredging work, and given by qualified instructors. In exception to EM 385-1-1, Section 01.A.17, comply with the following:

a. The SSHO must maintain competency through having taken 8 hours of formal classroom or online safety and health related coursework every year. Hours spent as an instructor in such courses will be considered the same as attending them, but each course only gets credit once (for example, instructing a 1-hour asbestos awareness course 5 times in a year provides one hour credit for training).

b. The SSHO and a CDSO must have a minimum of three years of experience within the past five years in one of the following:

(1) Supervising/managing dredging activities

(2) Supervising/managing marine construction activities

(3) Supervising/managing land-based construction activities

(4) Work managing safety programs or processes

(5) Conducting hazard analyses and developing controls in activities or environments with similar hazards

1.7.1.6 Crane Operators/Riggers

Provide Operators, Signal Persons, and Riggers meeting the requirements in EM 385-1-1, Section 15.B for Riggers and Section 16.B for Crane Operators and Signal Persons. Provide proof of current qualification.

1.7.2 Personnel Duties

1.7.2.1 Duties of the Site Safety and Health Officer (SSHO)

The SSHO must:

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production report.

b. Conduct mishap investigations and complete required accident reports. Report mishaps and near misses.

c. Use and maintain OSHA's Form 300 to log work-related injuries and illnesses occurring on the project site for Prime Contractors and subcontractors, and make available to the Contracting Officer upon request. Post and maintain the Form 300A on the site Safety Bulletin Board.

d. Maintain applicable safety reference material on the job site.

e. Attend the pre-construction conference, pre-work meetings including preparatory meetings, and periodic in-progress meetings.

f. Review the APP and AHAs for compliance with EM 385-1-1, and approve, sign, implement and enforce them.

g. Establish a Safety and Occupational Health (SOH) Deficiency Tracking System that lists and monitors outstanding deficiencies until resolution.

h. Ensure subcontractor compliance with safety and health requirements.

i. Maintain a list of hazardous chemicals on site and their material Safety Data Sheets (SDS).

j. Maintain a weekly list of high hazard activities involving energy, equipment, excavation, entry into confined space, and elevation, and be prepared to discuss details during QC Meetings.

k. Provide and keep a record of site safety orientation and indoctrination for Contractor employees, subcontractor employees, and site visitors.

Superintendent, QC Manager, and SSHO are subject to dismissal if the above duties are not being effectively carried out. If Superintendent, QC Manager, or SSHO are dismissed, project work will be stopped and will not be allowed to resume until a suitable replacement is approved and the above duties are again being effectively carried out.

1.7.3 Meetings

1.7.3.1 Preconstruction Conference

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project must attend the preconstruction conference. This includes the project superintendent, Site Safety and Occupational Health officer, quality control manager,

or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).

b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, and Government review of AHAs to preclude project delays.

c. Deficiencies in the submitted APP, identified during the Contracting Officer's review, must be corrected, and the APP re-submitted for review prior to the start of construction. Work is not permitted to begin until an APP is established that is acceptable to the Contracting Officer.

d. The functions of a Preconstruction conference may take place at the Post-Award Kickoff meeting for Design Build Contracts.

1.7.3.2 Safety Meetings

Conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health (SOH) training and motivation. Conduct meetings at least once a month for all supervisors on the project location. The SSHO, supervisors, foremen, or CDSOs must conduct meetings at least once a week for the trade workers. Document meeting minutes to include the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Maintain documentation on-site and furnish copies to the Contracting Officer on request. Notify the Contracting Officer of all scheduled meetings 7 calendar days in advance.

1.8 ACCIDENT PREVENTION PLAN (APP)

A qualified person must prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of EM 385-1-1, Appendix A, and as supplemented herein. Cover all paragraph and subparagraph elements in EM 385-1-1, Appendix A. The APP must be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP must interface with the Contractor's overall safety and health program referenced in the APP in the applicable APP element, and made site-specific. Describe the methods to evaluate past safety performance of potential subcontractors in the selection process. Also, describe innovative methods used to ensure and monitor safe work practices of subcontractors. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP must be signed by an officer of the firm (Prime Contractor senior person), the individual preparing the APP, the on-site superintendent, the designated SSHO, the Contractor Quality Control Manager, and any designated Certified Safety

Professional (CSP) or Certified Health Physicist (CIH). The SSHO must provide and maintain the APP and a log of signatures by each subcontractor foreman, attesting that they have read and understand the APP, and make the APP and log available on-site to the Contracting Officer. If English is not the foreman's primary language, the Prime Contractor must provide an interpreter.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. Once reviewed and accepted by the Contracting Officer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP is cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified. Continuously review and amend the APP, as necessary, throughout the life of the contract. Changes to the accepted APP must be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and Quality Control Manager. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered. Should any severe hazard exposure (i.e. imminent danger) become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate and remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSP A10.34), and the environment.

1.8.1 Names and Qualifications

Provide plans in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

a. Names and qualifications (resumes including education, training, experience and certifications) of site safety and health personnel designated to perform work on this project to include the designated Site Safety and Health Officer and other competent and qualified personnel to be used. Specify the duties of each position.

b. Qualifications of competent and of qualified persons. As a minimum, designate and submit qualifications of competent persons for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; and personal protective equipment and clothing to include selection, use and maintenance.

1.8.2 Plans

Provide plans in the APP in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

1.8.2.1 Confined Space Entry Plan

Develop a confined or enclosed space entry plan in accordance with EM 385-1-1, applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, OSHA Directive CPL 2.100, and any other federal, state and local regulatory requirements identified in this contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the

event of hazardous conditions. Include procedure for rescue by contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

1.8.2.2 Standard Lift Plan (SLP)

Plan lifts to avoid situations where the operator cannot maintain safe control of the lift. Prepare a written SLP in accordance with EM 385-1-1, Section 16.A.03, using Form 16-2 for every lift or series of lifts (if duty cycle or routine lifts are being performed). The SLP must be developed, reviewed and accepted by all personnel involved in the lift in conjunction with the associated AHA. Signature on the AHA constitutes acceptance of the plan. Maintain the SLP on the LHE for the current lift(s) being made. Maintain historical SLPs for a minimum of 3 months.

1.8.2.3 Critical Lift Plan - Crane or Load Handling Equipment

Provide a Critical Lift Plan as required by EM 385-1-1, Section 16.H.01, using Form 16-3. In addition, Critical Lift Plans are required for the following:

a. Lifts over 50 percent of the capacity of barge mounted mobile crane's hoist.

b. When working around energized power lines where the work will get closer than the minimum clearance distance in EM 385-1-1 Table 16-1.

c. For lifts with anticipated binding conditions.

d. When erecting cranes.

1.8.2.3.1 Critical Lift Plan Planning and Schedule

Critical lifts require detailed planning and additional or unusual safety precautions. Develop and submit a critical lift plan to the Contracting Officer 30 calendar days prior to critical lift. Comply with load testing requirements in accordance with EM 385-1-1, Section 16.F.03.

1.8.2.3.2 Lifts of Personnel

In addition to the requirements of EM 385-1-1, Section 16.H.02, for lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.1400 and EM 385-1-1, Section 16.T.

1.8.2.4 Barge Mounted Mobile Crane Lift Plan

Provide a Naval Architecture Analysis and include an LHE Manufacturer's Floating Service Load Chart in accordance with EM 385-1-1, Section 16.L.03.

1.8.2.5 Multi-Purpose Machines, Material Handling Equipment, and Construction Equipment Lift Plan

Multi-purpose machines, material handling equipment, and construction equipment used to lift loads that are suspended by rigging gear, require proof of authorization from the machine OEM that the machine is capable of making lifts of loads suspended by rigging equipment. Written approval from a qualified registered professional engineer, after a safety analysis is performed, is allowed in lieu of the OEM's approval. Demonstrate that

the operator is properly trained and that the equipment is properly configured to make such lifts and is equipped with a load chart.

1.8.2.6 Fall Protection and Prevention (FP&P) Plan

The plan must comply with the requirements of EM 385-1-1, Section 21.D and ASSP Z359.2, be site specific, and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A competent person or qualified person for fall protection must prepare and sign the plan documentation. Include fall protection and prevention systems, equipment and methods employed for every phase of work, roles and responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Review and revise, as necessary, the Fall Protection and Prevention Plan documentation as conditions change, but at a minimum every six months, for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. Keep and maintain the accepted Fall Protection and Prevention Plan documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Plan documentation in the Accident Prevention Plan (APP).

1.8.2.7 Rescue and Evacuation Plan

Provide a Rescue and Evacuation Plan in accordance with EM 385-1-1 Section 21.N and ASSP Z359.2, and include in the FP&P Plan and as part of the APP. Include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility.

1.8.2.8 Hazardous Energy Control Program (HECP)

Develop a HECP in accordance with EM 385-1-1 Section 12, 29 CFR 1910.147, 29 CFR 1910.333, 29 CFR 1915.89, ASSP Z244.1, and ASSP A10.44. Submit this HECP as part of the Accident Prevention Plan (APP). Conduct a preparatory meeting and inspection with all effected personnel to coordinate all HECP activities. Document this meeting and inspection in accordance with EM 385-1-1, Section 12.A.02. Ensure that each employee is familiar with and complies with these procedures.

1.8.2.9 Excavation Plan

Identify the safety and health aspects of excavation, and provide and prepare the plan in accordance with EM 385-1-1, Section 25.A and Section 31 00 00 EARTHWORK.

1.8.2.10 Site Safety and Health Plan

Identify the safety and health aspects, and prepare in accordance with Section 01 35 29.13 HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES.

1.8.2.11 Site Demolition Plan

Identify the safety and health aspects, and prepare in accordance with Section 02 41 00 DEMOLITION and referenced sources. Include engineering survey as applicable.

1.9 ACTIVITY HAZARD ANALYSIS (AHA)

Before beginning each activity, task or Definable Feature of Work (DFOW) involving a type of work presenting hazards not experienced in previous project operations, or where a new work crew or subcontractor is to perform the work, the Contractor(s) performing that work activity must prepare an AHA. AHAs must be developed by the Prime Contractor, subcontractor, or supplier performing the work, and provided for Prime Contractor review and approval before submitting to the Contracting Officer. AHAs must be signed by the SSHO, Superintendent, QC Manager and the subcontractor Foreman performing the work. Format the AHA in accordance with EM 385-1-1, Section 1 or as directed by the Contracting Officer. Submit the AHA for review at least 15 working days prior to the start of each activity task, or DFOW. The Government reserves the right to require the Contractor to revise and resubmit the AHA if it fails to effectively identify the work sequences, specific anticipated hazards, site conditions, equipment, materials, personnel and the control measures to be implemented.

AHAs must identify competent persons required for phases involving high risk activities, including confined entry, crane and rigging, excavations, trenching, electrical work, fall protection, and scaffolding.

1.9.1 AHA Management

Review the AHA list periodically (at least monthly) at the Contractor supervisory safety meeting, and update as necessary when procedures, scheduling, or hazards change. Use the AHA during daily inspections by the SSHO to ensure the implementation and effectiveness of the required safety and health controls for that work activity.

1.9.2 AHA Signature Log

Each employee performing work as part of an activity, task or DFOW must review the AHA for that work and sign a signature log specifically maintained for that AHA prior to starting work on that activity. The SSHO must maintain a signature log on site for every AHA. Provide employees whose primary language is other than English, with an interpreter to ensure a clear understanding of the AHA and its contents.

1.10 DISPLAY OF SAFETY INFORMATION

1.10.1 Safety Bulletin Board

Within one calendar day(s) after commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, may be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board as required by EM 385-1-1, Section 01.A.07. Additional items required to be posted include:

a. Confined space entry permit.

b. Hot work permit.

1.10.2 Safety and Occupational Health (SOH) Deficiency Tracking System

Establish a SOH deficiency tracking system that lists and monitors the

status of SOH deficiencies in chronological order. Use the tracking system to evaluate the effectiveness of the APP. A monthly evaluation of the data must be discussed in the QC or SOH meeting with everyone on the project. The list must be posted on the project bulletin board and updated daily, and provide the following information:

a. Date deficiency identified;

b. Description of deficiency;

c. Name of person responsible for correcting deficiency;

d. Projected resolution date;

e. Date actually resolved.

1.11 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in paragraph REFERENCES. Maintain applicable equipment manufacturer's manuals.

1.12 EMERGENCY MEDICAL TREATMENT

Contractors must arrange for their own emergency medical treatment in accordance with EM 385-1-1. Government has no responsibility to provide emergency medical treatment.

1.13 NOTIFICATIONS and REPORTS

1.13.1 Mishap Notification

Notify the Contracting Officer as soon as practical, but no more than twenty-four hours, after any mishaps, including recordable accidents, incidents, and near misses, as defined in EM 385-1-1 Appendix Q, any report of injury, illness, or any property damage. For LHE or rigging mishaps, notify the Contracting Officer as soon as practical but not more than 4 hours after mishap. The Contractor is responsible for obtaining appropriate medical and emergency assistance and for notifying fire, law enforcement, and regulatory agencies. Immediate reporting is required for electrical mishaps, to include Arc Flash; shock; uncontrolled release of hazardous energy (includes electrical and non-electrical); load handling equipment or rigging; fall from height (any level other than same surface); and underwater diving. These mishaps must be investigated in depth to identify all causes and to recommend hazard control measures.

Within notification include Contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (for example, type of construction equipment used and PPE used). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted. Assist and cooperate fully with the Government's investigation(s) of any mishap.

1.13.2 Accident Reports

a. Conduct an accident investigation for recordable injuries and

illnesses, property damage, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. The Contracting Officer will provide copies of any required or special forms.

b. Near Misses: Near miss reports are considered positive and proactive Contractor safety management actions.

c. Conduct an accident investigation for any load handling equipment accident (including rigging accidents) to establish the root cause(s) of the accident. Complete the LHE Accident Report (Crane and Rigging Accident Report) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Do not proceed with crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the Contracting Officer. The Contracting Officer will provide a blank copy of the accident report form.

1.13.3 LHE Inspection Reports

Submit LHE inspection reports required in accordance with EM 385-1-1 and as specified herein with Daily Reports of Inspections.

1.13.4 Certificate of Compliance and Pre-lift Plan/Checklist for LHE and Rigging

Provide a FORM 16-1 Certificate of Compliance for LHE entering an activity under this contract and in accordance with EM 385-1-1. Post certifications on the crane.

Develop a Standard Lift Plan (SLP) in accordance with EM 385-1-1, Section 16.H.03 using Form 16-2 Standard Pre-Lift Crane Plan/Checklist for each lift planned. Submit SLP to the Contracting Officer for approval within 15 calendar days in advance of planned lift.

1.14 HOT WORK

1.14.1 Permit and Personnel Requirements

Submit and obtain a written permit prior to performing "Hot Work" (i.e. welding or cutting) or operating other flame-producing/spark producing devices, from the Fire Division. A permit is required from the Explosives Safety Office for work in and around where explosives are processed, stored, or handled. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. Provide at least two 20 pound 4A:20 BC rated extinguishers for normal "Hot Work". The extinguishers must be current inspection tagged, and contain an approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch must be trained in accordance with NFPA 51B and remain on-site for a minimum of one hour after completion of the task or as specified on the hot work permit.

When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency Fire Division phone number. REPORT ANY FIRE, NO MATTER HOW SMALL, TO THE RESPONSIBLE FIRE DIVISION IMMEDIATELY.

1.14.2 Work Around Flammable Materials

Obtain permit approval from a NFPA Certified Marine Chemist for "HOT WORK"

within or around flammable materials (such as fuel systems or welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, or vaults) that have the potential for flammable or explosive atmospheres.

Whenever these materials, except beryllium and chromium (VI), are encountered in indoor operations, local mechanical exhaust ventilation systems that are sufficient to reduce and maintain personal exposures to within acceptable limits must be used and maintained in accordance with manufacturer's instruction and supplemented by exceptions noted in EM 385-1-1, Section 06.H

1.15 CONFINED SPACE ENTRY REQUIREMENTS

Confined space entry must comply with Section 34 of EM 385-1-1, OSHA 29 CFR 1926, OSHA 29 CFR 1910, OSHA 29 CFR 1910.146, and OSHA Directive CPL 2.100. Any potential for a hazard in the confined space requires a permit system to be used.

1.15.1 Entry Procedures

Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. Comply with EM 385-1-1, Section 34 for entry procedures. Hazards pertaining to the space must be reviewed with each employee during review of the AHA.

1.15.2 Forced Air Ventilation

Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its action level.

1.15.3 Sewer Wet Wells

Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

1.15.4 Rescue Procedures and Coordination with Local Emergency Responders

Develop and implement an on-site rescue and recovery plan and procedures. The rescue plan must not rely on local emergency responders for rescue from a confined space.

1.16 GAS PROTECTION

Provide one or more employees, properly trained and experienced in operation and calibration of gas testing equipment and formally qualified as gas inspectors, on duty during times workers are in confined spaces. Their primary functions are to test for gas and operate testing equipment. Unless equipment of constant supervisory type with automatic alarm is employed, provide gas tests at least every 2 hours, or more often when character of ground or experience indicates gas may be encountered. After an idle period exceeding one-half hour, perform a gas test before permitting workers to enter the excavation.

1.16.1 Gas Test Readings Record

Permanently record readings daily; indicate the concentration of gas, point of test, and time of test. Submit copies of the gas test readings to the Contracting Officer at the end of each work day.

1.16.2 Special Requirements

Special requirements, coordination, and precautions will apply to areas that contain a hazardous atmosphere or, by virtue of their use or physical character, may be oxygen deficient. A check by Government is required prior to entering confined space. Surveillance and monitoring are required in these types of work spaces by both Contractor and Government personnel.

1.17 HIGH NOISE LEVEL PROTECTION

Schedule operations that involve the use of equipment with output of high noise levels (i.e. jackhammers, air compressors, and explosive-actuated devices) for weekends and after duty working hours. Use of any such equipment must be approved in writing by the Contracting Officer prior to commencement of work.

1.18 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

a. Secure outside equipment and materials and place materials that could be damaged in protected areas.

b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

c. Ensure that temporary erosion controls are adequate.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

PPE is governed in all areas by the nature of the work the employee is performing. Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks. Safety glasses must be worn or carried/available on each person. Mandatory PPE includes:

a. Hard Hat

b. Long Pants

c. Appropriate Safety Shoes

d. Appropriate Class Reflective Vests

3.1.1 Worksite Communication

Employees working alone in a remote location or away from other workers must be provided an effective means of emergency communications (i.e., cellular phone, two-way radios, land-line telephones or other acceptable means). The selected communication must be readily available (easily within the immediate reach) of the employee and must be tested prior to the start of work to verify that it effectively operates in the area/environment. An employee check-in/check-out communication procedure must be developed to ensure employee safety.

3.1.2 Hazardous Material Use

Each hazardous material must receive approval from the Contracting Office or their designated representative prior to being brought onto the job site or prior to any other use in connection with this contract. Allow a minimum of 10 working days for processing of the request for use of a hazardous material.

3.1.3 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint, and hexavalent chromium, are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials. Low mercury lamps used within fluorescent lighting fixtures are allowed as an exception without further Contracting Officer approval. Notify the Radiation Safety Officer (RSO) prior to excepted items of radioactive material and devices being brought on base.

3.1.4 Unforeseen Hazardous Material

Contract documents identify materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). If material(s) that may be hazardous to human health upon disturbance are encountered during construction operations, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to FAR 52.243-4 Changes and FAR 52.236-2 Differing Site Conditions.

3.2 UTILITY OUTAGE REQUIREMENTS

Apply for utility outages at least 14 days in advance. At a minimum, the written request must include the location of the outage, utilities being affected, duration of outage, any necessary sketches, and a description of the means to fulfill energy isolation requirements in accordance with EM 385-1-1, Section 11.A.02 (Isolation). Some examples of energy isolation devices and procedures are highlighted in EM 385-1-1, Section 12.D. In

accordance with EM 385-1-1, Section 12.A.01, where outages involve Government or Utility personnel, coordinate with the Government on all activities involving the control of hazardous energy.

These activities include, but are not limited to, a review of HECP and HEC procedures, as well as applicable Activity Hazard Analyses (AHAs). In accordance with EM 385-1-1, Section 11.A.02 and NFPA 70E, work on energized electrical circuits must not be performed without prior government authorization. Government permission is considered through the permit process and submission of a detailed AHA. Energized work permits are considered only when de-energizing introduces additional or increased hazard or when de-energizing is infeasible.

3.3 OUTAGE COORDINATION MEETING

After the utility outage request is approved and prior to beginning work on the utility system requiring shut-down, conduct a pre-outage coordination meeting in accordance with EM 385-1-1, Section 12.A. This meeting must include the Prime Contractor, the Prime and subcontractors performing the work, the Contracting Officer, and the Public Utilities representative. All parties must fully coordinate HEC activities with one another. During the coordination meeting, all parties must discuss and coordinate on the scope of work, HEC procedures (specifically, the lock-out/tag-out procedures for worker and utility protection), the AHA, assurance of trade personnel qualifications, identification of competent persons, and compliance with HECP training in accordance with EM 385-1-1, Section 12.C. Clarify when personal protective equipment is required during switching operations, inspection, and verification.

3.4 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Provide and operate a Hazardous Energy Control Program (HECP) in accordance with EM 385-1-1 Section 12, 29 CFR 1910.333, 29 CFR 1915.89, ASSP A10.44, NFPA 70E, and paragraph HAZARDOUS ENERGY CONTROL PROGRAM (HECP).

3.4.1 Safety Preparatory Inspection Coordination Meeting with the Government or Utility

For electrical distribution equipment that is to be operated by Government or Utility personnel, the Prime Contractor and the subcontractor performing the work must attend the safety preparatory inspection coordination meeting, which will also be attended by the Contracting Officer's Representative, and required by EM 385-1-1, Section 12.A.02. The meeting will occur immediately preceding the start of work and following the completion of the outage coordination meeting. Both the safety preparatory inspection coordination meeting and the outage coordination meeting must occur prior to conducting the outage and commencing with lockout/tagout procedures.

3.4.2 Lockout/Tagout Isolation

Where the Government or Utility performs equipment isolation and lockout/tagout, the Contractor must place their own locks and tags on each energy-isolating device and proceed in accordance with the HECP. Before any work begins, both the Contractor and the Government or Utility must perform energy isolation verification testing while wearing required PPE detailed in the Contractor's AHA and required by EM 385-1-1, Sections 05.I and 11.B. Install personal protective grounds, with tags, to eliminate the potential for induced voltage in accordance with EM 385-1-1, Section

12.E.06.

3.4.3 Lockout/Tagout Removal

Upon completion of work, conduct lockout/tagout removal procedure in accordance with the HECP. In accordance with EM 385-1-1, Section 12.E.08, each lock and tag must be removed from each energy isolating device by the authorized individual or systems operator who applied the device. Provide formal notification to the Government (by completing the Government form if provided by Contracting Officer's Representative), confirming that steps of de-energization and lockout/tagout removal procedure have been conducted and certified through inspection and verification. Government or Utility locks and tags used to support the Contractor's work will not be removed until the authorized Government employee receives the formal notification.

3.5 FALL PROTECTION PROGRAM

Establish a fall protection program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify roles and responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures in accordance with ASSP Z359.2 and EM 385-1-1, Sections 21.A and 21.D.

3.5.1 Training

Institute a fall protection training program. As part of the Fall Protection Program, provide training for each employee who might be exposed to fall hazards and using personal fall protection equipment. Provide training by a competent person for fall protection in accordance with EM 385-1-1, Section 21.C. Document training and practical application of the competent person in accordance with EM 385-1-1, Section 21.C.04 and ASSP Z359.2 in the AHA.

3.5.2 Fall Protection Equipment and Systems

Enforce use of personal fall protection equipment and systems designated (to include fall arrest, restraint, and positioning) for each specific work activity in the Site Specific Fall Protection and Prevention Plan and AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in EM 385-1-1, Section 21.

Provide personal fall protection equipment, systems, subsystems, and components that comply with EM 385-1-1 Section 21.I, 29 CFR 1926.500 Subpart M,ASSP Z359.0, ASSP Z359.1, ASSP Z359.2, ASSP Z359.3, ASSP Z359.4, ASSP Z359.6, ASSP Z359.7, ASSP Z359.11, ASSP Z359.12, ASSP Z359.13, ASSP Z359.14, ASSP Z359.15, ASSP Z359.16 and ASSP Z359.18.

3.5.2.1 Additional Personal Fall Protection Measures

In addition to the required fall protection systems, other protective measures such as safety skiffs, personal floatation devices, and life rings, are required when working above or next to water in accordance with EM 385-1-1, Sections 21.O through 21.O.06. Personal fall protection systems and equipment are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall protection systems are required when operating other equipment such as scissor lifts. The need for tying-off in such equipment

is to prevent ejection of the employee from the equipment during raising, lowering, travel, or while performing work.

3.5.2.2 Personal Fall Protection Equipment

Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. The use of body belts is not acceptable. Harnesses must have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Snap hooks and carabineers must be self-closing and self-locking, capable of being opened only by at least two consecutive deliberate actions and have a minimum gate strength of 3,600 lbs in all directions. Use webbing, straps, and ropes made of synthetic fiber. The maximum free fall distance when using fall arrest equipment must not exceed 6 feet, unless the proper energy absorbing lanyard is used. Always take into consideration the total fall distance and any swinging of the worker (pendulum-like motion), that can occur during a fall, when attaching a person to a fall arrest system. All full body harnesses must be equipped with Suspension Trauma Preventers such as stirrups, relief steps, or similar in order to provide short-term relief from the effects of orthostatic intolerance in accordance with EM 385-1-1, Section 21.I.06.

3.5.3 Fall Protection for Roofing Work

Implement fall protection controls based on the type of roof being constructed and work being performed. Evaluate the roof area to be accessed for its structural integrity including weight-bearing capabilities for the projected loading.

a. Low Sloped Roofs:

(1) For work within 6 feet from unprotected edge of a roof having a slope less than or equal to 4:12 (vertical to horizontal), protect personnel from falling by the use of conventional fall protection systems (personal fall arrest/restraint systems, guardrails, or safety nets) in accordance with EM 385-1-1, Section 21 and 29 CFR 1926.500. A safety monitoring system is not adequate fall protection and is not authorized.

(2) For work greater than 6 feet from the unprotected roof edge, addition to the use of conventional fall protection systems the use of a warning line system is also permitted, in accordance with 29 CFR 1926.500 and EM 385-1-1, Section 21.L.

b. Steep-Sloped Roofs: Work on a roof having a slope greater than 4:12 (vertical to horizontal) requires a personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also applies to residential or housing type construction.

3.5.4 Horizontal Lifelines (HLL)

Provide HLL in accordance with EM 385-1-1, Section 21.I.08.d.2. Commercially manufactured horizontal lifelines (HLL) must be designed, installed, certified and used, under the supervision of a qualified person, for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500). The competent person for fall protection may (if deemed appropriate by the qualified person) supervise the assembly, disassembly, use and inspection of the HLL system

under the direction of the qualified person. Locally manufactured HLLs are not acceptable unless they are custom designed for limited or site specific applications by a Registered Professional Engineer who is qualified in designing HLL systems.

3.5.5 Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with EM 385-1-1, Section 21.F.01 and 29 CFR 1926 Subpart M.

3.5.6 Rescue and Evacuation Plan and Procedures

When personal fall arrest systems are used, ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue or assisted-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP). The plan must comply with the requirements of EM 385-1-1, ASSP Z359.2, and ASSP Z359.4.

3.6 WORK PLATFORMS

3.6.1 Scaffolding

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Comply with the following requirements:

a. Scaffold platforms greater than 20 feet in height must be accessed by use of a scaffold stair system.

b. Ladders commonly provided by scaffold system manufacturers are prohibited for accessing scaffold platforms greater than 20 feet maximum in height.

c. An adequate gate is required.

d. Employees performing scaffold erection and dismantling must be qualified.

e. Scaffold must be capable of supporting at least four times the maximum intended load, and provide appropriate fall protection as delineated in the accepted fall protection and prevention plan.

f. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward.

g. Special care must be given to ensure scaffold systems are not overloaded.

h. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material are prohibited. The first tie-in must be at the height equal to 4 times the width of the smallest dimension of the scaffold base.

i. Scaffolding other than suspended types must bear on base plates upon wood mudsills (2 in x 10 in x 8 in minimum) or other adequate firm foundation.

j. Scaffold or work platform erectors must have fall protection during the erection and dismantling of scaffolding or work platforms that are more than 6 feet.

k. Delineate fall protection requirements when working above 6 feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

3.6.2 Elevated Aerial Work Platforms (AWPs)

Workers must be anchored to the basket or bucket in accordance with manufacturer's specifications and instructions (anchoring to the boom may only be used when allowed by the manufacturer and permitted by the CP). Lanyards used must be sufficiently short to prohibit worker from climbing out of basket. The climbing of rails is prohibited. Lanyards with built-in shock absorbers are acceptable. Self-retracting devices are not acceptable. Tying off to an adjacent pole or structure is not permitted unless a safe device for 100 percent tie-off is used for the transfer.

Use of AWPs must be operated, inspected, and maintained as specified in the operating manual for the equipment and delineated in the AHA. Operators of AWPs must be designated as qualified operators by the Prime Contractor. Maintain proof of qualifications on site for review and include in the AHA.

3.7 EQUIPMENT

3.7.1 Material Handling Equipment (MHE)

a. Material handling equipment such as forklifts must not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions. Material handling equipment fitted with personnel work platform attachments are prohibited from traveling or positioning while personnel are working on the platform.

b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions. Material Handling Equipment Operators must be trained in accordance with OSHA 29 CFR 1910, Subpart N.

c. Operators of forklifts or power industrial trucks must be licensed in accordance with OSHA.

3.7.2 Load Handling Equipment (LHE)

The following requirements apply. In exception, these requirements do not apply to commercial truck mounted and articulating boom cranes used solely to deliver material and supplies (not prefabricated components, structural steel, or components of a systems-engineered metal building) where the lift consists of moving materials and supplies from a truck or trailer to the ground; to cranes installed on mechanics trucks that are used solely in the repair of shore-based equipment; to crane that enter the activity but are not used for lifting; nor to other machines not used to lift loads suspended by rigging equipment. However, LHE accidents occurring during such operations must be reported.

a. Equip cranes and derricks as specified in EM 385-1-1, Section 16.

b. Notify the Contracting Officer 15 working days in advance of any LHE entering the activity, in accordance with EM 385-1-1, Section 16.A.02, so that necessary quality assurance spot checks can be coordinated. Prior to cranes entering federal activities, a Crane Access Permit must be obtained from the Contracting Officer. A copy of the permitting process will be provided at the Preconstruction Conference. Contractor's operator must remain with the crane during the spot check. Rigging gear must comply with OSHA, ASME B30.9 Standards safety standards.

c. Comply with the LHE manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.

d. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, ASME B30.8 for floating cranes and floating derricks, ASME B30.9 for slings, ASME B30.20 for below the hook lifting devices and ASME B30.26 for rigging hardware.

e. When operating in the vicinity of overhead transmission lines, operators and riggers must be alert to this special hazard and follow the requirements of EM 385-1-1 Section 11, and ASME B30.5 or ASME B30.22 as applicable.

f. Do not use crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane. Additionally, submit a specific AHA for this work to the Contracting Officer. Ensure the activity and AHA are thoroughly reviewed by all involved personnel.

g. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.

h. All employees must keep clear of loads about to be lifted and of suspended loads, except for employees required to handle the load.

i. Use cribbing when performing lifts on outriggers.

j. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

k. A physical barricade must be positioned to prevent personnel access where accessible areas of the LHE's rotating superstructure poses a risk of striking, pinching or crushing personnel.

l. Maintain inspection records in accordance by EM 385-1-1, Section 16.D, including shift, monthly, and annual inspections, the signature of the person performing the inspection, and the serial number or other identifier of the LHE that was inspected. Records must be available for review by the Contracting Officer.

m. Maintain written reports of operational and load testing in accordance

with EM 385-1-1, Section 16.F, listing the load test procedures used along with any repairs or alterations performed on the LHE. Reports must be available for review by the Contracting Officer.

n. Certify that all LHE operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

o. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. At wind speeds greater than 20 mph, the operator, rigger and lift supervisor must cease all crane operations, evaluate conditions and determine if the lift may proceed. Base the determination to proceed or not on wind calculations per the manufacturer and a reduction in LHE rated capacity if applicable. Include this maximum wind speed determination as part of the activity hazard analysis plan for that operation.

p. On mobile cranes, lifts where the load weight is greater than 90 percent of the equipment's capacity are prohibited.

3.7.3 Machinery and Mechanized Equipment

a. Proof of qualifications for operator must be kept on the project site for review.

b. Manufacture specifications or owner's manual for the equipment must be on-site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or USACE EM 385-1-1. Incorporate such additional safety precautions or requirements into the AHAs.

c. Submit a Machinery & Mechanized Equipment Certification Form to the Contracting Officer prior to being placed into use.

3.7.4 Base Mounted Drum Hoists

a. Operation of base mounted drum hoists must comply with EM 385-1-1 and ASSP A10.22.

b. Rigging gear must comply with applicable ASME/OSHA standards

c. When used on telecommunication towers, base mounted drum hoists must comply with TIA-1019, TIA-222, ASME B30.7, 29 CFR 1926.552, and 29 CFR 1926.553.

d. When used to hoist personnel, the AHA must include a written standard operating procedure. Operators must have a physical examination in accordance with EM 385-1-1 Section 16.B.05 and trained, at a minimum, in accordance with EM 385-1-1 Section 16.U and 16.T. The base mounted drum hoist must also comply with OSHA Instruction CPL 02-01-056 and ASME B30.23.

e. Material and personnel must not be hoisted simultaneously.

f. Personnel cage must be marked with the capacity (in number of persons) and load limit in pounds.

g. Construction equipment must not be used for hoisting material or personnel or with trolley/tag lines. Construction equipment may be used for towing and assisting with anchoring guy lines.

3.7.5 Use of Explosives

Explosives must not be used or brought to the project site without prior written approval from the Contracting Officer. Such approval does not relieve the Contractor of responsibility for injury to persons or for damage to property due to blasting operations.

Storage of explosives, when permitted on Government property, must be only where directed and in approved storage facilities. These facilities must be kept locked at all times except for inspection, delivery, and withdrawal of explosives.

3.8 EXCAVATIONS

Soil classification must be performed by a competent person in accordance with 29 CFR 1926 and EM 385-1-1.

3.8.1 Utility Locations

Provide a third party, independent, private utility locating company to positively identify underground utilities in the work area in addition to any station locating service and coordinated with the station utility department.

3.8.2 Utility Location Verification

Physically verify underground utility locations, including utility depth, by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within 3 feet of the underground system.

3.8.3 Utilities Within and Under Concrete, Bituminous Asphalt, and Other Impervious Surfaces

Utilities located within and under concrete slabs or pier structures, bridges, parking areas, and the like, are extremely difficult to identify. Whenever contract work involves chipping, saw cutting, or core drilling through concrete, bituminous asphalt or other impervious surfaces, the existing utility location must be coordinated with station utility departments in addition to location and depth verification by a third party, independent, private locating company. The third party, independent, private locating company must locate utility depth by use of Ground Penetrating Radar (GPR), X-ray, bore scope, or ultrasound prior to the start of demolition and construction. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the Contractor from meeting this requirement.

3.9 ELECTRICAL

Perform electrical work in accordance with EM 385-1-1, Appendix A, Sections 11 and 12.

3.9.1 Conduct of Electrical Work

As delineated in EM 385-1-1, electrical work is to be conducted in a de-energized state unless there is no alternative method for accomplishing the work. In those cases obtain an energized work permit from the

Contracting Officer. The energized work permit application must be accompanied by the AHA and a summary of why the equipment/circuit needs to be worked energized. Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Attach temporary grounds in accordance with ASTM F855 and IEEE 1048. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator is allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method.

When working in energized substations, only qualified electrical workers are permitted to enter. When work requires work near energized circuits as defined by NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves and electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA. Ensure that each employee is familiar with and complies with these procedures and 29 CFR 1910.147.

3.9.2 Qualifications

Electrical work must be performed by QP personnel with verifiable credentials who are familiar with applicable code requirements. Verifiable credentials consist of State, National and Local Certifications or Licenses that a Master or Journeyman Electrician may hold, depending on work being performed, and must be identified in the appropriate AHA. Journeyman/Apprentice ratio must be in accordance with State, Local requirements applicable to where work is being performed.

3.9.3 Arc Flash

Conduct a hazard analysis/arc flash hazard analysis whenever work on or near energized parts greater than 50 volts is necessary, in accordance with NFPA 70E.

All personnel entering the identified arc flash protection boundary must be QPs and properly trained in NFPA 70E requirements and procedures. Unless permitted by NFPA 70E, no Unqualified Person is permitted to approach nearer than the Limited Approach Boundary of energized conductors and circuit parts. Training must be administered by an electrically qualified source and documented.

3.9.4 Grounding

Ground electrical circuits, equipment and enclosures in accordance with NFPA 70 and IEEE C2 to provide a permanent, continuous and effective path to ground unless otherwise noted by EM 385-1-1.

Check grounding circuits to ensure that the circuit between the ground and a grounded power conductor has a resistance low enough to permit sufficient current flow to allow the fuse or circuit breaker to interrupt the current.

3.9.5 Testing

Temporary electrical distribution systems and devices must be inspected,

tested and found acceptable for Ground-Fault Circuit Interrupter (GFCI) protection, polarity, ground continuity, and ground resistance before initial use, before use after modification and at least monthly. Monthly inspections and tests must be maintained for each temporary electrical distribution system, and signed by the electrical CP or QP.

-- End of Section --

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SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS
02/19

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization (e.g. ASTM B564 Standard Specification for Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided.

AACE INTERNATIONAL (AACE)
1265 Suncrest Towne Centre Drive
Morgantown, WV 26505-1876 USA
Ph: 304-296-8444
Fax: 304-291-5728
Internet: https://web.aacei.org/

ACOUSTICAL SOCIETY OF AMERICA (ASA)
1305 Walt Whitman Road, Suite 300
Melville, NY 11747-4300
Ph: 516-576-2360
Fax: 631-923-2875
E-mail: asa@acousticalsociety.org
Internet: https://acousticalsociety.org/

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC. (AIA/NAS)
1000 Wilson Blvd, Suite 1700
Arlington, VA 22209-3928
Ph: 703-358-1000
E-mail: aia@aia-aerospace.org
Internet: https://www.aia-aerospace.org/

AIR BARRIER ASSOCIATION OF AMERICA (ABAA)
1600 Boston-Providence Hwy
Walpole, MA 02081
Ph: 1-866-956-5888
Fax: 1-866-956-5819
Internet: https://www.airbarrier.org/

AIR CONDITIONING CONTRACTORS OF AMERICA (ACCA)
2800 Shirlington Road, Suite 300
Arlington, VA 22206

Ph: 703-575-4477
Internet: https://www.acca.org/

AIR DUCT COUNCIL (ADC)
1901 N. Roselle Road, Suite 800
Schaumburg, IL 60195
Ph: 847-706-6750
Fax: 847-706-6751
E-mail: info@flexibleduct.org
Internet: https://flexibleduct.org/

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC. (AMCA)
30 West University Drive
Arlington Heights, IL 60004-1893
Ph: 847-394-0150
Fax: 847-253-0088
E-mail: communications@amca.org
Internet: http://www.amca.org

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)
2111 Wilson Blvd, Suite 400
Arlington, VA 22201
Ph: 703-524-8800
Internet: http://www.ahrinet.org

ALLIANCE FOR TELECOMMUNICATIONS INDUSTRY SOLUTIONS (ATIS)
1200 G Street, NW, Suite 500
Washington, D.C. 20005
Ph: 202-628-6380
E-mail: nbutler@atis.org
Internet: http://www.atis.org

ALUMINUM ASSOCIATION (AA)
1400 Crystal Drive
Suite 430
Arlington, VA 22202
Ph: 703-358-2960
E-Mail: info@aluminum.org
Internet: https://www.aluminum.org/

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)
1900 E Golf Rd, Suite 1250
Schaumburg, IL 60173
Ph: 847-303-5664
E-mail: customerservice@aamanet.org
Internet: https://aamanet.org/

AMERICAN ASSOCIATION OF RADON SCIENTISTS AND TECHNOLOGISTS (AARST)
475 South Church Street - Suite 600
Hendersonville, NC 28792
Ph: 800-269-4174
Fax: 828-214-6299
E-mail: info@aarst.org
Internet: http://aarst-nrpp.com/wp/

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
444 North Capital Street, NW, Suite 249
Washington, DC 20001

Ph: 202-624-5800
Fax: 202-624-5806
E-Mail: info@aashto.org
Internet: https://www.transportation.org/

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)
1 Davis Drive
P.O. Box 12215
Research Triangle Park, NC 27709-2215
Ph: 919-549-8141
Fax: 919-549-8933
Internet: https://www.aatcc.org/

AMERICAN BEARING MANUFACTURERS ASSOCIATION (ABMA)
330 N. Wabash Ave., Suite 2000
Chicago, IL 60611
Ph: 202-367-1155
E-mail: info@americanbearings.org
Internet: https://www.americanbearings.org/

AMERICAN BOILER MANUFACTURERS ASSOCIATION (ABMA/BOIL)
8221 Old Courthouse Road, Suite 380
Vienna, VA 22182
Ph: 703-356-7172
E-mail: info@abma.com
Internet: https://www.abma.com/

AMERICAN BUREAU OF SHIPPING (ABS)
ABS Plaza
1701 City Plaza Drive
Spring, TX 77389 United States
Ph: 281-877-6000
Fax: 281-877-5976
E-Mail: ABS-WorldHQ@eagle.org
Internet: https://ww2.eagle.org/

AMERICAN COMPOSITES MANUFACTURER'S ASSOCIATION (ACMA)
2000 N. 15th St, Suite 250
Arlington, VA 22201
Ph: 703-525-0511
Fax: 703-525-0743
Internet: https://acmanet.org

AMERICAN CONCRETE INSTITUTE (ACI)
38800 Country Club Drive
Farmington Hills, MI 48331-3439
Ph: 248-848-3700
Fax: 248-848-3701
Internet: https://www.concrete.org/

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)
8445 Freeport Parkway, Suite 350
Irving, TX 75063-2595
Ph: 972-506-7216
Fax: 972-506-7682
E-mail: info@concrete-pipe.org
Internet: https://www.concretepipe.org/

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)
1330 Kemper Meadow Drive
Cincinnati, OH 45240
Ph: 513-742-2020
Fax: 513-742-3355
Internet: https://www.acgih.org/

AMERICAN FOREST FOUNDATION (AFF)
American Tree Farm System
2000 M Street, NW, Suite 550
Washington, DC 20036
Ph: 202-765-3660
Fax: 202-827-7924
Email: info@forestfoundation.org
Internet: https://www.treefarmsystem.org

AMERICAN FOREST AND PAPER ASSOCIATION (AF&PA)
American Wood Council
Public Policy Office
1101 K Street NW, Suite 700
Washington, DC 20005
Ph: 800-890-7732 or 202-463-2766
Fax: 412-741-0609
E-mail: publications@awc.org
Internet: https://www.awc.org/

AMERICAN GAS ASSOCIATION (AGA)
400 North Capitol Street, NW
Suite 450
Washington, D.C. 20001
Ph: 202-824-7000
Internet: https://www.aga.org/

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA)
1001 N. Fairfax Street, Suite 500
Alexandria, VA 22314-1587
Ph: 703-684-0211
Fax: 703-684-0242
E-mail: tech@agma.org
Internet: https://www.agma.org/

AMERICAN HARDBOARD ASSOCIATION (AHA)
1210 West Northwest Highway
Palatine, IL 60067
Ph: 847-934-8800
Fax: 847-934-8803
E-mail: aha@hardboard.org
Internet: http://domensino.com/AHA/

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA)
3141 Fairview Park Dr, Suite 777
Falls Church, VA 22042
Tel: 703-849-8888
Fax: 703-207-3561
E-mail: infonet@aiha.org
Internet https://www.aiha.org/

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
130 East Randolph, Suite 2000

Chicago, IL 60601
Ph: 312-670-5444
Fax: 312-670-5403
Steel Solutions Center: 866-275-2472
E-mail: solutions@aisc.org
Internet: https://www.aisc.org/

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)
7012 South Revere Parkway, Suite 140
Centennial, CO 80112
Ph: 503-639-0651
Fax: 503-684-8928
E-mail: mschoen@wclib.org
Internet: http://www.aitc-glulam.org

AMERICAN IRON AND STEEL INSTITUTE (AISI)
25 Massachusetts Avenue, NW Suite 800
Washington, DC 20001
Ph: 202-452-7100
Internet: https://www.steel.org/

AMERICAN LADDER INSTITUTE (ALI)
330 N. Wabash, Suite 2000
Chicago, IL 60611
Ph: 312-321-6806
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E-mail: enquiries@igmaonline.org
Internet: https://www.igmaonline.org/

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Fax: 847-299-1183
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NORTH ATLANTIC TREATY ORGANIZATION (NATO)
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PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

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SECTION 01 45 00.00 10

QUALITY CONTROL
11/16

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D3740	(2019) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E329	(2020) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program. Include all associated costs in the applicable Bid Schedule item.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contractor Quality Control (CQC) Plan; G

SD-06 Test Reports

Verification Statement

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system that complies with FAR 52.246-12 Inspection of Construction. QC consist of plans, procedures, and organization necessary to produce an end product which complies with the Contract requirements. The QC system covers all

design and construction operations, both onsite and offsite, and be keyed to the proposed design and construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the Contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent maintains a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 CONTRACTOR QUALITY CONTROL (CQC) PLAN

Submit no later than 15 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements FAR 52.246-12 Inspection of Construction. The Government will consider an interim plan for the first days of operation. Construction Design and construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all design and construction-operations, both onsite and offsite, including work by subcontractors designers of record, consultants, architect/engineers (AE), fabricators, suppliers and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager that reports to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Furnish copies of these letters to the Contracting Officer.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by

the Contracting Officer are required to be used.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and is identified by different trades or disciplines, or it is work by the same trade in a different environment. Although each section of the specifications can generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

j. Coordinate scheduled work with Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections. Where the applicable Code issue by the International Code Council (ICC) calls for inspections by the Building Official, the Contractor must include the inspections in the Quality Control Plan and must perform the inspections required by the applicable ICC. The Contractor must perform these inspections using independent qualified inspectors. Include the Special Inspection Plan requirements in the QC Plan.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in the Contractor Quality Control(CQC) Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference,Postaward Conference, before start of design or construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 5 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by

the Government, signed by both the Contractor and the Contracting Officer and will become a part of the contract file. There can be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings or address deficiencies in the CQC system or procedures which can require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a Safety and Health Manager, CQC System Manager, a Design Quality Manager, and sufficient number of additional qualified personnel to ensure safety and Contract compliance. The Safety and Health Manager reports directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety and Health Manager will also serve as a member of the CQC Staff Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff maintains a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization is responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization that is responsible for overall management of CQC and has the authority to act in all CQC matters for the Contractor. The CQC System Manager is required to be a graduate engineer, graduate architect, or a graduate of construction management, with a minimum of 2 years construction experience on construction similar to this Contract. A construction person with a minimum of 2 years in related work. This CQC System Manager is on the site at all times during construction and is employed by the prime Contractor. The CQC System Manager is assigned as CQC System Manager but has duties as project superintendent in addition to quality control. Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: electrical, mechanical, civil, structural, environmental, architectural, materials technician, submittals clerk. These individuals or specialized technical companies are directly employed by the prime Contractor and can not be employed by a supplier or subcontractor on this project; be responsible to the CQC System Manager; be physically present at the construction site during work on the specialized peronnel's areas of responsibility; have the necessary education or experience in accordance with the experience matrix listed herein. These individuals have no other duties other than quality control. A single

person can cover more than one area provided that the single person is qualified to perform quality control activities in each designated and that workload allows.

Experience Matrix	
Area	Qualifications
Civil	Graduate Civil Engineer or Construction Manager with 2 years experience in the type of work being performed on this project or technician with 5 yrs related experience
Mechanical	Graduate Mechanical Engineer with 2 yrs experience or person with 5 years of experience supervising mechanical features of work in the field with a construction company
Electrical	Graduate Electrical Engineer with 2 years related experience or person 5 years of experience supervising electrical features of work in the field with a construction company
Structural	Graduate Civil Engineer (with Structural Track or Focus) or Construction Manager with 2 years experience or person 5 years of experience supervising structural features of work in the field with a construction company
Architectural	Graduate Architect with 2 years experience or person with 5 years related experience
Environmental	Graduate Environmental Engineer with 3 years experience
Submittals	Submittal Clerk with 1 year experience
Concrete, Pavements and Soils	Materials Technician with 2 years experience for the appropriate area
Design Quality Control Manager	Registered Architect or Professional Engineer

3.4.4 Additional Requirement

In addition to the above experience and education requirements, the Contractor Quality Control(CQC) System Manager and Alternate CQC System Manager are required to have completed the Construction Quality Management (CQM) for Contractors course. If the CQC System Manager does not have a current certification, obtain the CQM for Contractors course certification

within 90 days of award. This course is periodically offered by the Naval Facilities Engineering Command and the Army Corps of Engineers. Contact the Contracting Officer for information on the next scheduled class.

The Construction Quality Management Training certificate expires after 5 years. If the CQC System Manager's certificate has expired, retake the course to remain current.

3.4.5 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, have to comply with the requirements in Section 01 33 00SUBMITTAL PROCEDURES. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 01 91 00.15 10 TOTAL BUILDING COMMISSIONING are included in the contract, the submittals required by those sections have to be coordinated with Section 01 33 00 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL

CQC 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. At least three phases of control are required to be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase is performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:

a. A review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.

b. Review of the Contract drawings.

c. Check to assure that all materials and equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Review Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.

f. Examination of the work area to assure that all required preliminary

work has been completed and is in compliance with the Contract.

g. Examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

h. Review of the appropriate activity hazard analysis to assure safety requirements are met.

i. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

j. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

k. Discussion of the initial control phase.

l. The Government needs to be notified at least 48 hours in advance of beginning the preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing are in compliance with the contract.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government needs to be notified at least 48 hours in advance of beginning the initial phase for definable feature of work. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for definable feature of work for future reference and comparison with follow-up phases.

g. The initial phase for each definable feature of work is repeated for each new crew to work onsite, or any time acceptable specified quality

standards are not being met.

h. Coordinate scheduled work with Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.

3.6.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work. Coordinate scheduled work with Special Inspections required by Section 01 45 35 SPECIAL INSPECTIONS, the Statement of Special Inspections and the Schedule of Special Inspections.

3.6.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and acceptance tests when specified. Procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports are submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated results in nonpayment for related work performed and disapproval of the test facility for this

Contract.

3.7.2 Testing Laboratories

All testing laboratories must be validated by the USACE Material Testing Center (MTC) for the tests to be performed. Information on the USACE MTC with web-links to both a list of validated testing laboratories and for the laboratory inspection request for can be found at: https://mtc.erdc.dren.mil/.

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel is required to meet criteria detailed in ASTM D3740 and ASTM E329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the Contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC System Manager near the end of the work, or any increment of the work established by a time stated in FAR 52.211-10 Commencement, Prosecution, and Completion of Work, or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by paragraph DOCUMENTATION. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph need

to be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative is required to be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands can also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notify the Contracting Officer at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the Contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance FAR 52.246-12 Inspection of Construction.

3.9 DOCUMENTATION

3.9.1 Quality Control Activities

Maintain current records providing factual evidence that required quality control activities and tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

a. The name and area of responsibility of the Contractor/Subcontractor.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with Contract reference, by whom, and action taken.

g. Offsite surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and specifications.

j. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identification of the Independent Technical Review (ITR) team, the ITR review comments, responses and the record of resolution of the comments.

3.9.2 Verification Statement

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract. Furnish the original and one copy of these records in report form to the Government daily within 48 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit one report for every 7 days of no work and on the last day of a no work period. All calendar days need to be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports need to be signed and dated by the Contractor Quality Control(CQC) System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer can 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 will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

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SECTION 01 45 35

SPECIAL INSPECTIONS
02/20

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2018) International Building Code

1.2 GENERAL REQUIREMENTS

Perform Special Inspections in accordance with the Statement of Special Inspections, Schedule of Special Inspections and Chapter 17 of ICC IBC. The Statement of Special Inspections and Schedule of Special Inspections are included as an attachment to this specification. Special Inspections are to be performed by an independent third party and are intended to ensure that the work of the prime contractor is in accordance with the Contract Documents and applicable building codes. Special inspections do not take the place of the three phases of control inspections performed by the Contractor's QC Manager or any testing and inspections required by other sections of the specifications.
Structural observations will be performed separately by the Government. The contractor must provide notification to the Contracting Officer 14 days prior to the following points of construction to allow for structural observation:

a. First Concrete Foundation Placement

b. First CMU Wall Grout Fill Placement

c. Structural steel, Steel Joist and Steel truss erection completion, including metal decking erection and attachment (prior to composite decking pour at PMEL B267).

1.3 DEFINITIONS

1.3.1 Continuous Special Inspections

Continuous Special Inspections is the constant monitoring of specific tasks by a special inspector. These inspections must be carried out continuously over the duration of the particular tasks.

1.3.2 Perform

Perform these Special Inspections tasks for each welded joint or member.

1.3.3 Observe

Observe these Special Inspections items on a periodic daily basis. Operations need not be delayed pending these inspections.

1.3.4 Special Inspector (SI)

A qualified person retained by the contractor and approved by the Contracting Officer as having the competence necessary to inspect a particular type of construction requiring Special Inspections. The SI must be an independent third party hired directly by the Prime Contractor.

1.3.5 Associate Special Inspector (ASI)

A qualified person who assists the SI in performing Special Inspections but must perform inspection under the direct supervision of the SI and cannot perform inspections without the SI on site.

1.3.6 Third Party

A Special inspector must not be an employee of the Contractor or of any Sub-Contractor performing the work to be inspected.

1.3.7 Special Inspector of Record (SIOR)

A licensed engineer in responsible charge of supervision of all special inspectors for the project and approved by the Contracting officer. The SIOR must be an independent third party entity hired directly by the Prime Contractor.

1.3.8 Contracting Officer

The Government official having overall authority for administrative contracting actions. Certain contracting actions may be delegated to the Contracting Officer's Representative (COR).

1.3.9 Contractor's Quality Control (QC) Manager

An individual retained by the prime contractor and qualified in accordance with the Section 01 45 00.00 20 QUALITY CONTROL having the overall responsibility for the contractor's QC organization.

1.3.10 Structural Engineer of Record (SER)

A registered design professional contracted by the Government as an A/E responsible for the overall design and review of submittal documents prepared by others. The SER is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws in state in which the design professional works. The SER is also referred to as the Engineer of Record (EOR) in design code documents.

1.3.11 Statement of Special Inspections (SSI)

A document developed by the SER identifying the material, systems, components and work required to have Special Inspections. The statement of special inspections is attached to 01 45 35 SPECIAL INSPECTIONS.

1.3.12 Schedule of Special Inspections (SSI)

A schedule which lists each of the required Special Inspections, the extent to which each Special Inspection is to be performed, and the required frequency for each in accordance with ICC IBC Chapter 17. The statement of

special inspections is attached to 01 45 35 SPECIAL INSPECTIONS.

1.3.13 Definable Feature of Work (DFOW)

An inspection group that is separate and distinct from other inspection groups, having inspection requirements and/or inspectors that are unique.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Special Inspections Project Manual; G

Special Inspections Agency's Written NDT Practices with method and evidence of regular equipment calibration where applicable

SD-06 Test Reports

Special Inspections Daily Reports

Special Inspections Biweekly Reports

SD-07 Certificates

AISC Certified Steel Fabricator
Steel Truss PlantSpecial Inspector of Record Qualifications; G
Special Inspector Qualifications; G

Qualification Records for NDT technicians

SD-11 Closeout Submittals

Interim Report of Special Inspections for Each DFOW; G

Comprehensive Final Report of Special Inspections; G

1.5 SPECIAL INSPECTOR QUALIFICATIONS

Submit qualifications for each special inspector and the special inspector of record; G.

1.5.1 Steel Construction and High Strength Bolting

1.5.1.1 Special Inspector

a. ICC Structural Steel and Bolting Special Inspector certificate with one year of related experience, or

b. Registered Professional Engineer with three years of related experience

1.5.1.2 Associate Special Inspector

Engineer-In-Training with one year of related experience.

1.5.2 Welding Structural Steel

1.5.2.1 Special Inspector

a. ICC Structural Welding Special Inspector certificate with one year of related experience, or

b. AWS Certified Welding Inspector

1.5.2.2 Associate Special Inspector

AWS Certified Associate Welding Inspector

1.5.3 Nondestructive Testing of Welds

1.5.3.1 Special Inspector

NDT Level III Certificate

1.5.3.2 Associate Special Inspector

NDT Level II Certificate plus one year of related experience

1.5.4 Cold Formed Steel Framing

1.5.4.1 Special Inspector

a. ICC Structural Steel and Bolting Special Inspector certificate with one year of related experience, or

b. ICC Commercial Building Inspector with one year of experience, or

c. ICC Residential Building Inspector with one year of experience, or

d. Registered Professional Engineer with three years related experience

1.5.4.2 Associate Special Inspector

Engineer-In-Training with one year of related experience.

1.5.5 Concrete Construction

1.5.5.1 Special Inspector

a. ICC Reinforced Concrete Special Inspector Certificate with one year of related experience, or

b. ACI Concrete Construction Special Inspector, or

c. Registered Professional Engineer with three years of related experience

1.5.5.2 Associate Special Inspector

a. ACI Concrete Construction Special Inspector in Training, or

b. Engineer-In-Training with one year of related experience

1.5.6 Masonry Construction

1.5.6.1 Special Inspector

a. ICC Structural Masonry Special Inspector Certificate with one year of related experience, or

b. Registered Professional Engineer with three years of related experience

1.5.6.2 Associate Special Inspector

Engineer-In-Training with one year of related experience.

1.5.7 Verification of Site Soil Condition, Fill Placement and Load-Bearing Requirements

1.5.7.1 Special Inspector

a. ICC Soils Special Inspector Certificate with one year of related experience, or

b. NICET Soils Technician Level II Certificate in Construction Material Testing, or

c. Geologist-In-Training with three years of related experience, or

d. Registered Professional Engineer with three years of related experience

1.5.7.2 Associate Special Inspector

a. NICET Soils Technician Level I Certificate in Construction Material Testing with one year of related experience, or

b. Engineer-In-Training with one year of related experience

1.5.8 Fire-Resistant Penetrations and Joints

1.5.8.1 Special Inspector

a. Passed the UL Firestop Exam with one year of related experience, or

b. Passed the FM Firestop Exam with one year of related experience, or

c. Registered Professional Engineer with related experience

1.5.8.2 Associate Special Inspector

Engineer-In-Training with one year of related experience.

1.5.9 Special Inspector of Record (SIOR)

Registered Professional Engineer with five years of related experience.

PART 2 PRODUCTS

2.1 FABRICATOR SPECIAL INSPECTIONS

Special Inspections of fabricator's work performed in the fabricator's shop is required to be inspected in accordance with the Statement of Special Inspections and the Schedule of Special Inspections unless the fabricator is certified by the approved agency to perform such work without Special Inspections. Submit the following certifications to the Contracting Officer for information to allow work performed in the fabricator's shop to not be subjected to Special Inspections.

AISC Certified Steel Fabricator.

Truss Plate Institute (TPI) steel truss plant quality assurance program certification.

At the completion of fabrication, submit a certificate of compliance, to be included with the comprehensive final report of Special Inspections, stating that the materials supplied and work performed by the fabricator are in accordance the construction documents.

PART 3 EXECUTION

3.1 RESPONSIBILITIES

3.1.1 Special Inspector of Record

a. Supervise all Special Inspectors required by the contract documents and the IBC.

b. Submit a SIOR Letter of Acceptance to the Contracting Officer attesting to acceptance of the duties of SIOR, signed and sealed by the SIOR.

c. Verify the qualifications of all of the Special Inspectors.

d. Verify the qualifications of fabricators.

h. Prepare a Special Inspections Project Manual, which will cover the following:

(1) Roles and responsibilities of the following individuals during Special Inspections: SIOR, SI, ASI, General Contractor's QC Manager and SER.

(2) Organizational chart and/or communication plan, indicating lines of communication.

(3) Contractor's internal plan for scheduling inspections. Address items such as timeliness of inspection requests, who to contact for inspection requests, and availability of alternate inspectors.

(4) Indicate the government reporting requirements.

(5) Propose forms or templates to be used by SI and SIOR to document inspections.

(6) Indicate procedures for tracking nonconforming work and verification that corrective work is complete.

(7) Indicate how the SIOR and/or SI will participate in weekly QC meetings.

(8) Indicate how Special Inspections of shop fabricated items will be handled when the fabricator's shop is not certified per paragraph FABRICATOR SPECIAL INSPECTIONS.

(9) Include a section in the manual that covers each specific item requiring Special Inspections that is indicated on the Schedule of Special Inspections. Provide names and qualifications of each special inspector who will be performing the Special Inspections for each specific item. Provide detail on how the Special Inspections are to be carried out for each item so that the expectations are clear for the General Contractor and the Subcontractor performing the work.

Make a copy of the Special Inspections Project Manual available on the job site during construction. Submit a copy of the Special Inspections Project Manual for approval.

i. Attend coordination and mutual understanding meeting where the information in the Special Inspections Project Manual will be reviewed to verify that all parties have a clear understanding of the Special Inspections provisions and the individual duties and responsibilities of each party.

j. Maintain a 3- ring binder for the Special Inspector's daily and biweekly reports and the Special Inspections Project Manual. This file must be located in a conspicuous place in the project trailer/office to allow review by the Contracting Officer and the SER.

k. Submit a copy of the Special Inspector's daily reports to the QC Manager.

l. Discrepancies that are observed during Special Inspections must be reported to the QC Manager for correction. If discrepancies are not corrected before the special inspector leaves the site the observed discrepancies must be documented in the daily report.

m. Submit a biweekly Special Inspections report until all work requiring Special Inspections is complete. A report is required for each biweekly period in which Special Inspections activity occurs, and must include the following:

(1) A brief summary of the work performed during the reporting time frame.

(2) Changes and/or discrepancies with the drawings, specifications that were observed during the reporting period.

(3) Discrepancies which were resolved or corrected.

(4) A list of nonconforming items requiring resolution.

(5) All applicable test results including nondestructive testing reports.

o. At the completion of the project submit a comprehensive final report of Special Inspections that documents the Special Inspections completed for the project including corrections of all discrepancies noted in the daily reports. The comprehensive final report of Special Inspections must be signed, dated and bear the seal of the SIOR.

3.1.2 Quality Control Manager

a. Supervise all Special Inspectors required by the contract documents and the IBC.

b. Verify the qualifications of all of the Special Inspectors.

c. Verify the qualifications of fabricators.

d. Maintain a 3- ring binder for the Special Inspector's daily and biweekly reports. This file must be located in a conspicuous place in the project trailer/office to allow review by the Contracting Officer and the SER.

e. Maintain a rework items list that includes discrepancies noted on the Special Inspectors daily report.

3.1.3 Special Inspectors

a. Inspect all elements of the project for which the special inspector is qualified to inspect and are identified in the Schedule of Special Inspections.

b. Attend preparatory phase meetings related to the Definable Feature of Work (DFOW) for which the special inspector is qualified to inspect.

c. Submit Special Inspections agency's written NDT practices for the monitoring and control of the agency's operations to include the following:

(1) The agency's procedures for the selection and administration of inspection personnel, describing the training, experience and examination requirements for qualifications and certification of inspection personnel.

(2) The agency's inspection procedures, including general inspection, material controls, and visual welding inspection.

d. Submit qualification records for nondestructive testing (NDT) technicians designated for the project.

e. Submit NDT procedures and equipment calibration records for NDT to be performed and equipment to be used for the project.

f. Submit a copy of the daily reports to the QC Manager.

g. Discrepancies that are observed during Special Inspections must be reported to the QC Manager for correction. If discrepancies are not corrected before the special inspector leaves the site the observed discrepancies must be documented in the daily report.

h. Submit a biweekly Special Inspection Report until all inspections are complete. A report is required for each biweekly period in which Special Inspections activity occurs, and must include the following:

(1) A brief summary of the work performed during the reporting time frame.

(2) Changes and/or discrepancies with the drawings, specifications that were observed during the reporting period.

(3) Discrepancies which were resolved or corrected.

(4) A list of nonconforming items requiring resolution.

(5) All applicable test result including nondestructive testing reports.

i. At the completion of each DFOW requiring Special Inspections, submit an interim report of Special Inspections that documents the Special Inspections completed for that DFOW. Identify the inspector responsible for each item inspected and corrections of all discrepancies noted in the daily reports. The interim report of Special Inspections must be signed, dated and indicate the certification of the special inspector qualifying them to conduct the inspection.

j. At the completion of the project submit a comprehensive final report of Special Inspections that documents the Special Inspections completed for the project and corrections of all discrepancies noted in the daily reports. The comprehensive final report of Special Inspections must be signed, dated and indicate the certification of the special inspector qualifying them to conduct the inspection.

3.2 DEFECTIVE WORK

Check work as it progresses, but failure to detect any defective work or materials must in no way prevent later rejection if defective work or materials are discovered, nor obligate the Contracting Officer to accept such work.

-- End of Section --

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STATEMENT OF SPECIAL INSPECTIONS

This Statement of Special Inspections was prepared in accordance with Section 1704.3 of the 2015 International Building Code (IBC) and UFC 3-301-01, ***Structural Engineering***.

☐ **The Contractor's Quality Control (QC) Manager**

☒ **The Special Inspector of Record (SIOR)**

shall oversee the special inspection requirements defined in this statement. The qualification requirements and responsibilities for the Special Inspector of Record (if required), Contractor's Quality Control (QC) Manager, and various inspection and testing agents, report submittal requirements, discrepancy tracking procedures, and other procedures necessary to execute the special inspections program are defined in project specification 01 45 35 SPECIAL INSPECTIONS.

The Special Inspection program does not relieve the Contractor of the responsibility to comply with the Contract Documents. Jobsite safety and means and methods of construction are solely the responsibility of the Contractor.

This ***Statement of Special Inspections*** includes a ***Schedule of Special Inspections*** attached herein that defines the following:

- Materials, systems, components and work required to have special inspection or testing
- Type and extent of each special inspection
- Type and extent of each test
- Additional requirements for special inspection or testing for wind or seismic resistance where required
- Identification as to whether special inspection is continuous or periodic for each type of special inspection

The ***Schedule of Special Inspections*** identifies the following elements of the buildings and structures for this project that require verification and inspection in accordance with IBC 2018 Section 1705.

☒ Structural Steel

☒ Steel Construction other than Structural Steel

☒ Concrete Construction

☒ Masonry Construction:
- ☒ Quality Assurance Level 2
- ☐ Quality Assurance Level 3

☐ Wood Construction

☒ Soils Construction

☐ Driven Deep Foundations

☐ Cast-In-Place Deep Foundations

☐ Helical Pile Foundations

☐ Sprayed Fire-Resistant Materials (SFRM)

☐ Mastic and Intumescent Fire-Resistant Coatings

☐ Exterior Insulation and Finish Systems (EIFS)

☒ Fire-Resistant Penetrations and Joints

☐ Smoke Control

☐ Architectural Components

☐ Mechanical and Electrical Components

☐ Seismically Isolated Structures

Structural Design Criteria

Building or Structure Risk Category, RC =	**III**
Nominal Design Wind Speed, V_{asd} =	**128** mph
Ultimate Design Wind Speed, V_{ult} =	**165** mph
Seismic Design Category, SDC =	**B**

Contractor Statement of Responsibility (IBC Section 1704.4)

Where the contractor statement of responsibility is required, each contractor responsible for the construction of a main wind- or seismic force-resisting system, designated seismic system, or a wind- or seismic-resisting component listed in the ***Statement of Special Inspections*** shall submit a ***Contractor Statement of Responsibility*** to the Contracting Officer prior to the commencement of work on the system or component.

Contractor Statement of Responsibility

☒ is required for this project.

☐ is not required for this project.

Structural Observations (IBC Section 1704.5)

Where structural observations are required, they will be performed by the structural Designer of Record or their designated representative. The frequency and extent of structural observations is defined in project specification 01 45 35 SPECIAL INSPECTIONS.

Structural Observations for Wind Resistance	Structural Observations for Seismic Resistance
☒ are required for this project.	☐ are required for this project.
☐ are not required for this project.	☒ are not required for this project.

Special Inspections for Wind and Seismic Resistance (IBC Section 1705.10 & 1705.11)

Where special inspections for wind and seismic resistance are required, the descriptions of the Seismic Force Resisting Systems, Designated Seismic Systems, and Wind Force Resisting Systems that are subject to special inspections are provided below, and the frequency and extent of the special inspections are defined in the ***Schedule of Special Inspections***.

Special Inspections for Wind Resistance	Special Inspections for Seismic Resistance
☒ are required for this project.	☐ are required for this project.
☐ are not required for this project.	☒ are not required for this project.

Main Wind Force Resisting System(s) and Components (IBC Section 1704.3.3)

The following is a description of the main wind force resisting structural system(s) and components that are subject to special inspections:

- Metal roof deck diaphragm including support fasteners, sidelap fasteners, bent plates at decking transitions and fasteners to joists, trusses and infill plates.
- Shear blocking and it's connections to the roof decking and structural steel embeds.
- CMU Reinforcing layout and detailing.

SCHEDULE OF SPECIAL INSPECTIONS

P – Perform these Special Inspections tasks for each welded joint or member. (AISC 360 & AISC 341)

O – Observe these Special Inspections items on a random daily basis. Operations need not be delayed pending these inspections. (AISC 360 & AISC 341)

D – Document, with a report, that the work has been performed in accordance with the contract documents. (AISC 341)

C – Continuous Special Inspections is the constant monitoring of specific tasks by a special inspector. These inspections must be carried out continuously over the duration of the particular tasks. (IBC)

P – Periodic Special Inspections is Special Inspections by the special inspector who is intermittently present where the work to be inspected has been or is being performed. (IBC)

STRUCTURAL STEEL

PRIOR TO WELDING (Table N5.4-1, AISC 360-10 & TABLE J6-1, AISC 341-10)				
Required	Task	Perform	Observe	Description
☒	1. Verify welding procedures (WPS) and consumable certificates	P	-	
☒	2. Material identification (Type/Grade)	-	O	
☒	3. Welder identification system	-	O	A system shall be maintained by which a welder who has welded a joint or member can be identified. Stamps, if used, shall be the low-stress dye type.
☒	4. Fit-up groove welds (including joint geometry)	-	O	• Joint preparation • Dimensions (alignment, root opening, root face, bevel) • Cleanliness (condition of steel surfaces) • Tacking (tack weld quality and location) • Backing type and fit (if applicable)
☒	5. Configuration and finish of access holes	-	O	
☒	6. Fit-up of fillet welds	-	O	• Dimensions (alignment, gaps at root) • Cleanliness (condition of steel surfaces) • Tacking (tack weld quality and location)

STRUCTURAL STEEL

DURING WELDING (Table N5.4-2, AISC 360-10 & TABLE J6-2, AISC 341-10)				
Required	Task	Perform	Observe	Description
☒	1. Use of qualified welders	-	O	
☒	2. Control and handling of welding consumables	-	O	• Packaging • Exposure control.
☒	3. No welding over cracked tack welds	-	O	
☒	4. Environmental conditions	-	O	• Wind speed within limits • Precipitation and temperature
☒	5. WPS followed	-	O	• Settings on welding equipment • Travel speed • Selected welding materials • Shielding gas type/flow rate • Preheat applied • Interpass temperature maintained (min./max.) • Proper position (F, V, H, OH) • Intermix of filler metals avoided unless approved
☒	6. Welding techniques	-	O	• Interpass and final cleaning • Each pass within profile limitations • Each pass meets quality requirements

STRUCTURAL STEEL

AFTER WELDING (TABLE N5.4-3, AISC 360-10 & TABLE J6-3, AISC 341-10):				
Required	Task	Perform	Observe	Description
☒	1. Welds cleaned	-	O	
☒	2. Size, length, and location of welds	P	-	
☒	3. Welds meet visual acceptance criteria	P/D***	-	• Crack prohibition • Weld/base-metal fusion • Crater cross section • Weld profiles • Weld size • Undercut • Porosity
☒	4. Arc strikes	P	-	
☒	5. k-area	P	-	When welding of doubler plates, continuity plates or stiffeners has been performed in the k-area, visually inspect the web k-area for cracks within 3 in. of the weld.
☒	6. Backing removed and weld tabs removed (if required)	P	-	
☒	7. Backing removed, weld tabs removed and finished, and fillet welds added (if required)	P/D	-	
☒	8. Placement of reinforcing or contouring fillet welds (if required)	P/D	-	
☒	9. Repair activities	P/D***	-	
☒	10. Document acceptance or rejection of welded joint/member	P	-	

STRUCTURAL STEEL

NONDESTRUCTIVE TESTING (SECTION N5.5, AISC 360-10 & SECTION J6.2, AISC 341-10):				
Required	Task	Perform	Observe	Description
☒	1. CJP welds (Risk Cat. II)	-	O	Ultrasonic testing shall be performed on 10% of CJP groove welds in butt, T- and corner joints subject to transversely applied tension loading in materials 5/16-inch thick or greater. Testing rate must be increased if > 5% of welds tested have unacceptable defects.
☐	2. CJP welds (Risk Cat. III, IV or V)	-	O	Ultrasonic testing shall be performed on all CJP groove welds in butt, T- and corner joints subject to transversely applied tension loading in materials 5/16-inch thick or greater.
☒	3. CJP welds	-	O	Ultrasonic testing shall be performed on 100% of CJP groove welds in materials 5/16-inch or greater. Magnetic particle testing shall be performed on 25% of all beam-to-column CJP groove welds.
☒	4. Access holes (flange > 2”)	-	O	Thermally cut surfaces of access holes shall be MT or PT when the flange thickness exceeds 2 in. for rolled shapes, or when the web thickness exceeds 2 in. for built-up shapes. Any cracks shall be deemed unacceptable regardless of size or location.
☒	5. Welded joints subject to fatigue	-	O	Radiographic or Ultrasonically inspect welded joints identified on the contract documents to be subject to fatigue per sections 5.1, 5.2, 5.3, 5.4, 6.1, 6.2, and 6.3 of Table A-3.1, AISC 360-10.

STRUCTURAL STEEL

NONDESTRUCTIVE TESTING (SECTION N5.5, AISC 360-10 & SECTION J6.2, AISC 341-10):				
Required	Task	Perform	Observe	Description
☒	6. K-area NDT	P	-	Where welding of doubler plates, continuity plates or stiffeners has been performed in the k-area, the web shall be tested for cracks using magnetic particle testing (MT). The MT inspection area shall include the k-area base metal within 3-inches of the weld. The MT shall be performed no sooner than 48 hours following completion of the welding.
☒	7. Base metal NDT for lamellar tearing and laminations	-	O	After joint completion, base metal thicker than 1 1/2 in. loaded in tension in the through-thickness direction in tee and corner joints, where the connected material is greater than 3/4 in. and contains CJP groove welds, shall be ultrasonically tested for discontinuities behind and adjacent to the fusion line of such welds.
☒	8. Beam cope and access hole	-	O	At welded splices and connections, thermally cut surfaces of beam copes and access holes shall be tested using magnetic particle testing or penetrant testing, when the flange thickness exceeds 1 1/2 in. for rolled shapes, or when the web thickness exceeds 1 1/2 in. for built-up shapes.
☒	9. Reduced beam section repair	-	O	Magnetic particle testing shall be performed on any weld and adjacent area of the reduced beam section (RBS) cut surface that has been repaired by welding, or on the base metal of the RBS cut surface if a sharp notch has been removed by grinding.
☒	10. Weld tab removal sites	-	O	At the end of welds where weld tabs have been removed, magnetic particle testing shall be performed on the same beam-to-column joints receiving UT.

STRUCTURAL STEEL

PRIOR TO BOLTING (TABLE N5.6-1, AISC 360-10 & TABLE J7-1, AISC 341-10):				
Required	Task	Perform	Observe	Description
☒	1. Manufacture's certification available for fastener materials	P	-	
☒	2. Fasteners marked in accordance with ASTM requirements	-	O	
☒	3. Proper fasteners selected for joint detail (grade, type, bolt length if threads are to be excluded from shear plane	-	O	
☒	4. Proper bolting procedure selected for joint detail	-	O	
☒	5. Connecting elements, including appropriate faying surface condition and hole preparation, if specified, meet applicable requirements	-	O	
☒	6. Pre-installation verification testing by installation personnel observed and documented for fastener assemblies and methods used	-	O/D***	
☒	7. Proper storage provided for bolts, nuts, washers, and other fastener components	-	O	

STRUCTURAL STEEL

DURING BOLTING (TABLE N5.6-2, AISC 360-10 & TABLE J7-2, AISC 341-10):				
Required	Task	Perform	Observe	Description
☒	1. Fastener assemblies of suitable condition, paced in all holes and washers (if required) are positioned as required	-	O	
☒	2. Joint brought to the snug-tight condition prior to pretensioning operations	-	O	
☒	3. Fastener component not turned by the wrench prevented from rotating	-	O	
☒	4. Fasteners are pretensioned in accordance with RCSC Specification, progressing systematically from the most rigid point toward the free edges	-	O	
AFTER BOLTING (TABLE N5.6-3, AISC 360-10 & TABLE J7-3, AISC 341-10):				
Required	Task	Perform	Observe	Description
☒	Document acceptance or rejection of bolted connections	P/D***	-	
OTHER STEEL INSPECTIONS (SECTION N5.7, AISC 360-10):				
Required	Task	Perform	Observe	Description
☒	1. Anchor rods and other embedments supporting structural steel	P	-	Verify the diameter, grade, type, and length of the anchor rod or embedded item, and the extent or depth of embedment prior to placement of concrete.
☒	2. Fabricated steel or erected steel frame	-	O	Verify compliance with the details shown on the construction documents, such as braces, stiffeners, member locations and proper application of joint details at each connection.

STRUCTURAL STEEL

OTHER STEEL INSPECTIONS (Tables J8-1 & J10-1, AISC 341-10):				
Required	Task	Perform	Observe	Description
☐	1. Reduced beam sections (RBS)	P/D	-	• Contour and finish • Dimensional tolerances
☐	2. Protected zones	P/D	-	No holes or unapproved attachments made by fabricator or erector
☐	3. H-piles	P/D	-	No holes or unapproved attachments made by the responsible contractor
STEEL ELEMENTS OF COMPOSITE CONSTRUCTION PRIOR TO CONCRETE PLACEMENT (TABLE N6.1, AISC 360-10):				
Required	Task	Perform	Observe	Description
☒	1. Placement and installation of steel deck	P	-	
☒	2. Placement and installation of steel headed stud anchors	P	-	
☒	3. Document acceptance or rejection of steel elements	P	-	
COMPOSITE STRUCTURES PRIOR TO CONCRETE PLACEMENT (TABLE J9-1, AISC 341-10):				
Required	Task	Perform	Observe	Description
☒	1. Material identification of reinforcing steel (Type/Grade)	-	O	
☒	2. Determination of carbon equivalent for reinforcing steel other than ASTM A706	-	O	
☒	3. Proper reinforcing steel size, spacing and orientation	-	O	
☒	4. Reinforcing steel has not been rebent in the field	-	O	
☒	5. Reinforcing steel has been tied and supported as required	-	O	
☒	6. Required reinforcing steel clearances have been provided	-	O	
☒	7. Composite member has required size	-	O	

STRUCTURAL STEEL

COMPOSITE STRUCTURES DURING CONCRETE PLACEMENT (TABLE J9-2, AISC 341-10):				
Required	Task	Perform	Observe	Description
☒	1. Concrete: Material identification (mix design, compressive strength, maximum large aggregate size, maximum slump)	-	O/D	
☒	2. Limits on water added at the truck or pump	-	O/D	
☒	3. Proper placement techniques to limit segregation	-	O	

STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL

STEEL ROOF AND FLOOR DECKS (IBC TABLE 1705.2.2):				
Required	Task	Continuous	Periodic	Description
☒	1. Material verification of cold-formed steel deck	-	P	Confirm that identification markings are provided to conform to ASTM standards specified on approved construction documents. Verify material with manufacturer's certified test reports.
☒	2. Floor and roof deck attachment	-	P	Visual inspection to confirm that welds meet acceptance criteria of AWS D1.3 and verify welder qualifications and mechanical fasteners installed at the proper spacing.

STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL

COLD FORMED STEEL (IBC 1705.2.2, 1705.10, 1705.11):				
Required	Task	Continuous	Periodic	Description
☒	1. Cold-formed steel light-frame construction welded connections (*, **)	-	P	Visually inspect all welds within the main wind force or seismic force resisting system in accordance with AWS D1.4.
☒	2. Cold-formed steel light-frame construction mechanical connections (*, **)	-	P	Visually inspect all screw attachment, bolting, anchoring and other fastening of components within the main wind force or seismic force resisting system including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.
☒	3. Cold-formed steel connections (#)	-	P	Verify proper welding operations, screw attachment, bolting, anchoring and other fastening of components within the progressive collapse resisting system, including horizontal tie force elements, vertical tie force elements and bridging elements.

CONCRETE CONSTRUCTION

IBC TABLE 1705.3, 1705.12.1:				
Required	Task	Continuous	Periodic	Description
☒	1. Reinforcing steel, including prestressing tendons	-	P	Verify prior to placing concrete that reinforcing is of specified type, grade and size; that it is free of oil, dirt and rust; that it is located and spaced properly; that hooks, bends, ties, stirrups and supplemental reinforcement are placed correctly; that lap lengths, stagger and offsets are provided; and that all mechanical connections are installed per the manufacturer's instructions and/or evaluation report.
☒	2. Anchors cast in concrete	-	P	Verify prior to placing concrete that cast in anchors have proper embedment, spacing and edge distance.
☒	3. Post-installed anchors or dowels	C		Inspect all post-installed anchors/dowels as required by the approved ICC-ES report.
☒	4. Use of required mix design	-	P	Verify that all mixes used comply with the approved construction documents
☒	5. Concrete slump, air content, and temperature	C	-	At the time fresh concrete is sampled to fabricate specimens for strength test verify these tests are performed.
☒	6. Concrete & shotcrete placement	C	-	Verify proper application techniques are used during concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated.
☒	7. Curing temperature and techniques	-	P	Inspect curing , cold weather protection and hot weather protection procedures.
☐	8. Pre-stressed concrete	C	-	Verify application of prestressing forces and grouting of bonded prestressing tendons in the seismic force-resisting system.

MASONRY CONSTRUCTION – LEVEL B

PRIOR TO CONSTRUCTION (SPEC ARTICLE 1.5, TMS-602/ACI 530.1-11):				
Required	Task	Continuous	Periodic	Description
☒	Review material certificates, mix designs, test results and construction procedures	-	P	Verify that materials conform to the requirements of the approved construction documents.
AS CONSTRUCTION BEGINS (TABLE 1.19.2, TMS-402/ACI 530-11):				
Required	Task	Continuous	Periodic	Description
☒	1. Proportions of site-prepared mortar	-	P	Verify that mortar is of the type and color specified on the construction documents, that it conforms to ASTM C 270, and that it is mixed in accordance with Article 2.6 A of TMS-602/ACI 530.1.
☒	2. Construction of mortar joints	-	P	Verify that mortar joints comply with Article 3.3 B of TMS-602/ACI 530.1.
☒	3. Location of reinforcement and connectors	-	P	Verify that reinforcement is placed in accordance with Article 3.4 of TMS-602/ACI 530.1.

MASONRY CONSTRUCTION – LEVEL B

PRIOR TO GROUTING (TABLE 1.19.2, TMS-402/ACI 530-11):				
Required	Task	Continuous	Periodic	Description
☒	1. Grout space	-	P	Verify that grout space is free of mortar droppings, debris, loose aggregate, and other deleterious materials and that cleanouts are provided per Article 3.2 D and 3.2 F of TMS-602/ACI 530.1.
☒	2. Grade, type, and size of reinforcement and anchor bolts	-	P	Verify that reinforcement, joint reinforcement, wall ties, anchor bolts and veneer anchors comply with the approved construction documents and Section 1.16 of TMS 402/ACI 530.
☒	3. Placement of reinforcement and connectors	-	P	Verify that reinforcement, joint reinforcement, wall ties, anchor bolts and veneer anchors are installed in accordance with the approved construction documents and Articles 3.2 E, 3.4, and 3.6 A of TMS 602/ACI 530.1.
☒	4. Proportions of site-prepared grout	-	P	Verify that grout is proportioned per ASTM C 476 and has a slump between 8-11 inches. Self-consolidated grout shall not be proportioned onsite.
☒	5. Construction of mortar joints	-	P	Verify that mortar joints are placed in accordance with Article 3.3 B of TMS 602/ACI 530.1.

MASONRY CONSTRUCTION – LEVEL B

DURING MASONRY CONSTRUCTION (TABLE 1.19.2, TMS-402/ACI 530-11):				
Required	Task	Continuous	Periodic	Description
☒	1. Size and location of structural elements	-	P	Verify the locations of structural elements with respect to the approved plans and confirm that tolerances meet the requirements of Article 3.3 F of TMS 602/ACI 530.1.
☒	2. Type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction.	-	P	Verify that correct anchorages and connections are provided per the approved plans and Sections 1.16.4.3 and 1.17.1 of TMS 402/ACI 530.
☒	3. Preparation, construction, and protection of masonry during cold weather (<40°F) or hot weather (>90°F).	-	P	Verify that cold-weather construction is performed in accordance with Article 1.8 C of TMS 602/ACI 530.1 and hot weather construction per Article 1.8 D of TMS 602/ACI 530.1.
☒	4. Placement of grout	C	-	Verify placement of grout is done in accordance with Article 3.5 of TMS 602/ACI 530.1.
☒	5. Observation of grout specimens, mortar specimens, and/or prisms	-	P	Confirm that specimens/prisms are performed as required by Article 1.4 of TMS-602/ACI 530.1.

MASONRY CONSTRUCTION – LEVEL B

MINIMUM TESTING (TABLE 1.19.2, TMS-402/ACI 530-11):				
Required	Task	Continuous	Periodic	Description
☒	1. Verification of Slump Flow and Visual Stability Index (VSI) for self-consolidating grout	-	-	Compressive strength tests should be performed in accordance with ASTM C 1019 for slump flow and ASTM C 1611 for VSI.
☒	2. Verification of f'm	-	-	Determine the compressive strength for each wythe by the "unit strength method" or by the "prism test method" as specified in Article 1.4 B of TMS 602/ACI 530.1 prior to construction.

SOILS CONSTRUCTION

IBC TABLE 1705.6				
Required	Task	Continuous	Periodic	Description
☒	1. Foundation bearing capacity	-	P	Verify the materials below foundations are adequate to achieve the design bearing capacity.
☒	2. Excavations	-	P	Verify the excavations are extended to the proper depth and have reached proper material.
☒	3. Perform classification and testing of compacted fill materials	-	P	
☒	4. Compacted fill material	C	-	Verify the use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill.
☒	5. Subgrade	-	P	Prior to placement of compacted fill, observe sub-grade and verify that site has been prepared properly.

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SECTION 01 57 19

TEMPORARY ENVIRONMENTAL CONTROLS - TYNDALL STANDARD
08/2021

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA SW-846	(Third Edition; Update IV) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
40 CFR 112	Oil Pollution Prevention
40 CFR 122.26	Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)
40 CFR 241	Guidelines for Disposal of Solid Waste
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 261.7	Residues of Hazardous Waste in Empty Containers
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 262.11	Standards Applicable to Generators of Hazardous Waste - Hazardous Waste Determination and Recordkeeping
40 CFR 262.31	Standards Applicable to Generators of Hazardous Waste-Labeling
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of

	Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 273	Standards For Universal Waste Management
40 CFR 273.2	Standards for Universal Waste Management - Batteries
40 CFR 273.3	Standards for Universal Waste Management - Pesticides
40 CFR 273.4	Standards for Universal Waste Management - Mercury Containing Equipment
40 CFR 273.5	Standards for Universal Waste Management - Lamps
40 CFR 279	Standards for the Management of Used Oil
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 300.125	National Oil and Hazardous Substances Pollution Contingency Plan - Notification and Communications
40 CFR 355	Emergency Planning and Notification
40 CFR 403	General Pretreatment Regulations for Existing and New Sources of Pollution
40 CFR 50	National Primary and Secondary Ambient Air Quality Standards
40 CFR 60	Standards of Performance for New Stationary Sources
40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 63	National Emission Standards for Hazardous Air Pollutants for Source Categories
40 CFR 64	Compliance Assurance Monitoring
40 CFR 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
40 CFR 761	Polychlorinated Biphenyls (PCBs)

	Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 172.101	Hazardous Material Regulation-Purpose and Use of Hazardous Material Table
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

TYNDALL AFB INSTRUCTIONS AND DIRECTIVES

Tyndall AFB Hazardous Waste Management Plan

Tyndall AFB Asbestos Management Plan

Installation Restoration Program and Aqueous Film Forming Foam Guidelines For MILCON Rebuild

Environmental Supplemental Guidance

General Environmental Requirements For Contracts

Tyndall AFB Guidelines for Non-ERP Soil Management USACE MILCON Buildout

Tyndall Soils Decision Matrix

Location Map for designated Soil Borrow Storage Area

1.2 DEFINITIONS

1.2.1 Class I and II Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act. A list of Class I ODS can be found on the EPA website at the following weblink. https://www.epa.gov/ozone-layer-protection/ozone-depleting-substances.

Class II ODS is defined in Section 602(s) of The Clean Air Act. A list of Class II ODS can be found on the EPA website at the following weblink. https://www.epa.gov/ozone-layer-protection/ozone-depleting-substances.

1.2.2 Contractor Generated Hazardous Waste

Contractor generated hazardous waste is materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e., methyl ethyl ketone, toluene), waste thinners, excess paints, excess solvents, waste solvents, excess pesticides, and

contaminated pesticide equipment rinse water.

1.2.3 Electronics Waste

Electronics waste is discarded electronic devices intended for salvage, recycling, or disposal.

1.2.4 Environmental Management System (EMS)

Environmental Management System is a framework that establishes environmental quality program compliance and budgeting for the three key pillars of environmental management (compliance, conservation, and pollution prevention) in accordance with AFI 32-7001 Environmental Management.

1.2.5 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally or historically.

1.2.6 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.7 Hazardous Debris

As defined in paragraph SOLID WASTE, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) in accordance with 40 CFR 261. Hazardous debris also includes debris that exhibits a characteristic of hazardous waste in accordance with 40 CFR 261.

1.2.8 Hazardous Materials

Hazardous materials as defined in 49 CFR 171 and listed in 49 CFR 172.

Hazardous material is any material that: Is regulated as a hazardous material in accordance with 49 CFR 173; or requires a Safety Data Sheet (SDS) in accordance with 29 CFR 1910.120; or during end use, treatment, handling, packaging, storage, transportation, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D. Designation of a material by this definition, when separately regulated or controlled by other sections or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this section for "control" purposes. Such material includes ammunition, weapons, explosive actuated devices, propellants, pyrotechnics, chemical and biological warfare materials, medical and pharmaceutical supplies, medical waste and infectious materials, bulk fuels, radioactive materials, and other materials such as asbestos, mercury, and polychlorinated

biphenyls (PCBs).

1.2.9 Hazardous Waste

Hazardous Waste is any material that meets the definition of a solid waste and exhibit a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity) as specified in 40 CFR 261, Subpart C, or contains a listed hazardous waste as identified in 40 CFR 261, Subpart D.

1.2.10 Land Application

Land Application means spreading or spraying discharge water at a rate that allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" must occur. Comply with federal, state, and local laws and regulations.

1.2.11 Municipal Separate Storm Sewer System (MS4) Permit

MS4 permits are those held by installations to obtain NPDES permit coverage for their stormwater discharges.

1.2.12 National Pollutant Discharge Elimination System (NPDES)

The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

1.2.13 Oily Waste

Oily waste are those materials that are, or were, mixed with Petroleum, Oils, and Lubricants (POLs) and have become separated from that POLs. Oily wastes also means materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with and have been contaminated by, POLs and may be appropriately tested and discarded in a manner which is in compliance with other state and local requirements.

This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land filled provided that: It is not prohibited in other state regulations or local ordinances; the amount generated is "de minimus" (a small amount); it is the result of minor leaks or spills resulting from normal process operations; and free-flowing oil has been removed to the practicable extent possible. Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, perform a hazardous waste determination prior to disposal. As this can be an expensive process, it is recommended that this type of waste be minimized through good housekeeping practices and employee education.

1.2.14 Regulated Waste

Regulated waste are solid wastes that have specific additional federal, state, or local controls for handling, storage, or disposal.

1.2.15 Sediment

Sediment is soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.16 Solid Waste

Solid waste is a solid, liquid, semi-solid or contained gaseous waste. A solid waste can be a hazardous waste, non-hazardous waste, or non-Resource Conservation and Recovery Act (RCRA) regulated waste. Types of solid waste typically generated at construction sites may include:

1.2.16.1 Debris

Debris is non-hazardous solid material generated during the construction, demolition, or renovation of a structure that exceeds 60 mm 2.5-inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (for example, cobbles and boulders), including aggregates intended, but not used, for on-site mixing of concrete, mortars, and paving) broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may be reinforced with or contain ferrous wire, rods, accessories and weldments. A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.2.16.2 Green Waste

Green waste is the vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.

1.2.16.3 Material not regulated as solid waste

Material not regulated as solid waste is nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

1.2.16.4 Non-Hazardous Waste

Non-hazardous waste is waste that is excluded from, or does not meet, hazardous waste criteria in accordance with 40 CFR 261.

1.2.16.5 Recyclables

Recyclables are materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable, wiring, insulated/non-insulated copper wire cable, wire rope, and structural components. It also includes commercial-grade refrigeration equipment with Freon removed, household appliances where the basic material content is metal, clean polyethylene terephthalate bottles, cooking oil, used fuel oil, textiles, high-grade paper products and corrugated cardboard, stackable pallets in good condition, clean crating material, and clean rubber/vehicle tires. Metal meeting the definition of lead contaminated or lead based paint contaminated may not be included as recyclable if sold to a scrap metal company. Paint cans that meet the definition of empty containers in accordance with 40 CFR 261.7 may be included as recyclable if sold to a

scrap metal company.

1.2.16.6 Surplus Soil

Surplus soil is existing soil that is in excess of what is required for this work. Surplus soil must be managed in accordance with attachments Installation Restoration Program and Aqueous Film Forming Foam Guidelines for Tyndall MILCON-Rebuild, Tyndall AFB Guidelines for Non-ERP Soil Management USACE MILCON Build-out, and UFGS 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL. Soil meeting the definition of hazardous material, hazardous waste, hazardous substance, or other regulated constituent as identified by concentrations above Florida Department of Environmental Protection's (FDEP) Soil Cleanup Target Level is not included. Contaminated soil must be managed in accordance with the requirements of the regulations associated with the classification of the contamination as indicated in attachment Installation Restoration Program and Aqueous Film Forming Foam Guidelines of Tyndall MILCON-Rebuild and UFGS 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL>.

1.2.16.7 Scrap Metal

This includes scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe, and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.

1.2.16.8 Wood

Wood is dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included. Treated wood includes, but is not limited to, lumber, utility poles, crossties, and other wood products with chemical treatment.

1.2.17 Surface Discharge

Surface discharge means discharge of water into drainage ditches, storm sewers, creeks or "waters of the United States". Surface discharges are discrete, identifiable sources and require a permit from the governing agency. Comply with federal, state, and local laws and regulations.

1.2.18 Wastewater

Wastewater is the used water and solids from a community that flow to a treatment plant.

1.2.18.1 Stormwater

Stormwater is any precipitation in an urban or suburban area that does not evaporate or soak into the ground, but instead collects and flows into storm drains, rivers, and streams.

1.2.19 Waters of the United States

Waters of the United States means Federally jurisdictional waters, including wetlands, that are subject to regulation under Section 404 of the Clean Water Act or navigable waters, as defined under the Rivers and Harbors Act.

1.2.20 Wetlands

Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

1.2.21 Universal Waste

The universal waste regulations streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (for example, thermostats), and lamps (for example, fluorescent bulbs), and aerosol cans. The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be found at 40 CFR 273.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preconstruction Survey

Solid Waste Management Permit; G

Regulatory Notifications and Permits
(Water, Air, Waste, Utility, etc); G

Environmental Protection Plan; G

Stormwater Notice of Intent and/or Stormwater Pollution Prevention Plan (SWPPP) (for NPDES coverage under the general permit for construction activities); G

Dirt and Dust Control Plan; G

Employee Training Records; G

Environmental Manager Qualifications

Hazardous Materials Forms(TAFB FORMS 81&82)and Safety Data Sheets; G

SD-06 Test Reports

Laboratory Analysis

Inspection Reports

Monthly Solid Waste Disposal Report

SD-07 Certificates

Employee Training Records

Certificate of Competency

Erosion and Sediment Control Inspector Qualifications

SD-11 Closeout Submittals

Stormwater Pollution Prevention Plan Compliance Notebook; G

Stormwater Notice of Termination (for NPDES coverage under the general permit for construction activities); G

Waste Determination Documentation; G

Disposal Documentation for Hazardous and Regulated Waste; G

Assembled Employee Training Records; G

Solid Waste Management Permit

Project Solid Waste Disposal Documentation Report; G

Hazardous Waste/Debris Management

Regulatory Notifications; G

Sales Documentation; G

Contractor Certification

As-Built Topographic Survey

Hazardous Material Usage Form (TAFB FORM 83)

1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this Contract. Comply with federal, state, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Tests and procedures assessing whether construction operations comply with Applicable Environmental Laws may be required. Analytical work must be performed by qualified laboratories; and where required by law, the laboratories must be certified.

1.4.1 Conformance with the Environmental Management System

Perform work under this contract consistent with the policy and objectives identified in the installation's Environmental Management System (EMS) in accordance with AFI 32-7001, Environmental Management. Perform work in a manner that conforms to objectives and targets of the environmental

programs and operational controls identified by the EMS. Support Government personnel when environmental compliance and EMS audits are conducted by escorting auditors at the Project site, answering questions, and providing proof of records being maintained. Provide monitoring and measurement information as necessary to address environmental performance relative to environmental, energy, and transportation management goals. In the event an EMS nonconformance or environmental noncompliance associated with the contracted services, tasks, or actions occurs, take corrective and preventative actions. In addition, employees must be aware of their roles and responsibilities under the installation EMS and of how these EMS roles and responsibilities affect work performed under the contract.

Coordinate with the installation's EMS coordinator to identify training needs associated with environmental aspects and the EMS, and arrange training or take other action to meet these needs. Provide training documentation to the Contracting Officer. The Installation Environmental Office will retain associated environmental compliance records. Make EMS Awareness training completion certificates available to Government auditors during EMS audits and include the certificates in the Employee Training Records. See paragraph EMPLOYEE TRAINING RECORDS.

1.5 QUALITY ASSURANCE

1.5.1 Preconstruction Survey and Protection of Features

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, perform a Preconstruction Survey of the project site with the Contracting Officer, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record. Include in the report a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. The Contractor and the Contracting Officer will sign this survey report upon mutual agreement regarding its accuracy and completeness. Protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference that their preservation may cause to the work under the Contract.

1.5.2 Regulatory Notifications

Provide regulatory notification requirements in accordance with federal, state and local regulations. In cases where the Government will also provide public notification (such as stormwater permitting), coordinate with the Contracting Officer. Submit copies of regulatory notifications to the Contracting Officer at least 30 days prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all-inclusive): demolition, renovation, NPDES defined site work, construction, removal or use of a permitted air emissions source, and remediation of controlled substances (asbestos, hazardous waste, lead paint). All permit applications must be reviewed by the 325 CES/CEIE and signed by the 325 CES Commander prior to submittal. The 325 CES/CEIE shall be copied on all regulatory correspondence.

1.5.3 Environmental Brief

Attend an environmental brief to be included in the preconstruction meeting. Provide the following information: TAFB Forms 81/82 which includes the types, quantities, and use of hazardous materials that will be brought onto the installation, along with Safety Data Sheets for each material listed on the form 82 and types and quantities of wastes/wastewater that may be generated during the Contract. Discuss the results of the Preconstruction Survey at this time.

Prior to initiating any work on site, meet with the Contracting Officer and installation Environmental Office to discuss the proposed Environmental Protection Plan (EPP). Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural and cultural resources, required reports, required permits, permit requirements (such as mitigation measures), and other measures to be taken.

1.5.4 Environmental Manager

Appoint in writing an Environmental Manager for the project site. The Environmental Manager is directly responsible for coordinating contractor compliance with federal, state, local, and installation requirements. The Environmental Manager must ensure compliance with Hazardous Waste Program requirements (including hazardous waste handling, storage, manifesting, and disposal); implement the EPP; ensure environmental permits are obtained, maintained, and closed out; ensure compliance with Stormwater Program requirements; ensure compliance with Hazardous Materials (storage, handling, and reporting) requirements; and coordinate any remediation of regulated substances (lead, asbestos, PCB transformers). This can be a collateral position; however, the person in this position must be trained to adequately accomplish the following duties: ensure waste segregation and storage compatibility requirements are met; inspect and manage Satellite Accumulation areas; ensure only authorized personnel add wastes to containers; ensure Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; coordinate removal of waste containers; and maintain the Environmental Records binder and required documentation, including environmental permits compliance and close-out. Submit Environmental Manager Qualifications to the Contracting Officer.

1.5.5 Employee Training Records

Prepare and maintain Employee Training Records throughout the term of the contract meeting applicable 40 CFR requirements. Provide Employee Training Records in the Environmental Records Binder. Ensure every employee completes a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures compliance with federal, state and local regulatory requirements for RCRA Large Quantity Generator. Provide a Position Description for each employee, by subcontractor, based on the Davis-Bacon Wage Rate designation or other equivalent method, evaluating the employee's association with hazardous and regulated wastes. This Position Description will include training requirements as defined in 40 CFR 262.17(a)(7) for a Large Quantity Generator facility. Submit these Assembled Employee Training Records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

Train personnel to meet EPA and state requirements. Conduct environmental protection/pollution control meetings for personnel prior to commencing

construction activities. Contact additional meetings for new personnel and when site conditions change. Include in the training and meeting agenda: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, waters of the United States, and endangered species and their habitat that are known to be in the area. Provide copy of the Erosion and Sediment Control Inspector Qualifications as defined by EPA or Certification as required by state.

1.5.6 Non-Compliance Notifications

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with federal, state or local environmental laws or regulations, permits, and other elements of the Contractor's EPP. After receipt of such notice, inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. FAR 52.242-14 Suspension of Work provides that a suspension, delay, or interruption of work due to the fault or negligence of the Contractor allows for no adjustments to the contract for time extensions or equitable adjustments. In addition to a suspension of work, the Contracting Officer may use additional authorities under the contract or law. The Prime Contractor will have the sole responsibility to ensure all their subcontractors comply with all environmental protection requirements of this specification section.

1.6 ENVIRONMENTAL PROTECTION PLAN

The purpose of the EPP is to present an overview of known or potential environmental issues that must be considered and addressed during construction. Incorporate construction related objectives and targets from the installation's EMS into the EPP. Include in the EPP measures for protecting natural and cultural resources, required reports, and other measures to be taken. Meet with the Contracting Officer or Contracting Officer Representative to discuss the EPP and develop a mutual understanding relative to the details for environmental protection including measures for protecting natural resources, required reports, and other measures to be taken. Submit the EPP within 15 days after Contract award and not less than 10 days before the preconstruction meeting. Revise the EPP throughout the project to include any reporting requirements, changes in site conditions, or contract modifications that change the project scope of work in a way that could have an environmental impact. No requirement in this section will relieve the Contractor of any applicable federal, state, and local environmental protection laws and regulations. During Construction, identify, implement, and submit for approval any additional requirements to be included in the EPP. Maintain the current version onsite.

The EPP includes, but is not limited to, the following elements:

1.6.1 General Overview and Purpose

1.6.1.1 Descriptions

A brief description of each specific plan required by environmental permit or elsewhere in this Contract such as stormwater pollution prevention plan, spill control plan, solid waste management plan, wastewater management plan, air pollution control plan, contaminant prevention plan, traffic control plan, Non-Hazardous Solid Waste Disposal Plan, and borrowing material plan.

1.6.1.2 Duties

The duties and level of authority assigned to the person(s) on the job site who oversee environmental compliance, such as who is responsible for adherence to the EPP, who is responsible for spill cleanup and training personnel on spill response procedures, who is responsible for manifesting hazardous waste to be removed from the site (if applicable), and who is responsible for training the Contractor's environmental protection personnel.

1.6.1.3 Procedures

A copy of any standard or project-specific operating procedures that will be used to effectively manage and protect the environment on the project site.

1.6.1.4 Communications

Communication and training procedures that will be used to convey environmental management requirements to Contractor employees and subcontractors.

1.6.1.5 Contact Information

Emergency contact information contact information (office phone number, cell phone number, and e-mail address).

1.6.2 General Site Information

1.6.2.1 Drawings

Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, jurisdictional wetlands, material storage areas, structures, sanitary facilities, storm drains and conveyances, and stockpiles of excess soil.

1.6.2.2 Work Area

Work area plan showing the proposed activity in each portion of the area and identify the areas of limited use or nonuse. Include measures for marking the limits of use areas, including methods for protection of features to be preserved within authorized work areas and methods to control runoff and to contain materials on site, and a traffic control plan.

1.6.2.3 Documentation

A letter signed by an officer of the firm appointing the Environmental Manager and stating that person is responsible for managing and implementing the Environmental Program as described in this contract.

Include in this letter the Environmental Manager's authority to direct the removal and replacement of non-conforming work.

1.6.3 Management of Natural Resources

a. Land resources.

b. Tree protection.

c. Replacement of damaged landscape features.

d. Temporary construction.

e. Stream crossings.

f. Fish and wildlife resources.

g. Wetland areas.

1.6.4 Protection of Historical and Archaeological Resources

a. Objectives.

b. Methods.

1.6.5 Stormwater Management and Control

a. Ground cover.

b. Erodible soils.

c. Temporary measures.

(1) Structural Practices.

(2) Temporary and permanent stabilization.

d. Effective selection, implementation and maintenance of Best Management Practices (BMPs).

1.6.6 Protection of the Environment from Waste Derived from Contractor Operations

Control and disposal of solid and sanitary waste. Control and disposal of hazardous waste.

This item consist of the management procedures for hazardous waste to be generated. The elements of those procedures will coincide with the Installation Hazardous Waste Management Plan. The Contracting Officer will provide a copy of the Installation Hazardous Waste Management Plan. As a minimum, include the following:

a. List of the types of hazardous wastes expected to be generated.

b. Procedures to ensure a written waste determination is made for appropriate wastes that are to be generated.

c. Sampling/analysis plan, including laboratory method(s) that will be used for waste determinations and copies of relevant laboratory

certifications.

d. Methods and proposed locations for hazardous waste accumulation/storage (that is, in tanks or containers).

e. Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted). The contractor shall provide applicable landfill tipping fee(s)and the projected cost of disposing of all project waste in the landfill(s), where allowed per UFGS 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

f. Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268).

g. Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and similar.

h. Used oil management procedures in accordance with 40 CFR 279; Hazardous waste minimization procedures.

i. Plans for the disposal of hazardous waste by permitted facilities; and Procedures to be employed to ensure required employee training records are maintained.

1.6.7 Prevention of Releases to the Environment

Procedures to prevent releases to the environment,

Notifications in the event of a release to the environment,

1.6.8 Regulatory Notification and Permits

List what notifications and permit applications must be made. Some permits require up to 180 days to obtain. Demonstrate that those permits have been obtained or applied for by including copies of applicable environmental permits. The EPP will not be approved until the permits have been obtained.

1.6.9 Clean Air Act Compliance

1.6.9.1 Haul Route

Submit truck and material haul routes along with a Dirt and Dust Control Plan for controlling dirt, debris, and dust on Installation roadways. As a minimum, identify in the plan the subcontractor and equipment for cleaning along the haul route and measures to reduce dirt, dust, and debris from roadways.

1.6.9.2 Pollution Generating Equipment

Identify air pollution generating equipment or processes that may require federal, state, or local permits under the Clean Air Act. Determine requirements based on any current installation permits and the impacts of the project. Provide a list of all fixed or mobile equipment, machinery or operations that could generate air emissions during the project to the Installation Environmental Office (Air Program Manager).

If emergency generators, boilers, or other sources of air pollutants will be associated with this facility, coordinate with the 325 CES/CEIEC Air

Quality Program Manager, 283-4341 BEFORE source installation. Ensure generator engines are certified to meet 40 CFR Part 60 Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines or CFR Part 60 Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. Any facility having refrigeration equipment, including air conditioning equipment, which uses a Class I or II substance (listed at 40 CFR 82, Subpart A, Appendices A and B), and any facility which maintains, services, or repairs motor vehicles using a Class I or Class II substance as refrigerant must comply with all requirements of 40 CFR 82, Subparts B and F, and with Chapter 62-281, F.A.C. Any refrigerant recycle/recovery equipment must be registered with the Air Quality Program manager (283-4341).

1.6.9.3 Stationary Internal Combustion Engines

Identify portable and stationary internal combustion engines that will be supplied, used or serviced. Comply with 40 CFR 60 Subpart IIII, 40 CFR 60 Subpart JJJJ, 40 CFR 63 Subpart ZZZZ, and local regulations as applicable. At minimum, include the make, model, serial number, manufacture date, size (engine brake horsepower), and EPA emission certification status of each engine. Maintain applicable records and log hours of operation and fuel use. Logs must include reasons for operation and delineate between emergency and non-emergency operation.

1.6.9.4 Refrigerants

Identify management practices to ensure that heating, ventilation, and air conditioning (HVAC) work involving refrigerants complies with 40 CFR 82 requirements. Technicians must be certified, maintain copies of certification on site, use certified equipment and log work that requires the addition or removal of refrigerant. Any refrigerant reclaimed is the property of the Government, coordinate with the Installation Environmental Office to determine the appropriate turn in location.

1.6.9.5 Air Pollution-engineering Processes

Identify planned air pollution-generating processes and management control measures (including, but not limited to, spray painting, abrasive blasting, demolition, material handling, fugitive dust, and fugitive emissions). Log hours of operations and track quantities of materials used.

1.6.9.6 Compliant Materials

Provide the Government a list of and SDSs for all hazardous materials proposed for use on site. Materials must be compliant with all Clean Air Act regulations for emissions including solvent and volatile organic compound contents, and applicable National Emission Standards for Hazardous Air Pollutants requirements. The Government may alter or limit use of specific materials as needed to meet installation permit requirements for emissions.

1.7 LICENSES AND PERMITS

Obtain licenses and permits required for the construction of the project and in accordance with FAR 52.236-7 Permits and Responsibilities. Notify the Government of all general use permitted equipment the Contractor plans to use on site.

1.8 ENVIRONMENTAL RECORDS BINDER

Maintain on-site a separate three-ring Environmental Records Binder and submit at the completion of the project. Make separate parts within the binder that correspond to each submittal listed under paragraph CLOSEOUT SUBMITTALS in this section.

1.9 SOLID WASTE MANAGEMENT PERMIT

Provide the Contracting Officer with written notification of the quantity of anticipated solid waste or debris that is anticipated or estimated to be generated by construction. Include in the report the locations where various types of waste will be disposed or recycled. Include letters of acceptance from the receiving location or as applicable; submit one copy of the receiving location state and local Solid Waste Management Permit or license showing such agency's approval of the disposal plan before transporting wastes off Government property.

1.9.1 Monthly Solid Waste Disposal Report

Monthly, submit a solid waste disposal report to the Contracting Officer. For each waste, the report will state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste.

1.10 FACILITY HAZARDOUS WASTE GENERATOR STATUS

Tyndall AFB is designated as a Large Quantity Generator. Meet the regulatory requirements of this generator designation for any work conducted within the boundaries of this Installation. Comply with provisions of federal, state, and local regulatory requirements applicable to this generator status regarding training and storage, handling, and disposal of construction derived wastes.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 ENVIRONMENTAL PERMITS AND COMMITMENTS

The Contractor shall ensure that required environmental permits are obtained prior to start of construction and/or installing or operating any new or modified equipment or processes or disturbing any land area. The contractor shall coordinate all environmental permits with the Contracting Officer and Tyndall AFB Environmental Office. The Contractor shall prepare any required technical documentation for the permit application, and submit to the Contracting Officer and Tyndall AFB Environmental Office for review. The 325 CES/CES will sign and forward applications to the contractor for submittal to the appropriate regulatory authority. The Contractor shall be responsible for operating within permit limits and abiding by all permit conditions. The Contracting Officer and 325 CES/CEIE shall be notified immediately of any exceedances of permit limits or violation of permit conditions. The Contractor shall immediately notify the Contracting Officer and 325 CES/CEIE of any unforeseen environmental conditions, which may conflict with approved permits. Any certifications required by permits shall be the responsibility of the Contractor. Copies of all permits and certifications shall be submitted to the Contracting Officer and 325 CES/CEIE.

Assurance that subcontractors comply with all environmental protection requirements of this section will be the sole responsibility of the prime Contractor.

3.2 PROTECTION OF NATURAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitats. Prior to the commencement of activities, consult with the Installation Environmental Office, regarding rare species or sensitive habitats that need to be protected. The protection of rare, threatened, and endangered animal and plant species identified, including their habitats, is the Contractor's responsibility.

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work that is consistent with the requirements of the Installation Environmental Office or as otherwise specified. Confine construction activities to within the limits of the work indicated or specified.

3.2.1 Flow Ways

Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as specified and permitted.

3.2.2 Vegetation

Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor is responsible for any resultant damage.

Protect existing trees that are to remain to ensure they are not injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. Coordinate with the Contracting Officer and Installation Environmental Office to determine appropriate action for trees and other landscape features scarred or damaged by equipment operations.

3.2.3 Streams

Stream crossings must allow movement of materials or equipment without violating water pollution control standards of the federal, state, and local governments. Construction of stream crossing structures must be in compliance with any required permits including, but not limited to, Clean Water Act Section 404, and Section 401 Water Quality.

The Contracting Officer's approval and appropriate permits are required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges. Obtain Contracting Officer's approval prior to installation. Remove temporary culverts or bridges upon completion of work, and repair the area to its original condition unless otherwise required by the Contracting Officer.

3.3 STORMWATER

Do not discharge stormwater from construction sites to the sanitary sewer. Discharge of hazardous substances will not be permitted under any circumstances. Construction site runoff will be prevented from entering any storm drain by the use of best management practices from the Florida Stormwater Erosion and Sedimentation Control Inspector's Manual. Prior to any project that disturbs greater than one acre, the contractor must complete a Notice of Intent with FDEP and have a Stormwater Pollution Prevention Plan approved by the Contracting Officer and 325 CES/CEIE. A notice of termination must also be filed at the conclusion of the project.

3.3.1 Construction General Permit

Comply with State of Florida Department of Environmental Protection Generic Permit for Stormwater Discharge from Large and Small Construction Activities. Under the terms and conditions of the permit, install, inspect, maintain BMPs, prepare stormwater erosion and sediment control inspection reports, and submit SWPPP inspection reports. Maintain construction operations and management in compliance with the terms and conditions of the general permit for stormwater discharges from construction activities.

3.3.1.1 Stormwater Pollution Prevention Plan

Submit a project-specific Stormwater Pollution Prevention Plan (SWPPP) to the Contracting Officer for approval, prior to the commencement of work. The SWPPP must meet the requirements of 40 CFR 122.26 and the EPA General Permit and the State of Florida General Permit for stormwater discharges from construction sites.

Include the following:

a. Comply with terms of the state general permit for stormwater discharges from large and small construction activities. Prepare SWPPP in accordance with state requirements. Use state guidance located at https://floridadep.gov/water/stormwater/content/construction-activity-cgp to prepare the SWPPP.

b. Select applicable BMPs from EPA Fact Sheets located at https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#constr or in accordance with applicable state or local requirements.

c. Include a completed copy of the Notice of Intent, BMP Inspection Report Template, and Stormwater Notice of Termination, except for the effective date.

3.3.1.2 Stormwater Notice of Intent for Construction Activities

Prepare and submit a Stormwater Notice of Intent for NPDES coverage under the general permit for construction activities to the Contracting Officer for review and approval. Create a Stormwater Pollution Prevention Plan (SWPPP) for the project meeting the Florida General Permit for Stormwater Discharge from Large and Small Construction Activities for stormwater discharges from construction sites.

Prepare and submit a Notice of Intent as a co-permittee to the Contracting Officer, for review and approval.

Submit the approved NOI and appropriate permit fees onto the appropriate federal or state agency for approval. No land disturbing activities may commence without permit coverage. Maintain an approved copy of the SWPPP at the onsite construction office, and continually update as regulations require, reflecting current site conditions.

3.3.1.3 Inspection Reports

Submit "Inspection Reports" to the Contracting Officer in accordance with the State of Florida Construction General Permit.

3.3.1.4 Stormwater Pollution Prevention Plan Compliance Notebook

Create and maintain a three ring binder of documents that demonstrate compliance with the Construction General Permit. Include a copy of the permit Notice of Intent, proof of permit fee payment, SWPPP and SWPPP update amendments, inspection reports and related corrective action records, copies of correspondence with the State Permitting Agency, and a copy of the permit Notice of Termination in the binder. At project completion, the notebook becomes property of the Government. Provide the compliance notebook to the Contracting Officer.

3.3.1.5 Stormwater Notice of Termination for Construction Activities

Submit a Notice of Termination to the Contracting Officer for approval once construction is complete and final stabilization has been achieved on all portions of the site for which the permittee is responsible. Once approved, submit the Notice of Termination to the appropriate state or federal agency.

3.3.2 Erosion and Sediment Control Measures

Provide erosion and sediment control measures in accordance with state and local laws and regulations. Preserve vegetation to the maximum extent practicable.

Erosion control inspection reports may be compiled as part of a stormwater pollution prevention plan inspection reports.

3.3.2.1 Erosion Control

Prevent erosion by mulching, Compost Blankets, Geotextiles, temporary slope drains,and/or silt fence. Stabilize slopes by sodding, seeding, or such combination of these methods necessary for effective erosion control. Use of hay bales is prohibited.

3.3.2.2 Sediment Control Practices

Implement sediment control practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement sediment control practices prior to soil disturbance and prior to creating areas with concentrated flow, during the construction process to minimize erosion and sediment laden runoff. Include the following devices: silt fence, temporary diversion dikes, and/or storm drain inlet protection.

3.3.3 Work Area Limits

Mark the areas that need not be disturbed under this Contract prior to commencing construction activities. Mark or fence isolated areas within the general work area that are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers must be visible in the dark. Personnel must be knowledgeable of the purpose for marking and protecting particular objects.

3.3.4 Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Contracting Officer. Move or relocate the Contractor facilities only when approved by the Government. Provide erosion and sediment controls for onsite borrow and spoil areas to prevent sediment from entering nearby waters. See UFGS 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL for additional requirements. Control temporary excavation and embankments for plant or work areas to protect adjacent areas.

3.3.5 Environmental Resource Permit

The Contractor shall comply with all Environmental Resource Permit requirements in accordance with FL Admin Code 62-330.

3.4 SURFACE AND GROUNDWATER

3.4.1 Dewatering

Construction operations for dewatering must be constantly controlled to maintain compliance with existing state water quality standards and designated uses of the surface water body. Comply with the State of Florida water quality standards and anti-degradation provisions. Do not discharge excavation ground water to the sanitary sewer, storm drains, or to surface waters without prior specific authorization in writing from the Installation Environmental Office. Discharge of hazardous substances will not be permitted under any circumstances. Use sediment control BMPs to prevent construction site runoff from directly entering any storm drain or surface waters.

If the construction dewatering is noted or suspected of being contaminated, it may only be released to the storm drain system if the discharge is specifically permitted. Obtain authorization for any contaminated groundwater release in advance from the Installation Environmental Officer and the federal or state authority, as applicable. Discharge of hazardous substances will not be permitted under any circumstances. See UFGS 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL for additional requirements.

3.4.2 Waters of the United States

Do not enter, disturb, destroy, or allow discharge of contaminants into waters of the United States.

3.5 PROTECTION OF CULTURAL RESOURCES

3.5.1 Archaeological Resources

If, during excavation or other construction activities, any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, activities that may damage or alter such resources will be suspended. Resources covered by this paragraph include, but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, immediately notify the Contracting Officer so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources. The Government retains ownership and control over archaeological resources.

3.6 AIR RESOURCES

Equipment operation, activities, or processes will be in accordance with 40 CFR 64 and state air emission and performance laws and standards.

3.6.1 Preconstruction Air Permits

Notify the Air Program Manager, through the Contracting Officer, at least 60 days prior to bringing equipment, assembled or unassembled, onto the Installation, so that air permits can be secured. Necessary permitting time must be considered in regard to construction activities. Clean Air Act (CAA) permits must be obtained prior to bringing equipment, assembled or unassembled, onto the Installation.

Confirm that these permits have been obtained.

3.6.2 Oil or Dual-fuel Boilers and Furnaces

Provide product data and details for new, replacement, or relocated fuel fired boilers, heaters, or furnaces to the Installation Environmental Office (Air Program Manager) through the Contracting Officer. Data to be reported include: equipment purpose (water heater, building heat, process), manufacturer, model number, serial number, fuel type (oil type, gas type) size (MMBTU heat input). Provide in accordance with paragraph PRECONSTRUCTION AIR PERMITS.

3.6.3 Burning

Burning is prohibited on the Government premises.

3.6.4 Class I and II ODS Prohibition

Class I and II ODS are Government property and must be returned to the Government for appropriate management. Coordinate with the Installation Environmental Office to determine the appropriate location for turn in of all reclaimed refrigerant.

3.6.5 Accidental Venting of Refrigerant

Accidental venting of a refrigerant is a release and must be reported immediately to the Contracting Officer.

3.6.6 EPA Certification Requirements

Heating and air conditioning technicians must be certified through an EPA-approved program. Maintain copies of certifications at the employees' places of business; technicians must carry certification wallet cards, as provided by environmental law.

3.6.7 Dust Control

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster. Since these products contain Crystalline Silica, comply with the applicable OSHA standard, 29 CFR 1910.1053 or 29 CFR 1926.1153 for controlling exposure to Crystalline Silica Dust.

3.6.7.1 Particulates

Dust particles, aerosols and gaseous by-products from construction activities, and processing and preparation of materials (such as from asphaltic batch plants) must be controlled at all times, including weekends, holidays, and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates that would exceed 40 CFR 50, state, and local air pollution standards or that would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators, or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with state and local visibility regulations.

3.6.7.2 Abrasive Blasting

Blasting operations cannot be performed without prior approval of the Installation Air Program Manager. The use of silica sand is prohibited in sandblasting.

Provide tarpaulin drop cloths and windscreens to enclose abrasive blasting operations to confine and collect dust, abrasive agent, paint chips, and other debris. Perform work involving removal of hazardous material in accordance with 29 CFR 1910.

3.6.8 Odors

Control odors from construction activities. The odors must be in

compliance with state regulations and local ordinances and may not constitute a health hazard.

3.7 WASTE MINIMIZATION

Minimize the use of hazardous materials and the generation of waste. Include procedures for pollution prevention/ hazardous waste minimization in the Hazardous Waste Management Section of the EPP. Obtain a copy of the installation's Pollution Prevention/Hazardous Waste Minimization Plan for reference material when preparing this part of the EPP. If no written plan exists, obtain information by contacting the Contracting Officer. Describe the anticipated types of the hazardous materials to be used in the construction when requesting information.

3.7.1 Salvage, Reuse and Recycle

Identify anticipated materials and waste for salvage, reuse, and recycling in accordance with AFMAN 32-7002, Environmental Compliance and Pollution Prevention and DODI 4715.23, Integrated Recycling and Solid Waste Management. Describe actions to promote material reuse, resale or recycling. All scrap metal should remain property of the U.S. government. Coordination with the 325 CES/CEIE recycling manager is required.

Include the name, physical address, and telephone number of the hauler, if transported by a franchised solid waste hauler. Include the destination and, unless exempted, provide a copy of the state or local permit (cover) or license for recycling.

3.7.2 Nonhazardous Solid Waste Diversion Report

Maintain an inventory of nonhazardous solid waste diversion and disposal of construction and demolition debris. Submit a report to the Contracting Officer on the first working day after each fiscal year quarter, starting the first quarter that nonhazardous solid waste has been generated. Include the following in the report:

Construction and Demolition (C&D) Debris Disposed	cubic yards or tons as appropriate
C&D Debris Recycled	cubic yards or tons as appropriate
C&D Debris Composted	cubic yards or tons as appropriate
Total C&D Debris Generated	cubic yards or tons as appropriate
Waste Sent to Waste-To-Energy Incineration Plant (This amount should not be included in the recycled amount)	cubic yards or tons as appropriate

3.8 WASTE MANAGEMENT AND DISPOSAL

3.8.1 Waste Determination Documentation

Complete a Waste Determination form (provided at the pre-construction conference) for Contractor-derived wastes to be generated. All potentially hazardous solid waste streams that are not subject to a specific exclusion or exemption from the hazardous waste regulations (e.g., scrap metal, domestic sewage) or subject to special rules, (lead-acid batteries and precious metals) must be characterized in accordance with the requirements of 40 CFR 261 or corresponding applicable state or local regulations. Base waste determination on user knowledge of the processes and materials used, and analytical data when necessary. Consult with the Installation environmental staff for guidance on specific requirements. Attach support documentation to the Waste Determination form. As a minimum, provide a Waste Determination form for the following waste (this listing is not inclusive): oil- and latex -based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and containers of the original materials.

3.8.1.1 Sampling and Analysis of Waste

3.8.1.1.1 Waste Sampling

Sample waste in accordance with EPA SW-846. Clearly mark each sampled drum or container with the Contractor's identification number, and cross reference to the chemical analysis performed.

3.8.1.1.2 Laboratory Analysis

Follow the analytical procedure and methods in accordance with the 40 CFR 261. Provide analytical results and reports performed to the Contracting Officer.

3.8.1.1.3 Analysis Type

Identify hazardous waste by analyzing for the following characteristics: ignitability, corrosivity, reactivity, or toxicity based on TCLP results.

3.8.2 Solid Waste Management

3.8.2.1 Project Solid Waste Disposal Documentation Report

Provide copies of the waste handling facilities' weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, a statement indicating the disposal location for the solid waste that is signed by an employee authorized to legally obligate or bind the firm may be submitted. The Contractor certification must include the receiver's tax identification number and business, EPA or state registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained for the Contractor's own use, submit the information previously described in this paragraph on the solid waste disposal report. Prices paid or received do not have to be reported to the Contracting Officer unless required by other provisions or specifications of this Contract or public law.

3.8.2.2 Control and Management of Solid Wastes

Perform work under this contract consistent with the policies and

objectives identified in Tyndall Integrated Solid Waste Management Plan (ISWMP) and in accordance with AFMAN 32-7002, Environmental Compliance and Pollution Prevention. Pick up solid wastes, and place in covered containers that are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with non-hazardous solid waste. Transport solid waste off Government property and dispose of it in compliance with 40 CFR 260, state, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill is the minimum acceptable offsite solid waste disposal option. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. Segregate and separate treated wood components disposed at a lined landfill approved to accept this waste in accordance with local and state regulations. Solid waste disposal offsite must comply with most stringent local, state, and federal requirements, including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

Manage hazardous material used in construction, including but not limited to, aerosol cans, waste paint, cleaning solvents, contaminated brushes, and used rags, in accordance with 49 CFR 173.

3.8.3 Control and Management of Hazardous Waste

Do not dispose of hazardous waste on Government property. Do not discharge any waste to a sanitary sewer, storm drain, or to surface waters or conduct waste treatment or disposal on Government property without written approval of the Contracting Officer.

3.8.3.1 Hazardous Waste/Debris Management

Identify construction activities that will generate hazardous waste or debris. Provide a documented waste determination for resultant waste streams. Identify, label, handle, store, and dispose of hazardous waste or debris in accordance with federal, state, and local regulations, including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268.

Manage hazardous waste in accordance with the approved Hazardous Waste Management Section of the EPP. Store hazardous wastes in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of Government facilities is identified as being generated by the Government. Prior to removal of any hazardous waste from Government property, hazardous waste manifests must be signed by personnel from the Installation Environmental Office. Do not bring hazardous waste onto Government property. Provide the Contracting Officer with a copy of waste determination documentation for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D.

3.8.3.2 Waste Storage/Satellite Accumulation/90 Day Storage Areas

Accumulate hazardous waste at satellite accumulation points and in compliance with 40 CFR 262.15 and applicable state or local regulations. Individual waste streams will be limited to 55 gallons of accumulation (or 1 quart for acutely hazardous wastes). If the Contractor expects to generate hazardous waste at a rate and quantity that makes satellite accumulation impractical, the Contractor may request a temporary 90 day accumulation point be established. Submit a request in writing to the

Contracting Officer and provide the following information (Attach Site Plan to the Request):

Contract Number	
Contractor	
Haz/Waste or Regulated Waste POC	
Phone Number	
Type of Waste	
Source of Waste	
Emergency POC	
Phone Number	
Location of the Site	

Attach a Waste Determination form for the expected waste streams. Allow 10 working days for processing this request. Additional compliance requirements (e.g., training and contingency planning) that may be required are the responsibility of the Contractor. Barricade the designated area where waste is being stored and post a sign identifying as follows:

"DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"

3.8.3.3 Hazardous Waste Disposal

3.8.3.3.1 Responsibilities for Contractor's Disposal

Provide hazardous waste manifest to the Installations Environmental Office for review, approval, and signature prior to shipping waste off Government property.

3.8.3.3.1.1 Services

Provide service necessary for the final treatment or disposal of the hazardous material or waste in accordance with 40 CFR 260, local, and state, laws and regulations, and the terms and conditions of the Contract within 60 days after the materials have been generated. These services include necessary personnel, labor, transportation, packaging, detailed analysis (if required for disposal or transportation, include manifesting or complete waste profile sheets, equipment, and compile documentation).

3.8.3.3.1.2 Samples

Obtain a representative sample of the material generated for each job done to provide waste stream determination.

3.8.3.3.1.3 Analysis

Analyze each sample taken and provide analytical results to the Contracting Officer. See paragraph WASTE DETERMINATION DOCUMENTATION.

3.8.3.3.1.4 Labeling

Determine the Department of Transportation's (DOT's) proper shipping names for waste (each container requiring disposal) and demonstrate to the Contracting Officer how this determination is developed and supported by the sampling and analysis requirements contained herein. Label all containers of hazardous waste with the words "Hazardous Waste" or other words to describe the contents of the container in accordance with 40 CFR 262.31 and applicable state or local regulations.

3.8.3.3.2 Contractor Disposal Turn-In Requirements

Hazardous waste generated must be disposed of in accordance with the following conditions to meet installation requirements:

a. Drums must be compatible with waste contents and drums must meet DOT requirements for 49 CFR 173 for transportation of materials.

b. Band drums to wooden pallets.

c. No more than three 208 liter 55 gallon drums or two 321 Liter 85 gallon over packs are to be banded to a pallet.

d. Band using 32 millimeters 1-1/4 inch minimum band on upper third of drum.

e. Provide label in accordance with 49 CFR 172.101.

f. Leave 7 to 12 centimeters 3 to 5 inches of empty space above volume of material.

3.8.3.4 Universal Waste Management

Manage the following categories of universal waste in accordance with federal, state, and local requirements and installation instructions:

a. Batteries as described in 40 CFR 273.2.

b. Lamps as described in 40 CFR 273.5.

c. Mercury-containing equipment as described in 40 CFR 273.4.

d. Pesticides as described in 40 CFR 273.3 and Armed Forces Management Board (AFPMD) standard pesticides list.

e. Aerosol Cans.

Mercury is prohibited in the construction of this facility, unless specified otherwise, and with the exception of mercury vapor lamps and fluorescent lamps. Dumping of mercury-containing materials and devices such as mercury vapor lamps, fluorescent lamps, and mercury switches, in rubbish containers is prohibited. Remove without breaking, pack to prevent breakage, and transport out of the activity in an unbroken condition for disposal as directed.

3.8.3.5 Electronics End-of-Life Management

Recycle or dispose of electronics waste, including, but not limited to,

used electronic devices such computers, monitors, hard-copy devices, televisions, mobile devices, in accordance with 40 CFR 260-262, state, and local requirements, and installation instructions.

3.8.3.6 Disposal Documentation for Hazardous and Regulated Waste

Contact the Contracting Officer for the facility RCRA identification number that is to be used on each manifest.

3.8.4 Releases/Spills of Oil and Hazardous Substances

3.8.4.1 Response and Notifications

Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated in accordance with 40 CFR 300. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Installation Fire Department, the Installation Command Duty Officer, the Installation Environmental Office, the Contracting Officer and the state or local authority.

Submit verbal and written notifications as required by the federal (40 CFR 300.125 and 40 CFR 355), state, local regulations and instructions. Provide copies of the written notification and documentation that a verbal notification was made within 20 days. Spill response must be in accordance with 40 CFR 300 and applicable state and local regulations. Contain and clean up these spills without cost to the Government.

3.8.4.2 Clean Up

Clean up hazardous and non-hazardous waste spills. Reimburse the Government for costs incurred including sample analysis materials, clothing, equipment, and labor if the Government will initiate its own spill cleanup procedures, for Contractor- responsible spills, when: Spill cleanup procedures have not begun within one hour of spill discovery/occurrence; or, in the Government's judgment, spill cleanup is inadequate and the spill remains a threat to human health or the environment.

3.8.5 Mercury Materials

Immediately report to the Environmental Office and the Contracting Officer instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the Contracting Officer.

Do not recycle a mercury spill cleanup; manage it as a hazardous waste for disposal.

3.8.6 Wastewater

3.8.6.1 Disposal of wastewater must be as specified below.

3.8.6.1.1 Treatment

Do not allow wastewater from construction activities, such as onsite

material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, and forms to enter water ways or to be discharged prior to being treated to remove pollutants. Dispose of the construction- related waste water off-Government property in accordance with 40 CFR 403, state, regional, and local laws and regulations.

3.8.6.1.2 Surface Discharge

For discharge of ground water, obtain a state or federal permit specific for pumping and discharging ground water prior to surface discharging. Surface discharge in accordance with the requirements of the NPDES or state STORMWATER DISCHARGES FROM CONSTRUCTION SITES permit.

3.8.6.1.3 Land Application

Water generated from the flushing of lines after disinfection or disinfection in conjunction with hydrostatic testing must be discharged into the sanitary sewer with prior approval and notification to the Wastewater Treatment Plant's Operator.

3.9 HAZARDOUS MATERIAL MANAGEMENT

Address procedures and proper handling of hazardous materials, including the appropriate transportation requirements. Do not bring hazardous material onto Government property that does not directly relate to requirements for the performance of this contract. Submit an SDS and estimated quantities to be used for each hazardous material to the Contracting Officer and the 325 CES/CEIEC Hazardous Materials Management Office for approval prior to bringing the material on the installation. Typical materials requiring SDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. Use hazardous materials in a manner that minimizes the amount of hazardous waste generated. Containers of hazardous materials must have National Fire Protection Association labels or their equivalent. Certify that hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste, in accordance with 40 CFR 261.

3.9.1 Hazardous Material (HM)

For the purposes of the document, Hazardous Materials (HM) are defined as any product, material, chemical or substance listed in 49 CFR 172.101 (revised) and 40 CFR 302-304 (revised). Specifically, a HM is any substance or material, in any quantity or form that has the potential to harm human health or the environment or displays specific characteristics (reactive, corrosive, ignitable, and toxic).

Perform work under this contract consistent with the policies and objectives identified in AFMAN 32-7002, Environmental Compliance and Pollution Prevention. A letter of review from 325 CES/CEIE Must be accomplished prior to commencement of work on each task order. The contractor shall submit TAFB Form 81 (Contractor Questionnaire) and TAFB Form 82 (Chemical Inventory) if applicable (within 10 duty days after the Notice to Proceed is issued), for review. The Contractor should note that Tyndall AFB is required to report chemicals used such as (but not limited to) compressed gases, adhesives, aerosol cans, sealants, paints, lubricants, oils, cleaners, degreasers, pesticides, Fuels. Copies of manufacturer-specific Safety Data Sheets (SDS) must be attached to TAFB Form 82. These SDSs shall also be readily accessible at the location of each hazardous material. After submission, 325

CES/CEIE will notify the Project Manager and/or CONS of the reportable chemicals and of any special instructions. As directed by the CO, the Contractor is required to submit TAFB Form 83 (Reporting Entry Form) showing material usage monthly until completion of the task order. A letter from CEIE will be accomplished with each submittal monthly and/or completion. The CO must be notified of any changes from the original submittal (i.e. new chemical is added, size of container or unit of issue changes or if the manufacturer changes), changes must be submitted using TAFB form 82. An up-dated letter of review indicating changes will be sent from CEIE to the Contracting Office before the material can be brought onto the installation.

3.9.2 Hazardous Waste (Includes Special and Universal Waste)

The Contractor shall be considered the primary co-generator for all hazardous wastes generated throughout the duration of the contract. However, all hazardous waste management activities shall be coordinated and approved by the Contracting Officer and Tyndall AFB. The Contractor shall identify what wastes are hazardous using specific and technical knowledge and/or sampling and analysis. This responsibility also includes preparation of waste profile sheets, packaging, marking and labeling of wastes in accordance with 49 CFR Subchapter C.

Hazardous and special waste include, but are not limited to:

1. Fuels and oils of all types
2. Used tires
3. Computer monitors
4. Lighting ballast
5. Exit signs and lighting (batteries)
6. Asbestos (survey required)
7. Lead roof vent flashing
8. All electronic devices
9. Aerosol spray cans (including empties)
10. Paints
11. Adhesives
12. Corrosives
13. Non-flammable and non-corrosive cleaners
14. Fertilizer
15. Hydraulic fluid
16. Antifreeze

Universal waste include, but are not limited to:

1. Spent fluorescent lamps
2. High Intensity Discharge (HID) lamps
3. Batteries (except alkaline
4. Mercury thermostats
5. Silent switches
6. Mechanical switches
7. Relays and contacts
8. Aerosol spray cans (including empties)

All hazardous, special, and universal waste items mentioned-above shall be managed IAW local, state, federal, and Tyndall AFB Hazardous Waste Management Plan. Under no circumstances shall hazardous, special, or universal waste be disposed of in the dumpster. In addition, the contractor shall ensure that all employees, including their subs, comply with the rules and procedures outlined in this specification and the Tyndall AFB Hazardous Waste Management Plan.

The Contractor shall be familiar with and have immediate access to the following publications and regulations:

1. Environmental Protection Agency (EPA): Title 40 Code of Federal Regulations, Parts 260-279

2. Occupational Safety and Health Administration (OSHA): 29 Code of Federal Regulations Parts 1910 and 1926

3. Department of Transportation (DOT): Title 49 Code of Federal Regulations, Parts 171-177

4. Tyndall AFB Hazardous Waste Management Plan

The contactor shall manage all hazardous waste, special waste, and universal waste IAW the Tyndall Hazardous Waste Management Plan. In addition, the contractor shall ensure that all employees, including their subs, comply with the rules and procedures outlined in the Tyndall AFB Hazardous Waste Management Plan.

If transportation of Hazardous Wastes is required, the contractor shall possess or ensure the transportation of hazardous waste has a valid state and federal identification number and provide such identification to the Contracting Officer and Tyndall AFB environmental office prior to any waste movement. The contractor shall ensure a designated representative from 325 CES/CEIE signs the hazardous waste/non-hazardous waste manifests and profiles.

3.9.3 Toxic Waste

A. Asbestos: All asbestos work must be accomplished in accordance with federal, state, and local laws and the Tyndall AFB Asbestos Management Plan.

1. Notice of Asbestos Renovation or Demolition, DEP Form 62-257.900(1) must be submitted to Florida Department of Environmental Protection at least 10 working days prior to any demolition and/or renovation regardless of whether asbestos is present or not. A copy of this notification must be provided to the Contracting Officer and 325 CES/CEIE prior to performing any work.

2. A copy of all submittals must be provided to the Contracting Officer and 325 CES/CEIE with adequate time built in for review.

3. The use of materials, products or equipment containing asbestos is not allowed. See sample list below.

4. Prior to the commencement of construction, the prime Contractor, each subcontractor and material/equipment supplier shall provide the Contracting Officer and 325 CES/CEIE with a Notarized statement that to the best of their knowledge, no asbestos will be used in the construction of this project. Additionally, the Contractor must have available the most current Safety Data Sheet proving the materials contain no asbestos.

5. Sample list of Asbestos Containing Materials (ACM):

Note: The following list does not include every product/material that may contain asbestos. It is intended as a general guide to show which types of materials may contain asbestos:

(1) Cement Pipes	(2) Cement Wallboard
(3) Cement Siding	(4) Asphalt Floor Tile
(5) Vinyl Floor Tile	(6) Vinyl Sheet Flooring
(7) Flooring Backing	(8) Construction Mastics
(9) Acoustical Plaster	(10) Decorative Plaster
(11) Textured Paints/Coatings	(12) Ceiling Tiles & Lay-in-Panels
(13) Spray-Applied Insulation	(14) Blown-in Insulation
(15) Fireproofing Materials	(16) Taping Compounds
(17) Packing Materials	(18) High Temperature Gaskets
(19) Laboratory Hoods	(20) Laboratory Gloves
(21) Fire Blankets & Table Tops	(22) Fire Curtains
(23) Elevator Equipment Panels	(24) Elevator Brake Shoes
(25) HVAC Duct Insulation	(26) Boiler Insulation
(27) Breeching Insulation	(28) Ductwork Flexible Fabric
(29) Cooling Towers	(30) Pipe Insulation
(31) Heating and Electrical	(32) Electrical Panel Partitions
(33) Electrical Cloth ducts	(34) Spackling compounds
(35) Chalkboards	(36) Roofing Shingles
(37) Roofing Felt	(38) Base Flashing
(39) Thermal Paper Products	(40) Fire doors
(41) Caulking/putties	(42) Adhesives
(43) Wallboard	(44) Joint Compounds
(45) Vinyl Wall Coverings	(46) Electrical Wiring Insulation

Caution needs to be taken to ensure materials purchased do not contain one or more % asbestos by volume.

B. Lighting Ballast: When fluorescent and mercury vapor fixtures are removed, the ballast shall be examined for PCB labeling. Ballast is presumed to contain PCBs unless they are clearly labeled "NO PCBs". Suspected ballasts shall be removed and disposed of IAW Tyndall AFB Hazardous Waste Management Plan.

C. Lead Based Paint: No paint containing lead shall be used during the course of this contract. The Occupational Health and Safety Act (OSHA) Lead Construction Standard, 29 CFR 1926.62 is in effect whenever materials are disturbed that contain any amount of lead. This will require contractors disturbing lead-based paint to institute medical surveillance, training, engineering controls, worker protection measures and employee monitoring until monitoring results per the lead paint standard demonstrate that employee exposure is below the action level and permissible exposure limit. The Contractor on site must maintain all documentation regarding lead exposure by either historical data or project data. This data shall also be made available to the Contracting Officer and 325 CES/CEIE.

1. Prior to the commencement of construction, the prime Contractor, each subcontractor and material/equipment supplier shall provide to the Contracting Officer and 325 CES/CEIE with a Notarized statement that to the best of their knowledge, no lead based paint will be used in the construction of this project. Additionally, the Contractor must have available the most current Safety Data Sheet proving that the paint does not have any lead content.

2. The contractor shall be responsible for collection and disposal of all lead paint chips and lead paint-contaminated materials, and for accumulation of these chips/materials on site. The contractor shall test the paint materials, provide containers for proper disposal, and transport any resulting hazardous waste to an appropriate hazardous waste

accumulation area should it test positive as hazardous waste. All necessary accumulation, disposal activities and documentation shall be coordinated with the Contracting Officer and 325 CES/CEIE.

3. A copy of contractor's exposure assessment data shall be provided to the Contracting Officer and 325 CES/CEIE.

4. Copies of all lead paint-related documentation generated from this project, including lead testing, air monitoring and hazardous waste manifests, shall be provided by the the Contractor to the Contracting Officer. A copy shall be forwarded to 325 CES/CEIE within 10 working days of test completion.

3.10 PREVIOUSLY USED EQUIPMENT

Clean previously used construction equipment prior to bringing it onto the project site. Equipment must be free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the U.S. Department of Agriculture jurisdictional office for additional cleaning requirements.

3.11 CONTROL AND MANAGEMENT OF ASBESTOS-CONTAINING MATERIAL (ACM)

Manage and dispose of asbestos- containing waste in accordance with 40 CFR 61. Manifest asbestos-containing waste and provide the manifest to the Contracting Officer. Notifications to the state and Installation Air Program Manager are required before starting any asbestos work.

3.12 CONTROL AND MANAGEMENT OF LEAD-BASED PAINT (LBP)

Manage and dispose of lead-contaminated waste in accordance with 40 CFR 745. Manifest any lead-contaminated waste and provide the manifest to the Contracting Officer.

3.13 CONTROL AND MANAGEMENT OF LIGHTING BALLAST AND LAMPS CONTAINING PCBS

Manage and dispose of contaminated waste in accordance with 40 CFR 761.

3.14 PETROLEUM, OIL, LUBRICANT (POL) STORAGE AND FUELING

POL products include flammable or combustible liquids, such as gasoline, diesel, lubricating oil, used engine oil, hydraulic oil, mineral oil, and cooking oil. Store POL products and fuel equipment and motor vehicles in a manner that affords the maximum protection against spills into the environment. Manage and store POL products in accordance with EPA 40 CFR 112, and other federal, state, regional, and local laws and regulations. Use secondary containments, dikes, curbs, and other barriers, to prevent POL products from spilling and entering the ground, storm or sewer drains, stormwater ditches or canals, or navigable waters of the United States. Describe in the EPP (see paragraph ENVIRONMENTAL PROTECTION PLAN) how POL tanks and containers must be stored, managed, and inspected and what protections must be provided. Storage of fuel on the project site must be in accordance with EPA, state, and local laws and regulations and paragraph OIL STORAGE INCLUDING FUEL TANKS. The COR and Tyndall AFB Environmental Office must approve the use of fuel storage tanks on base, and the contractor must ensure adequate spill containment (spill kits) for any tanks approved for use on Tyndall AFB. The contractor must have written spill procedures for tanks and heavy equipment that they use on base.

POL/Storage Tanks: Storage tanks and POL can be a source of contamination if not managed appropriately. Contractor personnel obtaining fuels from Storage Tanks agrees to follow all 62-761 FAC and the following list of Air Force Technical Order's to ensure compliance: 37-1-1, 37A-1-101, 42B-1-1, 42B-1-1S-2, 42B-1-16, 42B-1-22, 42B-1-23, and 42C-1-12.

All fuel, oil, and chemical spills that occur on Tyndall AFB (regardless of amount) must be immediately reported to the base Fire and Emergency Services (911).

3.14.1 Used Oil Management

Manage used oil generated on site in accordance with 40 CFR 279. Determine if any used oil generated while onsite exhibits a characteristic of hazardous waste. Used oil containing 1,000 parts per million of solvents is considered a hazardous waste and disposed of at the Contractor's expense. Used oil mixed with a hazardous waste is also considered a hazardous waste. Dispose in accordance with paragraph HAZARDOUS WASTE DISPOSAL.

3.14.2 Oil Storage Including Fuel Tanks

Provide secondary containment and overfill protection for oil storage tanks. A berm used to provide secondary containment must be of sufficient size and strength to contain the contents of the tanks plus 5 inches freeboard for precipitation. Construct the berm to be impervious to oil for 72 hours that no discharge will permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Use drip pans during oil transfer operations; adequate absorbent material must be onsite to clean up any spills and prevent releases to the environment. Cover tanks and drip pans during inclement weather. Provide procedures and equipment to prevent overfilling of tanks. If tanks and containers with an aggregate aboveground capacity greater than 5000 liter 1320 gallons will be used onsite (only containers with a capacity of 208 liter 55 gallons or greater are counted), provide and implement a SPCC plan meeting the requirements of 40 CFR 112. Do not bring underground storage tanks to the installation for Contractor use during a project. Submit the SPCC plan to the Contracting Officer for approval.

Monitor and remove any rainwater that accumulates in open containment dikes or berms. Inspect the accumulated rainwater prior to draining from a containment dike to the environment, to determine there is no oil sheen present.

3.15 INADVERTENT DISCOVERY OF PETROLEUM-CONTAMINATED SOIL OR HAZARDOUS WASTES

If petroleum-contaminated soil, or suspected hazardous waste is found during construction that was not identified in the Contract documents, immediately notify the Contracting Officer. Do not disturb this material until authorized by the Contracting Officer.

3.16 CHLORDANE

Evaluate excess soils and concrete foundation debris generated during the demolition of housing units or other wooden structures for the presence of chlordane or other pesticides prior to reuse or final disposal.

3.17 SOUND INTRUSION

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives are not permitted without written permission from the Contracting Officer, and then only during the designated times. Confine pile-driving operations to the period between 8 a.m. and 4 p.m., Monday through Friday, exclusive of holidays, unless otherwise specified.

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the State of Florida rules.

3.18 POST CONSTRUCTION CLEANUP

Clean up areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing by the Contracting Officer, remove traces of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade parking area and similar temporarily used areas to conform with surrounding contours.

3.19 INSTALLATION RESTORATION PROGRAM (IRP)

Contractor must follow these guidances attached to this specification section:

a. Installation Restoration Program and Aqueous Film Forming Foam Guidelines for MILCON Rebuild (dated 8 November 2021, Attachment 1);

b. Environmental Supplemental Guidance (Version 8, Attachment 2);

c. General Environmental Requirements For Contracts (Version 2, Attachment 3);

d. Tyndall AFB Guidelines for Non-ERP Soil Management USACE MILCON Buildout (22 May 2020, Attachment 4);

e. Tyndall Soils Decision Matrix (Attachment 5)

f. Location Map for Designated Soil Borrow Storage Area (Attachment 6)

g. Tyndall AFB Hazardous Waste Management Plan;

h. Tyndall AFB Asbestos Management Plan;

i. 40 CFR 262.11

j. 40 CFR 273.6

k. Additionally, a soils report pertaining to the LOX project site is provided for information only. See Tyndall AFB,

l. Pre-Demolition Soil Testing Report for Facilities Reduction Program FY19 Tyndall II, Tyndall AFB, Florida, Building 370 Deployment Processing Center, 28 April 2020 (Attachment 7).

-- End of Section --

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ATTACHMENT 1

Installation Restoration Program and Aqueous Film Forming Foam Guidelines for Tyndall MILCON-Rebuild
8 November 2021

Overview: The contractor shall be responsible for performing characterization work, as required, and be responsible for the final disposition of soils and groundwater from construction projects at Tyndall Air Force Base. Characterization efforts shall include a combination of generator knowledge and analytical testing. Soil and groundwater within Installation Restoration Program (IRP) site boundaries and/or Aqueous Film Forming Foam (AFFF) site boundaries and any soil outside of IRP and AFFF site boundaries that shows evidence of contamination shall be managed in accordance with applicable RCRA and CERCLA requirements and with applicable guidelines herein. For groundwater, the guidelines also apply to dewatering effluent within 500 feet of an IRP/AFFF site boundary and known perfluorooctane Sulfonate (PFOS) and/or perfluorooctanoic Acid (PFOA) contamination.

All excavated soil within the MILCON Rebuild program shall be managed in accordance with these requirements. The Contractor shall not dispose of characterized soils off-base that screen within Air Force (AF) and regulatory levels required herein, but shall move excess soil to designated on base soils borrow storage area for final disposition. Contractor shall dispose of soil with contaminant levels that exceed Air Force (AF) and regulatory screening levels at an authorized off-base disposal facility. Soil outside of IRP and AFFF site boundaries are considered clean/non-contaminated (unless soil shows evidence of contamination), does not require characterization, and shall be moved to designated soils borrow storage area for final disposition. All designated soils borrow storage areas are anticipated to be within 15 miles of the project site. Soil management outside of these areas and soils brought on-site from off-base for backfill shall follow “Tyndall AFB Guidelines for Non-ERP Soil Management”, except as noted here.

Where PFOA/PFOS is the sole “chemical of concern” when assessing soil/water media, the contractor is instructed to follow Air Force guidance. This guidance requires removal and/or treatment of any soil/water media that tests above the EPA lifetime health advisory (LHA)/Air Force approved reference dose (RFd) standard of 2E-05 milligrams per kilograms-day (e.g., 70 ppt water or 1.30 mg/kg soil). Soil should be sampled and tested for PFOA/PFOS in areas of known AFFF releases; soil need not be tested for PFOA/PFOS in other areas unless the soil will be moved outside the boundaries of Tyndall AFB. Untested soil and soil/water media that tests below the Air Force approved reference dose shall be available for unrestricted use/reuse within the boundaries of Tyndall AFB. If the Contracting Officer deems necessary for either previously untested soil or soil below the Air Force approved reference dose to leave the boundaries of Tyndall AFB, the contractor shall first sample and test the soil following testing guidance herein, and then follow applicable state and local requirements for soil disposition. Payment for Contracting Officer required additional soil testing and off-base disposal will be handled under the changes clause of this contract. In no instance should the contractor dispose of this type of soil in a Subpart C Landfill without first coordinating plans through USACE C.O.R. Further,

consistent with Air Force policy, PFOA/PFOS is not a contaminant with a defined maximum contaminate level. Therefore any liquid concentration of PFOA/PFOS below the EPA lifetime health advisory concentration may be reinserted into the ground within the boundaries of Tyndall AFB.

1. OSHA Compliance: The contractor has the responsibility to fulfill its obligation under 29 CFR 1910.120, Occupational Safety and Health Administration Standards (OSHA), Hazardous Waste Operations and Emergency Response (HAZWOPER), and address the health and safety of its employees associated with construction activities relative to this project.

2. Analytical testing shall be conducted at a Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP)-certified laboratory. The contractor is required to utilize the services of a qualified environmental professional for sampling and a DoD ELAP-certified laboratory for testing. The Contractor may establish an on-site laboratory at the project site if determined necessary by the Contractor. However, on-site test laboratories shall also be accredited under the DoD ELAP and meet all state and federal requirements, including state certification, where appropriate.

3. The Contractor shall comply with applicable federal, state, and local requirements for any task involving the transportation and disposal of solid or hazardous wastes in a manner compliant with 40 Code of Federal Regulations (CFR) 260-265 and 268, and 49 CFR 171, 172, 173, 178, 179, and other applicable regulations.

4. The Contractor shall obtain and comply with all FDEP approved/issued wastewater permits which generally contain requirements for, depending on the type of facility and disposal means, the treatment of the wastewater, disposal to surface water (NPDES), discharge to ground water, and land-application of reclaimed water.

5. The Contractor is responsible for developing and obtaining AF approval of soil and groundwater management work plans through USACE C.O.R. Work plans shall detail means and methods to ensure proper management of waste soil and water, ensuring contamination is not spread during construction, dewatering, and containerizing activities. Work plans shall be submitted a minimum of 30 days prior to start of work at the site.

6. If any contamination is encountered or suspected (e.g., suspicious odors, fuel smells, soil staining, odd soil colors, unfamiliar liquids, buried materials, etc.) at the site, contact USACE and 325 CES HWPM. These soils are to be separated, stockpiled on-site and covered with polyethylene plastic sheeting at least 10 mil thick until properly tested and disposed.

7. Documentation of any sampling and testing results, and reuse or disposal actions shall be provided in a summary report prepared by the contractor in accordance with UFGS section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS, section 02 61 13, EXCAVATION AND

HANDLING OF CONTAMINATED MATERIAL and section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

8. Construction activities shall avoid damaging or disturbing any monitoring wells and shall protect wells from the introduction of contaminants (mud/dirt or PVC glue introduced/caps or plugs removed/risers compromised) that may be located in the construction area. Cost to sample, repair, and/or replace damaged wells, as a result of construction, shall be incurred by the contractor. No wells may be abandoned without prior approval of the USACE C.O.R who will coordinate this action with the Tyndall RPM. If wells must be abandoned, repaired, or replaced, the action shall be in accordance with FDEP regulations, and the well shall be surveyed by a Florida licensed water well driller. Monitoring well abandonment, repair, or installation documentation and applicable GIS files shall be provided to the Tyndall RPM through the USACE C.O.R. Placement of replacement wells will require coordination with Environmental Protection Agency (EPA), FDEP, and the Tyndall RPM.

9. Proper decontamination is required for any equipment which contacts contaminated soils or groundwater prior to mobilization outside IRP/construction site boundaries. Decontamination fluids are to be collected and stored in 55-gallon drums, properly labeled and stored on pallets in an on-base waste accumulation area in a manner not to exceed the time requirements of a RCRA Central Accumulation Point (usually 90 days for a LQG) and applicable laws until sampled, characterized, and disposed of at a proper disposal facility.

10. Baseline sampling at all temporary on-base waste accumulation and/or treatment areas shall be completed prior to storage of soil piles. Soil piles must be constructed to prevent effluent from migrating to clean areas by using bottom and top polyethylene plastic liners, and stockpile covers shall be appropriately secured and weighed down. When PFOA/PFOS are the sole chemicals of concern, ground barrier cover need not be employed. Soil piles must be regularly inspected and maintained to ensure the cover remains intact, excessive water does not accumulate, wattles remain in place, signs are legible and in place, and safety warning devices are present and upright. The contractor shall complete final cleanup in locations used for treatment and/or stockpiling waste materials and collect and analyze confirmation samples to verify cleanup success.

11. The Government will prepare soil borrow storage areas for final disposition and will direct and oversee all contractor disposal activities, unless contract requirements note otherwise. Contractor shall provide all testing and reporting documentation to C.O.R. for waste management following completion of all disposal activities. For contractor prepared and managed soil borrow storage areas, the following applies. Requirements from #10. above shall apply for soil borrow storage area(s), except where noted that stockpile bottom liners are not required. All aspects of grading, site and stockpile preparation, site fencing, handling, placement, and maintenance, including stockpile cover materials and liner materials and all other items incidental to construction of stockpiles. Soil shall be managed in accordance with “Stockpile Erosion Protection” section of the Florida Storm water erosion and Sedimentation Control

Inspectors Manual. Contractor shall obtain a Construction General Permit and prepare a Storm water Pollution Prevention Plan (SWPPP) to address any runoff from the soil stockpile, but must be submitted to Tyndall AFB Environmental Office through C.O.R. for review and approval. Per the SWPPP, additional soil storage site maintenance shall include weekly stockpile and SWPPP inspections and reporting; performing periodic and emergency maintenance as required; and preparing a draft and final stockpile Inspection & Maintenance and SWPPP inspection report. The report shall include all inspection records and shall note the repairs performed during the year. The Contractor will maintain these long-term stockpiles until the project's Beneficial Occupancy Date (BOD), unless earlier BOD for soils management is approved by Contracting Officer. See contract plans and specifications for additional requirements.

12. Soil management - within IRP site boundaries:

a. Soil inside IRP site boundaries is believed to be contaminated but has not historically been shown to be hazardous. See AF provided Remedial Investigation (RI) reports for constituents of concern (COCs) within project limits for use in characterization efforts.

b. Excavated soil within these areas that is suitable for reuse as defined by geotechnical requirements shall be redeposited back within the point of excavation. Soil may be temporarily moved within the IRP study area as long as it is subsequently redeposited in the same excavated area. Soils should be staged on polyethylene plastic liner, properly covered and labeled, and shall not leave that IRP site boundary until redeposited or tested as described below. Best management practices shall be utilized to prevent spreading contamination into previously uncontaminated or less contaminated areas within the IRP site boundary.

c. If soils are to be removed for disposal from the site, they shall be tested prior to disposal or reuse. Soils shall be properly characterized and classified as either hazardous or non-hazardous wastes in accordance with the U.S. Air Force Hazardous Waste Management Plan 325th Fighter Wing Tyndall AFB (specifically Appendix A Waste Analysis Plan) dated 10/23/2020; tested utilizing the Toxic Characteristic Leaching Procedure (TCLP), analyzed for characteristic hazardous chemicals (40 CFR 261, Subpart C) and/or as required by the authorized disposal facility. Results are to be provided to the United States Army Corps Engineers (USACE) and the 325 Civil Engineer Squadron (CES) Hazardous Waste Program Manager (HWPM) prior to any transportation for proper disposal at an authorized disposal facility. Additionally, soils that exhibit a hazardous waste characteristic are to be further sampled, consistent with Paragraph 12.d. to determine applicability of Land Disposal Restrictions (LDR) and any Underlying Hazardous Constituents (40 CFR 268). Copies of transportation and disposal documents (profiles, manifests, bills of lading) are to be provided to USACE and the 325 CES HWPM. An AF representative will sign all profiles and hazardous waste manifests. The government anticipates that soil will not be a classified as hazardous waste; if the soil is classified as hazardous waste, payment for disposal will be handled under the changes clause of this contract.

d. Soil from excavation or construction activities that is contaminated with a Resource Conservation Recovery Act (RCRA) characteristic or listed waste or contains a waste for which a LDR exists must be assessed to determine if it requires transport and final disposition off-base. Such waste may be moved to an appropriate staging area within the IRP/construction site pending results before determining final disposition so long as it is properly covered and labeled. If the soil is determined to have listed waste contained within the testing sample, absent exemption or exclusion (e.g., application of the RCRA ICR rule) such media must remain within the IRP/construction site boundary until final disposition. Listed waste shall not be redeposited at the point of generation –absent ability to apply a RCRA exclusion or exemption. If the soil is not hazardous, it may be moved outside the IRP/construction site boundary to an approved on-base waste accumulation area (if designated available) for storage until final disposition or to soils borrow storage area for final disposition. All excess non-hazardous IRP soil shall be stockpiled in a dedicated IRP stockpile at designed soils borrow storage area. Prior to transport to soils borrow storage area for final disposition, soil shall be tested per each disposal unit using a composited sample with aliquots from all four corners of the container not to exceed 20 cubic yards, analyzed by DoD ELAP-certified laboratory, and results provided with transportation and disposal documents to USACE COR and 325 CES HWPM.

e. For reuse at a location other than the point of generation soil shall be tested for COCs per following methods. Soils are to be staged in soil piles of 400 CY within the IRP/construction site or approved on-base waste accumulation area (if designated available), sampled, and analyzed in accordance with the parameters identified below. One composite sample of eight aliquots is to be collected from each 400 CY stockpile. The 400-CY soil stockpile shall be divided into eight equal sections of 50 CY each (e.g., spokes dividing a wagon wheel). The "A" sample is to be always collected on the north side of the stockpile, and the subsequent samples are to be collected in a clockwise manner. In lieu of site defined COCs, contractor shall test for following constituents:

- Volatile Organic Compounds (VOCs) per Method 8260
- Semi-volatile Organic Compounds (SVOCs) [Base/Neutrals (e.g., PAHs, Pesticides, PCBs) and Acid Extractables (e.g., Phenols)] per Methods 8270/8081/8082
- RCRA metals by Method 6020
- Petroleum Residual Organics (by FL-PRO)

Analytical results will be compared to the FDEP industrial/commercial and residential Soil Cleanup Target Levels (SCTLs) to determine acceptability of the proposed material as clean fill. Results of every analyte must be below the FDEP appropriate Soil Cleanup Target Levels in order to be used as backfill on TAFB.

13. Soil management – generally

a. Soil in areas of known AFFF-releases should be tested for PFOA/PFOS levels pursuant to AF policy. Soil outside of known AFFF-releases need not be tested for PFOA/PFOS levels unless

directed by the Contracting Officer as noted above. Soil containing PFOA and/or PFOS may be tested on-site, next to the point of generation, within the MILCON-rebuild Zone, and/or within an approved on-base waste accumulation area. Analytical results are to be compared to the EPA RSL/Air Force policy standard (for PFOS and/or PFOA) to determine acceptability of the proposed material for reuse anywhere within the boundaries of Tyndall AFB. Notify USACE and 325 CES regarding PFOA and/or PFOS soil samples above the EPA RSL and treat soil as required herein. If other COCs exceeding regulatory standards are identified in the soil, then the soil will be managed to address the regulated COC(s) in the manner prescribed herein. PFOA/PFOS, without other identifiable contaminants of concern present, is not considered hazardous. See AF provided AFFF site investigation reports for use in characterization efforts. To the extent PFOA/PFOS is the sole COC, the contractor is instructed to follow Air Force guidance in the Overview above.

b. Soils are to be staged in soil piles of 400 CY within the AFFF/construction site or approved on-base waste accumulation area (if designated available), sampled, and analyzed in accordance with the parameters identified below. One composite sample of eight aliquots is to be collected from each 400 CY stockpile. The 400-CY soil stockpile shall be divided into eight equal sections of 50 CY each (e.g., spokes dividing a wagon wheel). The “A” sample is to be always collected on the north side of the stockpile, and the subsequent samples are to be collected in a clockwise manner. Analytical results are to be compared to the EPA RSL/Air Force policy standard (for PFOS and/or PFOA) to determine acceptability of the proposed material for reuse within the point of excavation, within the project limits, and anywhere within the boundaries of Tyndall AFB.

c. Excavated soil that either need not be tested or that tests below EPA RSL/AF policy standard and is suitable for reuse as defined by geotechnical requirements shall be reused within the project limits or within the boundaries of Tyndall AFB as allowed by the AF. Soil excess to project needs with PFOS/PFOA detected below 1.30 mg/kg shall be moved to designated on-base soils borrow storage area for final disposition. Notify USACE and 325 CES regarding PFOA and/or PFOS soil samples above 1.30 mg/kg and handle soil as required below in 13.d. If other COCs exceeding regulatory standards are identified in the soil, then the soil shall also be managed to address the regulated COC(s) as prescribed in paragraph 12 above. Soils should be staged on polyethylene plastic liner, properly covered and labeled, and shall not leave testing area until tested. Best management practices shall be utilized to prevent spreading contamination into previously uncontaminated or less contaminated areas within the AFFF site boundary.

d. Excess soil which exceeds 1.30 mg/kg for PFOS and/or PFOA may be treated to below 1.3 mg/kg or be disposed of at an authorized off-base disposal facility. For all excess PFOA/PFOS soil destined for off-base disposal, soil shall be tested and documented prior to disposal as described in part 1. above. AFFF- related solid waste with PFOS/PFOA is not considered hazardous waste. The government anticipates that soil will not have PFOS and/or PFOA above 1.3 mg/kg; if detected above this EPA RSL screening level, payment for disposal will be handled under the changes clause of this contract. Excess soil moved to the soils borrow storage area for

final disposition will require separate stockpiles for: 1) AFFF: excess soil with sole COCs of PFOS/PFOA, which tests below EPA RSL/AF policy standard; 2) IRP: excess soil with comingled COCs not required to be disposed at an authorized off base facility (i.e. not hazardous waste); and 3) excess soil that shows no evidence of contamination outside of IRP and AFFF site boundaries.

14. Groundwater management - generally

a. Groundwater inside **AFFF/**IRP site boundaries and within 500 feet of **AFFF/**IRP site boundaries or areas of known AFFF releases is believed to be contaminated but has not historically been shown to be hazardous. See AF provided Remedial Investigation (RI) reports for constituents of concern (COCs) within project limits for use in characterization efforts. PFOA/PFOS, without other identifiable contaminants of concern present, is not considered hazardous. See AF provided AFFF site investigation reports for use in characterization efforts. To the extent PFOA/PFOS is the sole COC, the contractor is instructed to follow Air Force guidance. This guidance states that if groundwater meets the EPA lifetime health advisory (LHA)/Air Force approved reference dose (RfD) standard of 2E-05 milligram per kilogram (mg/kg) -day (e.g., 70 ppt water), the groundwater media may be reinserted into the ground within the boundaries of Tyndall AFB. If sample results exceed EPA LHA of 70 parts per trillion (ppt) for PFOS and/or PFOA, then filtration will be required until groundwater effluent meets the EPA LHA before reinserting into the ground.

b. Dewatering within a contaminated groundwater plume or an area with known contamination is allowed as long as effluent percolates back into the known plume areas (FDEP to approve infiltration plan), other approved on-site method(s) of disposition are used (e.g., discharge to stormwater system/surface water discharge or reinjection using “connector wells” under Rule 62-528.600 under permitted conditions), and/or the dewatering liquid is disposed of off-site.

c. Dewatering effluent destined for disposal at an authorized disposal facility requires analysis for characteristic hazardous chemicals and the potential presence of listed hazardous waste and other constituents as required by 40 CFR 262.11 and treatment/disposal facilities. Results are to be provided to the USACE and the 325 CES HWPM prior to any transportation for proper disposal at an authorized disposal facility or may be conservatively handled as hazardous waste in accordance with appropriate hazardous waste laws and regulations if approved by USACE and the 325 CES HWPM or required by the contract or statement of work. Copies of transportation and disposal documents (profiles, manifests, bills of lading) are to be provided to USACE and the 325 CES HWPM. An AF representative will sign all hazardous waste manifests.

d. For groundwater inside AFFF site boundaries, within 500 feet of AFFF site boundaries, or within 500 feet of known AFFF releases, sample recovered groundwater from dewatering activities at the influent and effluent locations of the dewatering and /or treatment systems at the following frequency and analyze samples at a certified laboratory.

- Sample 4 times a day for 2 Days (i.e. 7 AM, 10 AM, 1 PM, and 4 PM)
- Sample 2 times a day for following 3 weeks (i.e. 8 AM and 4 PM)
- If pumping is still occurring at this dewatering location, then sample 1 time per day until the dewatering point is no longer being used (i.e. 11 AM)

NOTE:

1. If clean sample results (all contaminants are below their groundwater cleanup target level [GCTL] and/or PFOS and/or PFOA is below 70 ppt) are found for any 4 consecutive sampling events during the duration of dewatering from a specific dewatering point then confirmatory samples can be immediately reduced to a frequency of 1 per day until dewatering is complete. A treatment step won't be needed on the dewatered water that is below the "clean" threshold.

2. If a contractor determines a treatment step is to be used on dewatered water before infiltrating it back into the point of generation, then only Steps 1 and 3 need to be followed during the duration of dewatering at a dewatering point.

(a) If quantities of liquid PFOS/PFOA waste must be treated, contractor will use either Granular Activated Carbon (GAC), ion exchange, or other approved treatment technology to bring chemical concentrations below the LHA, before returning it to its source location at the point of generation in accordance with Air Force (AF) and permitting requirements.

(b) Alternative on-site (next to the point of generation, within the MILCON-rebuild Zone, or within an approved accumulation area) final disposition options may be approved for use. Contractor is responsible for coordinating with the AF through the C.O.R. Treated and/or non-treated dewatering effluent may be discharged to storm water system/surface water discharge under permitted conditions (including compliance with surface water standards). This action would be considered an on-site disposal option.

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ATTACHMENT 2

Environmental Supplemental Guidance

The A/E is required to address all environmental regulations as well as guidance provided by Tyndall BCE, including but not limited to: *Installation Restoration Program and Aqueous Film Forming Foam Guidelines for MILCON Rebuild* dated 5 April 2021; *Environmental Protection* "General Environmental Requirements for Contracts v2"; Tyndall Map PFOS & PFOA Areas; Final AFFF SI Report delivered to regulators; Basewide Conceptual Site Model, Tyndall Air Force Base; DoD Vapor Intrusion Handbook; Environmental Restoration Program Site Reports; IRP Map 2016 May 10 Base Map – Restoration Sites (with wetlands); Wetlands Delineation Survey; AF813s; and Final NEPA guidance.

The following information is supplemental guidance for vapor intrusion risk determination for projects located within IRP and/or AFFF sites.

1. Follow the requirements of the DoD Vapor Intrusion Handbook

    1.1. Vapor intrusion shall be evaluated when volatile chemicals are present in soil, soil gas, or groundwater that underlies existing structures or has the potential to underlie future buildings and there may be a complete human exposure pathway. A/E shall conduct screening level evaluations as required for facility designs. If design model data exceeds the generic screening levels then the A/E shall provide the requirements for a vapor intrusion system in the RFP.

The following information is supplemental guidance for demolition:

1. Existing buildings shown to be demolished within the zone limits shall be demolished by others prior to construction contract award.
2. Any data required for design (construction methods and environmental testing) shall be provided by Tyndall Base Civil Engineering Office (BCE).
3. The A-E is responsible for showing demolition of any pavements and underground utilities interfering with construction and including related design requirements in the contract drawings and specifications.

The following information is supplemental guidance for boring activities.

1. General Requirements:
    1.1. The Contractor shall develop a Site-specific Safety and Health Plan (SSHP) in accordance with 29 CFR 1910.120 and EM 385-1-1. SSHP will be submitted to USACE PM and TL for Mobile District Safety Office approval prior to drilling. The plan shall define emergency procedures, discuss any site hazards that could be encountered during execution of this performance work statement, address accident prevention, and present appropriate action levels for potential contaminants to be encountered.

    For all drilling sites that are within documented areas of known soil and/or groundwater contamination, this SSHP must include at a minimum: the identification of the known contaminants and respective hazard evaluations, procedures for managing Investigative Derived Wastes (IDW), the selected personal protective equipment, and address all decontamination procedures for personnel and equipment

    1.2. All borings and piezometers outside of designated IRP sites or AFFF site boundaries, which penetrate depths greater than 9 feet, shall be backfilled and tremie grouted per contract requirements. Cuttings that are not redeposited in bore hole shall be spread in the vicinity of the bore hole or handled in accordance with Environmental requirements and guidance addressed above. Note that storage of containerized materials shall remain within the vicinity of the boring location on the site.

2. Installation Restoration Program (IRP) Sites:

1.1. Boring activities within designated IRP sites, including soil and/or within 50 feet of and within groundwater contamination plume, are required to adhere to the following:

1.1.1. All cuttings shall be recovered and containerized in 55 gallon drums, sampled and tested for full Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic Leaching Procedure (TCLP), evaluated based on industry limits and disposed of at an appropriate offsite facility. All test results shall be provided to the appropriate facility environmental representative. Note that storage of containerized materials shall remain within the vicinity of the boring location on the site until time of removal.

1.1.2. Waste Profile and all waste manifests to be signed by 325th CES prior to disposal.

1.1.3. The entire borehole shall be grouted using tremie pipe from the bottom of the maximum penetration depth continuously to the ground surface.

1.1.4. Borings that approach and/or exceed a confining layer are required to adhere to the following:

1.1.4.1. Continuous sampling for the entire exploration depth.

1.1.4.2. If required to bore through a confining layer to satisfy the required sampling depth for geotechnical design purposes, a casing shall be installed between the ground surface and the top of the confining layer and sealed with grout before boring may extend below the top of the confining layer.

1.1.5. Decontamination of drilling equipment is required after completion of drilling within each IRP site, and within 50 feet of and within each IRP groundwater plume.

2. Aqueous Film Forming Foam (AFFF) Sites:

2.1. Borings within AFFF site boundaries are required to follow the Installation Restoration Program and Aqueous Film Forming Foam Guidelines for MILCON Rebuild dated 5 April 2021. Preferred disposal will follow Tyndall RPM guidance.

2.1.1. Decontamination of drilling equipment is required after completion of drilling within designated AFFF sites.

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ATTACHMENT 3

ENVIRONMENTAL PROTECTION

1. General:

All projects shall minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work must be protected during the entire duration of a project. Contractor shall comply, and assure that all sub-contractors comply, with all applicable federal, state, and local laws and regulations, Air Force Instructions, Air Force Manuals, Engineering Technical Letters, regulations, ordinances, policies and standards related to environmental matters. Copies of local policies and procedures will be provided to the contractor upon request.

The use of materials which have been identified by Governmental agencies as being hazardous or creating potentially hazardous conditions will not be allowed on any project. Specifically, products containing lead, asbestos, polychlorinated biphenyl (PCB), and Ozone depleting chemicals are prohibited. The contractor shall assume a strict and cautious position in responding to reports of other materials, which may be identified as hazardous during construction period.

If any material originally specified or approved for use in the work should become listed as suspected or verified as being hazardous, the contractor shall immediately notify the Contracting Officer and initiate efforts to postpone the installation or use of the material until the matter can be investigated.

All contractors must comply with requirements for the protection of natural resources (e.g. wetlands) and cultural resources (archeological sites and historic buildings). In the event of any unexpected discoveries of intact archaeological deposits or human remains, all ground-disturbing activity near the find shall cease and the contractor shall contact 325 CES/CEIE. Contractor shall not resume any work near the find until consultation with Native American Tribes and State Historical Preservation Office is concluded.

The contractor shall reimburse the Government for any remediation undertaken to clean up releases by the contractor and for any civil or criminal fines or penalties for any environmental infraction caused by the contractor.

2. Environmental Permits:

a. Obtaining and complying with all environmental permits and commitments required by Federal, State, Regional, and local environmental laws and regulations is the Contractor's responsibility.

b. All permits applications will be staffed through 325 CES/CEIE for signature and forward to Florida Department of Environmental Protection or US Army Corps of Engineers as necessary.

c. Typical environmental permitting process for execution methods:

1. Design-Build: The prime contractor’s A/E shall provide the necessary design work, payment, and application forms to obtain any permits for potable water, sanitary sewer, stormwater treatment facility, and 62-621 construction activity as part of the overall contract. The prime contractor is responsible for completion of the necessary as-built permit certifications once the items are complete.

2. Design-Bid-Build: The A/E of record shall provide the necessary design work, payment, and application form to obtain any ERP permits for wetland fill activities, potable water, sanitary sewer, and stormwater treatment facility and provide to 325 CES/CEIE at final design. The construction contractor

is responsible for obtaining the 62-621 construction activity permit. The contractor shall provide as-built certifications for permitted items at the end of construction.

3. As-built certifications shall be staffed by the contractor through 325 CES/CEIE for signature and forward to Florida Department of Environmental Protection (FDEP).

d. Sanitary sewer and drinking water permits: The A-E shall bear full responsibility to accurately conceive, and design the proposed utility system and/or modifications to the existing system(s) based on acceptable practices for design as required by state and federal regulations.

3. National Environmental Protection Act (NEPA):

In the event that the government has prepared any NEPA Documentation, i.e. Environmental Impacts Statement (EIS), Environmental Assessments (EA), or a Finding of No Significant Impact (FONSI), the designer shall prepare the design so that it is entirely compatible with any and all requirements of the NEPA documents.

4. Fuel Tanks:

For any new fuel tanks, the Storage Tank Manager (325 CES/CEIE) must approve prior to install to ensure that proper registration and coordination with State agencies is performed as needed.

5. Air Quality:

a. Many operations are subject to specific air quality regulations. State-specific emission standards are identified in Chapter 62-296 of the Florida Administrative Code (F.A.C.). Florida regulates hazardous air pollutants (HAP) in accordance with the National Emissions Standards for Hazardous Air Pollutants (NESHAP) in Title 40 of the Code of Federal Regulations (CFR): Part 61 is regulation by HAP and Part 63 is regulation by industrial category. There are also federal New Source Performance Standards specified for criteria air pollutants in Title 40, Part 60 of the CFR.

b. Contractors working on projects that involve the creation or changing, in any way, of an air pollution source located at Tyndall AFB shall coordinate with 325 CES/CEIE to modify the existing air operating permit or, for a new air source, apply for a construction permit. The cost of any fees involved shall be paid by the conbtractor. Conduct a thorough site/plan survey to identify all activities that generate and/or control air emissions. Air permitting requirements are specified in Chapters 62-4, 62-204, 62-210, and 62-212 of the Florida Administrative Code (F.A.C.). Projects utilizing regulated equipment are required to obtain permits prior to beginning construction on new emissions units, modifying an existing emissions unit or installing air pollution control equipment. These permits will specify applicable emissions standards and work practices to control the emissions of pollutants such as particulate matter, carbon monoxide, nitrogen oxides, sulfur oxides, volatile organic compounds, and hazardous air pollutants.

c. Prior to the start of the project, the Contractor will submit a listing of all stationary and mobile emission sources and associated criteria and hazardous air pollutants for each source. During the project, the list will be maintained by the Contractor, and updates submitted to 325 CES/CEIE as changes occur. Air pollution sources include, but are not limited to, external combustion sources (boilers), internal combustion sources (gas, diesel, propane, natural gas – fired generators and other internal combustion driven types of equipment), woodworking shops, paint spray booths, fuel storage and dispensing operations, welding operations, abrasive cleaning, degreasers and emitters of ozone depleting substances and/or hazardous air pollutants (HAPS).

6. Asbestos Containing Materials: The Contractor and subcontractors are prohibited from using any Asbestos Containing Materials (ACM) on any assigned project. In the event the Contractor encounters previously unidentified ACM or suspected ACM during work, the Contractor shall take all necessary precautions to ensure the ACM is not disturbed. The Contractor shall immediately notify the 325 CES Project Manager and Contracting Officer and await further guidance. The Government will take steps, as necessary, to ascertain the material's composition and determine any necessary remedial action.

a. The Contractor or subcontractors performing asbestos removal must be licensed/certified by the State of Florida, show proof of acceptable Federal/State approved disposal site, and must have properly certified and trained asbestos abatement workers. Contractor must perform in strict compliance with all applicable State, Local, and Federal regulations.

b. Notice of Demolition or Asbestos Renovation, DEP Form 62-257.900(1) must be submitted to Florida Department of Enviro Many operations are subject to specific air quality regulations. State-specific emission standards are identified in Chapter 62-296 of the Florida Administrative Code (F.A.C.). Florida regulates hazardous air pollutants (HAP) in accordance with the National Emissions Standards for Hazardous Air Pollutants (NESHAP) in Title 40 of the Code of Federal Regulations (CFR): Part 61 is regulation by HAP and Part 63 is regulation by industrial category. There are also federal New Source Performance Standards specified for criteria air pollutants in Title 40, Part 60 of the CFR, postmarked or received at least 10 working days prior to the start of all demolitions (i.e. load-bearing structures) and for the removal of asbestos-containing material from all applicable sources meeting or exceeding the thresholds identified in the Asbestos National Emission Standards for Hazardous Air Pollutants regulations. A copy of this notification must be provided to the Contracting Officer and 325 CES/CEIE prior to performing any work.

c. Contractors will coordinate with 325 CES/CEIEC Hazardous Waste Program Manager or designee for approval and signature of disposal shipping documents.

7. Hazardous Waste:

a. The Contractor shall conduct and record hazardous waste determinations for all Solid Wastes to identify, characterize, store and dispose of any hazardous waste generated during work in strict accordance with Federal and State guidelines found in the Code of Federal Regulations..

b. The contractor shall comply with all provisions of 40 CFR 260 through 281 regarding the generation, storage, and disposal of hazardous waste. The contractor shall stop all work in the event 325 CES/CEIE identifies noncompliance with federal and state regulations and shall correct any discrepancies immediately within 2 hours of notification. All hazardous waste shall be labeled and an inventory management system will be initiated to insure timely removal and proper disposal. No on-base disposal will be allowed.

c. All drums will be labeled with a hazardous waste label. The label shall include the proper DOT shipping name, UN or NA number, EPA waste number, generator information. The label shall be placed on the side of the drum. All drums used to store hazardous waste shall be non-leaking and safe to handle. Contractor shall be responsible for over packing drums that are rusted, dented, or leaking. Drums and/or over-packs shall be provided by the contractor. All drums shall be "new" DOT approved containers.

d. Hazardous waste transportation and disposal shall be coordinated through 325 CES/CEIE. The contractor shall be responsible for transportation and disposal of all hazardous waste at an EPA approved treatment, storage, disposal facility (TSDF). The transportation and disposal facilities shall be approved

by 325 CES/CEIE prior to their use. Manifests and profiles shall be signed only by 325 CES/CEIE. Drums shall be disposed of within 90 days of placing the first drop in the container.

8. Solid, Liquid, and Gaseous Contaminants: The Contractor shall be responsible for the proper disposal of all solid, liquid, and gaseous contaminants in accordance with all applicable Federal, State, and Local codes and regulations, as described elsewhere herein.

9. Covered Chutes: All chutes for refuse, and the like, shall be covered or of such a design to fully confine the material to prevent dust dissemination.

10. Management of Liquid Wastes: The contractor shall not dispose of any waste or residual material on the ground or in any storm sewer or drainage system. This includes but is not limited to paints, coatings, solvents, petroleum products, etc. Discharge of any material or diluted material into sanitary or industrial sewer systems shall be coordinated with the Base Environmental Element through the Contracting Officer, and shall be approved by the Base Environmental Element. Waste material for disposal shall be disposed of in accordance with Federal and State waste regulations and with local base policies. If in doubt, consult with the Base Environmental Element, Tyndall AFB, through the Contracting Officer.

11. Hazardous Chemical and Liquid Petroleum Products Spill Prevention: All hazardous materials and wastes shall be stored and handled in a manner to minimize the potential for spills. Liquid containers of 55 gallons or greater will be stored on or in a secondary containment compatible with the material being stored, and capable of containing the entire contents of the largest single container. (e.g. A secondary containment pallet capable of holding 60 gallons may have more than a single 55 gallon drum stored upon it). Spill response materials and tools shall be available in the immediate area to contain and control a spill. In the event of a spill every effort will be made to prevent the material from entering a storm water or sanitary sewer inlet. If the spill is a result of negligence or failure to adhere to these requirements the contractor will be solely responsible for the cost of cleanup and restoration of the area. Copies of the Spill Prevention, Containment and Countermeasures Plan and the Hazardous Material Management Plan will be provided to the Contractor by the Contracting Officer upon request.

12. Hazardous Material Inventory and Tracking:

a. A letter of review from 325 CES/CEIEC Must be accomplished prior to commencement of work on each task order.

b. The contractor shall submit TAFB Form 81 (Contractor Questionnaire) and TAFB Form 82 (Chemical Inventory) for review and approval to the 325 CES/CEIEC Hazardous Materials Office (HAZMO) 7-10 business days prior to commencement of work.

c. The Contractor should note that Tyndall AFB is required to report chemicals used such as (but not limited to) compressed gases, adhesives, aerosol cans, sealants, paints, lubricants, oils, cleaners, degreasers, pesticides, and fuels. Copies of manufacturer-specific Safety Data Sheets (SDS) must be attached to TAFB Form 82. These SDSs shall also be readily accessible at the location of each hazardous material. **Materials Safety Data Sheets (MSDS) are no longer accepted.**

d. After submission, the 325 CES/CEIEC HAZMO will notify the Project Manager and/or CONS of the reportable chemicals and of any special instructions. **The contractor or subcontractor cannot bring any materials onto the installation until they have received a hazardous materials approval letter from the 325 CES/CEIEC HAZMO.** As directed by the CO, the Contractor is required to submit TAFB Form 83 (Reporting Entry Form) showing material usage monthly until completion of the task order. A letter from 325 CES/CEIEC HAZMO will be accomplished with each submittal monthly and/or

completion. The CO must be notified of any changes from the original submittal (i.e. new chemical is added, size of container or unit of issue changes or if the manufacturer changes), changes must be submitted using TAFB form 82. An updated letter of review indicating changes will be sent from 325 CES/CEIEC HAZMO to the Contracting Office before the material can be brought onto the installation. Prime contractors shall be responsible to ensure all sub-contractors comply with this requirement.

e. The contractor shall identify a single Point of Contact (POC) in writing to the HAZMO. Submit changes in writing to the HAZMO as they occur.

f. All containers will be labeled and the Contractor will provide the 325 CES Environmental Element, the Fire Department, and Readiness Flight with a listing of all Extremely Hazardous Substances (as defined in 40 CFR Part 355, Appendix A), approximate volumes of petroleum based substances (i.e., lubricants, fuels, etc.) and hazardous materials as defined in 40 CFR Part 302.4. This information will be updated any time different materials are brought on base.

g. All contractors and subcontractors must comply with the requirements for hazardous materials in accordance with AFMAN 32-7002, Environmental Compliance and Pollution Prevention.

13. The contractor shall notify the Contracting Officer upon encountering any material thought to be hazardous that was not generated by the contractor during the work. The Government shall be responsible for characterization, transportation, storage and disposal of the material if it is determine to be hazardous.

14. Non-Hazardous Solid Waste Diversion Reporting: The Contractor shall maintain an inventory of non-hazardous solid waste diversion and disposal of construction and demolition debris. The Contractor shall submit a report to 325 CES/CEIE through the Contracting Officer on the first business day after each fiscal year quarter, starting the first quarter that non-hazardous solid waste has been generated. The following shall be included in the report:

a. Construction and Demolition (C&D) Debris Disposed = in thousands of pounds

b. Non-C & D recycled items (i.e. cardboard, paper, metal, plastic, glass, etc.) = in thousands of pounds

c. Total C&D Debris Generated = in thousands of pounds.

15. Burning of any type of materials will not be permitted to accomplish the work.

16. All pesticide usage must be coordinated with the Base Entomologist (283-4358). Pesticides must be applied by certified personnel.

17. Stormwater

a. If disturbing 1 acre or more, the contractor needs an NPDES construction permit which meets standards set forth in FDEP Doc. No. 62-621.300(4)(a), Oct 22, 2000. The Notice of Intent shall be submitted along with the appropriate fee to the NPDES Stormwater Notice Center 48 hours before beginning construction. A copy of the permit application and permit letter must be provided to the Environmental Element within 1 week of submittal or receipt. A copy of the Stormwater Pollution Prevention Plan (SWPPP) must be kept on-site. Additionally, a Notice of Termination (NOT) shall be submitted to the NPDES Stormwater Notice Center with a copy provided to 325 CES/CEIE when project is completed.

b. Work specific Best Management Practices (BMP's) shall be implemented prior to construction activities and maintained at all times during construction to prevent siltation and turbid discharges. Identify and cover Stormwater structures using protection devices before performing any work. The BMP's are to be installed along the perimeter of all work areas to prevent the displacement of fill material outside the work area into surface waters, stormwater inlets, etc. Immediately after completion of the final grading of the land surface, all slopes, land surfaces, and filled areas shall be stabilized using approved sod, seeding, degradable mats, staked hay bales, staked filter cloth, barriers, turbidity screens, or a combination of similar stabilizing materials to prevent erosion. The erosion control measures shall remain in place and be maintained until all authorized work is completed and the work areas are stabilized and verified by USAF personnel.

c..There shall be no storage or stockpiling of tools, materials (i.e. lumber, pilings, debris) within wetlands, ditches, swales, or elsewhere within waters of the state.

d. All stormwater conveyance structures shall remain in operable condition and shall not be allowed to deteriorate or otherwise contribute to a water quality violation.

e. The contractor shall provide at least one person on each land-disturbing project site who is certified in the *Florida Stormwater, Erosion, and Sedimentation Control Inspector Training and Certification Program*. This person will conduct and document site inspections weekly and after rainfall events according to FDEP Document No. 62-621.300(4)(a), for land-disturbing projects 1 acre and over conducted within Tyndall's fence line. This inspection log shall be made available as needed to project managers, base environmental office or FDEP.

18. Disposal of waste water will be as specified below:

a. Waste water from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, forms, etc. will not be allowed to enter water ways or to be discharged prior to being treated to remove pollutants. Dispose of the construction related waste water off-Government property in accordance with all Federal, State, Regional and Local laws and regulations.

b. For discharge of ground water, the Contractor will obtain a State or Federal permit specific for pumping and discharging ground water prior to surface discharging.

19. Petroleum, Oils, & Lubricants (POL)/ Tanks: Contractors with POL tanks must maintain a maintenance log, reconciliation records and also ensure secondary containment valves are closed. Employees must have proper training for spill cleanup and response. Contractor shall ensure all areas are free of spill residues. Tyndall AFB's Environmental Compliance POL/Tank Program Manager can be reached at 283-2723.

20. Scrap metal generated from base projects shall remain the property of the US Government unless otherwise specified in the contract. The contractors and/or subcontractors must coordinate with the 325 CES/CEIEC Recycling Manager and the Tyndall Recycling Center Manager for turning over materials to the base for recycling. All revenue generated from the sale of scrap metal should be returned to the Tyndall AFB Recycling Program.

21. Storage: Storage areas for material designated for reuse or recycling should be coordinated with the 325 CES/CEIEC Solid Waste/Recycling Manager. Any solid waste generated by the project is the responsibility of the contractor to dispose of off the installation.

22. Environmental Management Systems (EMS). Contractors must perform work consistent with the policy and objectives identified in the installations Environmental Management Systems in accordance with AFI 32-7001, Environmental Management. Perform work in a manner that conforms to objectives and targets of environmental programs and operational controls identified by the EMS. Provide monitoring and measurement information as necessary to address environmental performance relative to environmental, energy, and transportation management goals. In the event of an EMS nonconformance or environmental noncompliance associated with the contracted services, tasks, or actions occurs, take corrective and preventative actions. In addition, employees must be aware of their roles and responsibilities under the installation EMS and of how these EMS roles and responsibilities affect work performed under the contract. Coordinate training needs associated with environmental aspects and the EMS, and arrange training or take other action to meet these needs. Provide training documentation to the Contracting Officer. Make EMS Awareness training completion certificates available to Government auditors during EMS audits and include the certificates in the Employee Training Records.

23. References:

a. Air Force

1. AFI 32-7001, Environmental Management
2. AFMAN 32-1053, Integrated Pest Management
3. AFMAN 32-1067, Water and Fuel Systems
4. AFMAN 32-7002, Environmental Compliance and Pollution Prevention
5. AFMAN 32-7003, Environmental Conservation

b. Florida Department of Environmental Protection

1. Florida Administrative Code (F.A.C) Chapters 62-210-300 and 62-296, Air Regulations
2. Chapter 62-730, Hazardous Waste
3. Chapter 62-762, Aboveground Storage Tanks Systems
4. Chapter 62-710, Used Oil Management
5. Chapter 62-4, Permits
6. Chapter 62-330, Environmental Resources Permitting
7. Chapter 62-331, State 404 Program
8. 62-25 Regulation of Stormwater Discharges

c. Environmental Protection Agency

1. 40 Code of Federal Regulations (CFR) 260-281, Hazardous Waste Management

2. 40 CFR Part 302.4, Designation of Hazardous Substances

3. 40 CFR Part 60-63, National Emissions Standards for Hazardous Air Pollutants

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ATTACHMENT 4

Tyndall AFB Guidelines for Non-ERP Soil Management
USACE MILCON Build-Out
22 May 2020

Projects outside ERP study areas shall be conducted within the following guidelines. To the extent these guidelines conflict with provisions contained within the contract, Statement of Work, or approved work plans, those documents control.

1. Soil outside ERP study areas is not believed to be contaminated. It is the government's intent to use any excess viable (free of roots and debris) soil from excavation or construction activities on other projects on TAFB that are not on ERP study areas. Therefore, excess soil without any evidence of contamination as described in Section #4 below, may be moved to the designated soils borrow storage area for use on other construction projects on TAFB as directed by government officials without testing for contamination.

2. Deviations from statement in Section #1 above:
2a. Excess soil with evidence of contamination as described in Section #4 below discovered during excavation must be tested utilizing criteria for verifying soil is clean found in Section #3 below prior to moving the soil to the soils borrow storage area. If the excess soil is verified as clean, the soil may be moved to the soils borrow storage area. If the excess soil is not verified as clean, the soil shall be disposed of at an authorized disposal facility as described in Section #2b below with the caveat that if the results of the analysis conducted as described in Section #3 below can be used to determine that the soil is not hazardous to the satisfaction of the 325 CES HWPM and an authorized disposal facility, then TCLP analysis is not required and the totals analysis can be used for the waste profile. Otherwise, contaminated soil must follow the requirements in the current IRP MILCON Guidelines.
2b. If the government determines the soils borrow storage area is full and can no longer receive excess soil generated from outside ERP study areas, the excess soil must be disposed of offsite at an authorized disposal facility. A Hazardous Waste Determination (HWD) must be conducted on this excess soil The HWD shall be conducted by testing excess soil utilizing TCLP analysis or the analysis outlined in Section #3 below for clean fill and the divide by 20 rule to approximate the TCLP result. These analytical results and all waste profiles shall be provided to the 325 CES Hazardous Waste Program Manager (HWPM) prior to any transportation for proper disposal at an authorized disposal facility or may be conservatively handled as hazardous waste in accordance with appropriate hazardous waste laws and regulations if approved by the 325 CES HWPM or required by the contract or statement of work. Copies of transportation and disposal documents (profiles, manifests, bills of lading) must be provided to the 325 CES HWPM. The contractor is responsible for the sampling, profiling, proper handling, and disposal of any contaminated media. Utilize the services of a qualified environmental professional for sampling and testing. The 325 CES HWPM is the signature authority for all disposal documents as the generator's representative.

3. Any soils brought on-site from off-base and used for backfill should be properly tested or certified clean (with appropriate documentation) to ensure that no contaminants are being applied on-site. The source of backfill should be natural or virgin material (other than the operation of a borrow pit facility) and should be in an area which has not previously been used for commercial or industrial activities. If the soils to be used for backfill are not certified clean with appropriate documentation, testing of the soils shall be required and must include at least one (1) soil sample collected from the borrow source and analyzed for the following parameters:

- Volatile Organic Compounds (VOCs) per Method 8260
- Semi-volatile Organic Compounds (SVOCs) [Base/Neutrals (e.g., PAHs, Pesticides, PCBs) and Acid Extractables (e.g., Phenols)] per Methods 8270/8081/8082
- RCRA metals by Method 6020
- Petroleum Residual Organics (by FL-PRO)

Analytical results will be compared to the FDEP residential Soil Cleanup Target Levels to determine acceptability of the proposed material as clean fill. Results of every analyte must be below the FDEP residential Soil Cleanup Target Levels in order to be used as backfill on TAFB.

4. Contractors must be made aware of the appropriate procedures if any contamination is encountered (i.e. suspicious odors, fuel smells, soil staining, odd soil colors, unfamiliar liquids, buried materials, etc.) at the site. If these conditions are encountered, AFCEC/CZOE and 325 CES/CEIEC must be contacted. If discovered, these soils should be separated, stockpiled on, and covered with visqueen until properly tested/disposed.

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ATTACHMENT 5

Tyndall Soils Decision Matrix							
soil	excavation in limits of AFFF site?	Is the soil suitable for reuse using geotechnical standards?	is there a need for the soil to be reused within the limits of the AFFF site?	is there a need for the soil to be reused outside of the limits of the AFFF site?	sampling required?	PFAS and PFOA < EPA RSL screening levels (1.3 mg/kg)	PFAS and PFOA > EPA RSL screening levels
	yes	yes	yes	NA	yes, for PFOS and PFOA	reuse within the limits of the AFFF site boundaries	dispose of in a Subtitle D Municipal Solid Waste Landfill
			no	yes	yes, for PFOS and PFOA	reuse at a location outside of AFFF site boundaries	dispose of in a Subtitle D Municipal Solid Waste Landfill
				no	yes, for PFOS and PFOA	move soil to designated soil borrow storage area: dedicated PFOS/PFOA stockpile (if no other COCs): if comingled with other COCs, now follow IRP guidance	dispose of in a Subtitle D Municipal Solid Waste Landfill
	yes	no	NA can't reuse unsuitable soil	NA can't reuse unsuitable soil	yes, for PFOS and PFOA	move soil to designated soil borrow storage area: dedicated PFOS/PFOA stockpile (if no other COCs): if comingled with other COCs, now follow IRP guidance	dispose of in a Subtitle D Municipal Solid Waste Landfill
soil	excavation in limits of IRP site?	Is the soil suitable for reuse using geotechnical standards?	is there a need for the soil to be reused at point of excavation (within the limits of the IRP site)?	is there a need for the soil to be reused outside of the point of excavation?	sampling required?	Non-hazardous?	Hazardous?
	yes	yes	yes	NA	No	Screening not applicable. Reuse at point of excavation within the limits of the IRP site.	Screening not applicable. Reuse at point of excavation within the limits of the IRP site.
			no	yes	yes, TCLP and either COCs or full suite VOC, SVOC, RCRA metals, FL-PRO	reuse soil if below project specific SCTLs; move soil above SCTL to soil borrow storage area (dedicated IRP stockpile)	dispose of in a Subtitle C Landfill.
				no	yes, TCLP	move soil to designated soil borrow storage area: dedicated IRP stockpile	dispose of in a Subtitle C Landfill.
	yes	no	NA can't reuse unsuitable soil	NA can't reuse unsuitable soil	yes, TCLP	move soil to designated soil borrow storage area: dedicated IRP stockpile	dispose of in a Subtitle C Landfill.
soil	excavation outside limits of AFFF and IRP site?	Is the soil suitable for reuse using geotechnical standards?	is there a need for the soil to be reused?		sampling required?	shows NO evidence of contamination?	shows evidence of contamination?
	yes	yes	yes		No	Screening not applicable. Reuse on construction site	notify COR, follow non-ERP guidelines
			no		No	Screening not applicable. Move soil to designated soil borrow storage area: dedicated clean soil stockpile	notify COR, follow non-ERP guidelines
	yes	no	NA can't reuse unsuitable soil		No	Screening not applicable. Move soil to designated soil borrow storage area: dedicated clean soil stockpile	notify COR, follow non-ERP guidelines
Note: Refer to UFGS 01 57 19 Attachments Installation Restoration Program and Aqueous Film Forming Foam Guidelines for Tyndall MILCON-Rebuild and Tyndall AFB Guidelines for Non-ERP Soil Management USACE MILCON Build-Out for Full Contract Requirements							

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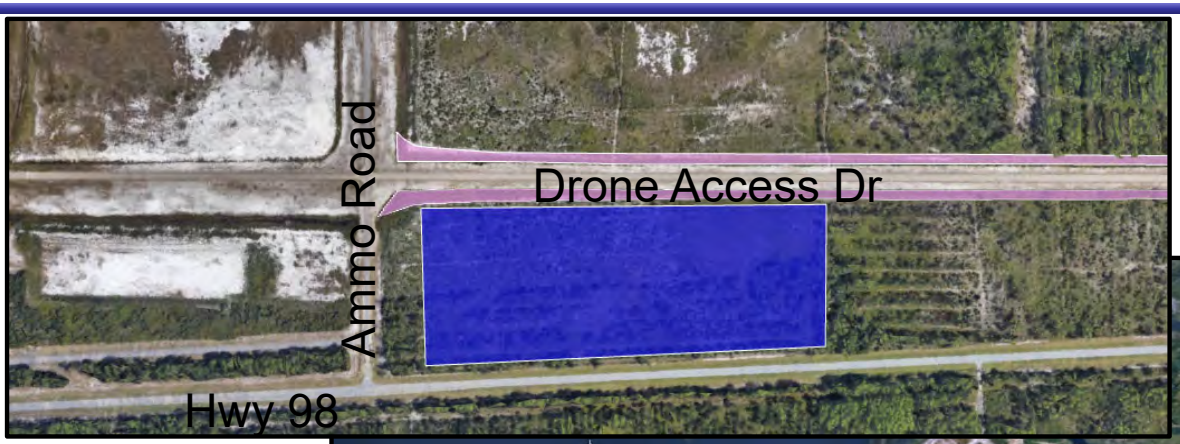
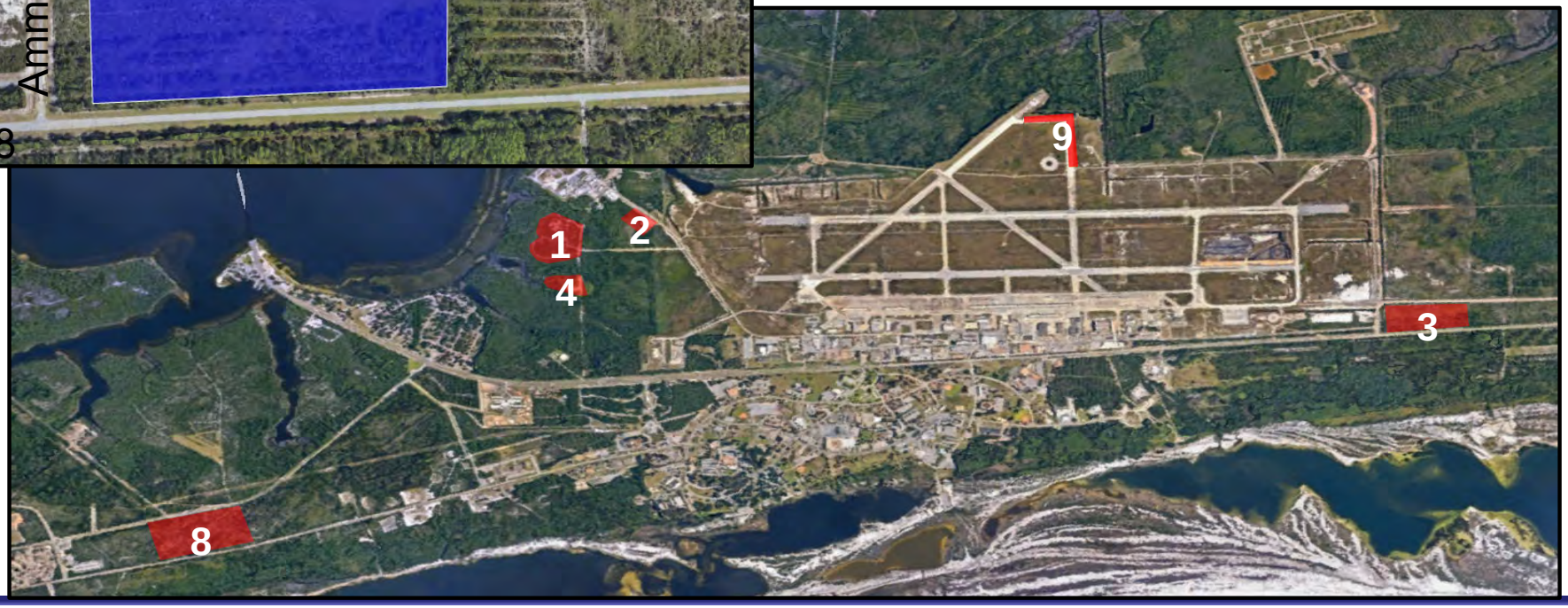
ATTACHMENT 6

Site 3 – Ammo Gate



- **Size:** 30 Acres
- **Use:** Clean soil storage and reuse



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ATTACHMENT 7

Pre-Demolition Soil Testing Report for Facilities Reduction Program, Tyndall AFB

(LOX Project Site)

TYNDALL AFB PRE-DEMOLITION SOIL TESTING

W912DY-19-P-0053

Pre-Demolition Soil Testing Report

For:
Facilities Reduction Program FY19 Tyndall II
Tyndall AFB, Florida
Building 370 Deployment Processing Center
Prepared For:
US Army Corps of Engineers
Engineering & Support Service Center
4910 University Square, Suite 4
Huntsville, Alabama 35816-1822
Facilities Reduction Program
ATTN: CEHNC-ISF

28 April 2020

AQ#: 15671

CERTIFICATION PAGE

Pre-Demolition Soils Testing Report

Facilities Reduction Program FY19 Tyndall II
Tyndall Air Force Base, Florida
Building 370 Deployment Processing Center

AirQuest Project #15671

Prepared For:

US Army Corps of Engineers
Engineering & Support Service Center
4910 University Square, Suite 4
Huntsville, Alabama 35816-1822
ATTN: CEHNC-ISF

Prepared By:

AirQuest Environmental, Inc.
6851 Southwest 45th Street
Fort Lauderdale, Florida 33314
Geology Business GB-721

Digitally signed by Ted J Smith
Date: 2020.04.24 17:51:47 -04'00'

Ted Smith, PG
FL Professional Geologist No. PG1368

28 April 2020

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TABLES

APPENDICES

1 INTRODUCTION AND SITE DESCRIPTION

In accordance with the Performance Work Statement (PWS) for contract W912DY-19-P-0053, AirQuest Environmental, Inc. ("AirQuest") performed pre-demolition soil testing for Building 370 located at Tyndall Air Force Base, Florida ("the site"). The testing was performed by AirQuest Project Team Members as shown in Table 1. Copies of applicable licenses and accreditations are included in Appendix I.

Table 1 – Survey Information

Survey	Name	Survey Date
Soil Sample Collection	Ted Smith	April 2, 2020

1.1 PURPOSE

The purpose of the survey was to collect soil samples for organochlorine pesticides (OCP) analyses for each structure. A diagram depicting sample locations is provided in Appendix II.

The investigation was conducted to facilitate the repairs at Tyndall Air Force Base following Hurricane Michael.

1.2 SITE DESCRIPTION

The single-story building measured approximately 7,000 square feet and was constructed of steel beams on a concrete block foundation. The roof deck and exterior walls were constructed of sheet metal. Ceilings were constructed of drywall system and select areas were finished with acoustic tile. Interior walls were constructed of metal studs and finished with drywall system. Select areas of the concrete floors were finished with vinyl floor tile and carpet.

2 SOIL TESTING FOR ORGANOCHLORINE PESTICIDES

AirQuest advanced four (4) soil borings and collected two (2) samples at each boring location at depths of zero to six inches (0 - 6 in.) and eighteen to twenty-four inches (18 – 24 in.) below land surface using a properly decontaminated hand bucket auger. The samples were generally collected near the four corners of the building as shown in Appendix II.

The soil sampling was conducted in accordance with Florida Department of Environmental Protection (FDEP) Standard Operating Procedures SOP-001-01 FS 3000 (Soil) and SOP-001-01 FQ1000 (Field Quality Control Requirements). One boring log was completed for the building site documenting the observed lithology, visually estimated moisture content, noticeable odors, soil color, sample collection times, sampler's name, sampling interval and boring completion method. The soil boring log and soil boring location photographs are included in Appendix III.

The samples were placed in dedicated sample containers provided by the laboratory and labeled according to the referenced building/structure, collection time, sampler's name and analysis. A

chain of custody form was completed to document the chronology of ownership, control and transfer of the samples. All samples were placed in a cooler filled with ice for transfer to the laboratory.

The soil samples were shipped to Eurofins TestAmerica ("TestAmerica") in Pensacola, Florida, a NELAC accredited environmental laboratory licensed in the State of Florida, for analysis by EPA Method: 8081B (Organochlorine Pesticides by GC). Analytical results are summarized in Table 2. A copy of the laboratory report and chain of custody record is included in Appendix IV.

The analytical results indicate there are traces of OCP 4,4'-DDE and Dieldrin above laboratory method detection limits but below practical quantitation limits, in some of the soil samples. The detected concentrations do not exceed the Commercial/Industrial or Residential Soil Cleanup Target Levels (SCTLs) provided in Chapter 62-777 FAC, the criteria used by the FDEP.

Table 2 – Soil Sample Analytical Results

Sample	Sample Depth (Inches)	Results (mg/kg)	
		4,4'-DDE	Dieldrin
OCP-370.1	0-6	ND	0.0027I
OCP-370.2	18-24	ND	ND
OCP-370.3	0-6	ND	ND
OCP-370.4	18-24	ND	ND
OCP-370.5	0-6	ND	ND
OCP-370.6	18-24	ND	ND
OCP-370.7	0-6	0.0021I	0.0031I
OCP-370.8	18-24	ND	ND
SCTL Residential/Commercial		2.9	0.06
SCTL Industrial		15	0.3

mg/kg – milligrams/kilogram
ND – None Detected Above the Method Detection Limit
Total Chlordane = cis-Chlordane + trans-Chlordane
SCTL – Soil Cleanup Target Level, Chapter 62-777 Florida Administrative Code
I – The Reported Value is Between the Laboratory Method Detection Limit and the Laboratory Practical Quantitation Limit

3 CONCLUSIONS AND RECOMMENDATIONS

The soils surrounding the site were sampled and analyzed for Organochlorine Pesticide constituents.

The soil analytical results did not identify EPA Method 8081B compounds above the Commercial/Industrial or Residential SCTLs.

4 LIMITATIONS

This report was prepared in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions. This report was prepared for the exclusive use of the client and assigned agents and is not intended for any other purposes. Our report is based on the information available to us at the time of our investigation and limited in scope to the stated purpose and/or the area(s) inspected. Other conditions elsewhere in the site may differ from those in the inspected/ surveyed locations and such conditions are unknown, may change over time, and/or have not been considered. This report does not claim to identify all potential hazards and/or contaminants that may be present, nor does it imply any medical opinion on the relationship of potential health effects with any reported hazards and/ or contaminants. Our opinions are based on our findings and professional expertise, with no guaranty or warranty implied herein. Should additional information become available, we reserve the right to determine the impact, if any, of the new information on our opinions, conclusions, and recommendations if necessary, as warranted by the discovery of the additional information. AirQuest accepts no responsibility for interpretation of this report by others. Its contents shall not be used or relied upon by other parties without prior written authorization by AirQuest.

Appendix I
Certification

RICK SCOTT, GOVERNOR

JONATHAN ZACHEM, SECRETARY

Florida dbpr

STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION

BOARD OF PROFESSIONAL GEOLOGISTS

THE PROFESSIONAL GEOLOGIST HEREIN IS LICENSED UNDER THE
PROVISIONS OF CHAPTER 492, FLORIDA STATUTES

SMITH, TED J

1735 CLARENDON AVENUE
LAKELAND FL 33803

LICENSE NUMBER: PG1368

EXPIRATION DATE: JULY 31, 2020

Always verify licenses online at MyFloridaLicense.com

Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.

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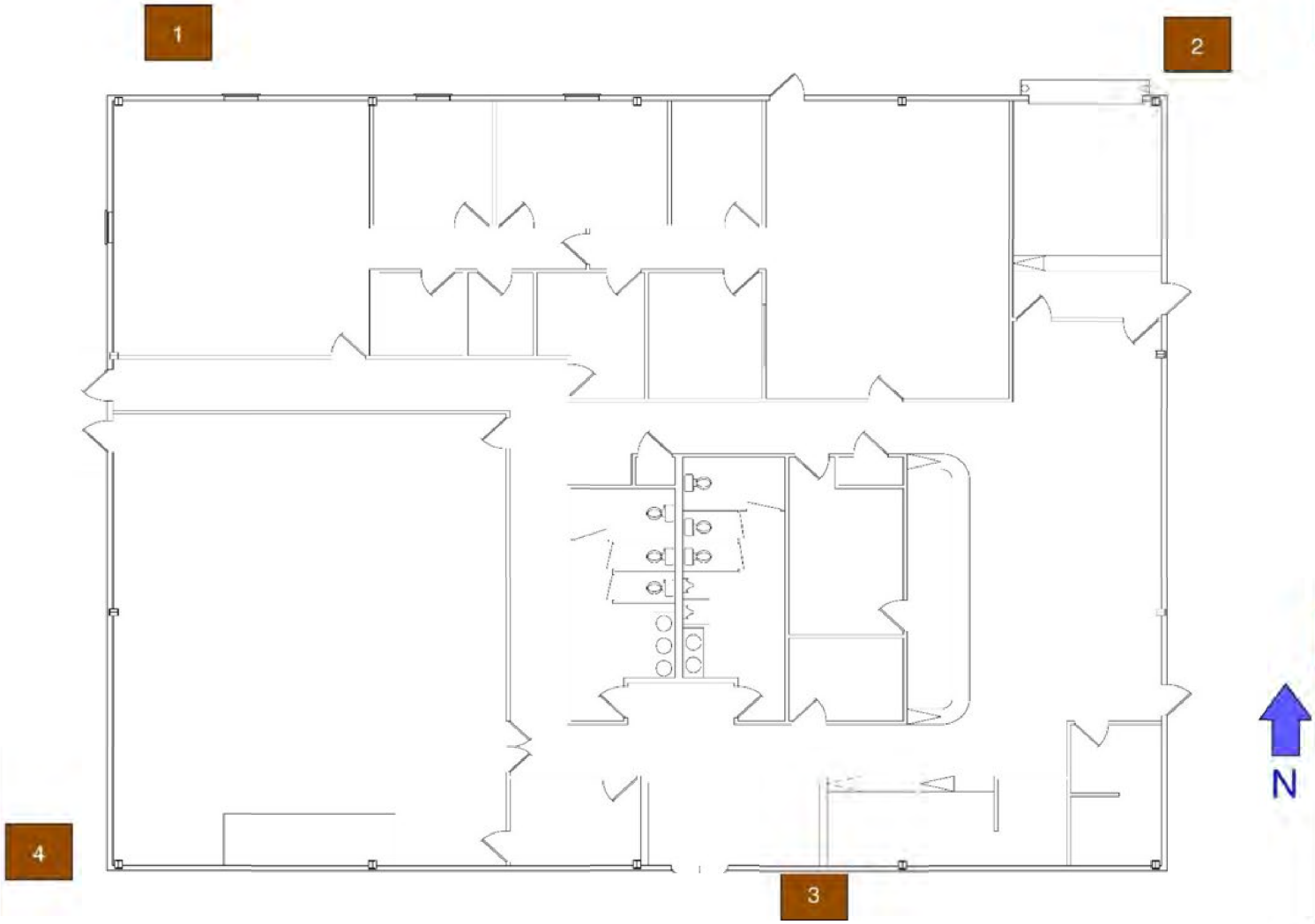
Appendix II
Sample Location Diagram



Sampling Locations

LEGEND

SOIL BORING LOCATION	1

Contract

FACILITIES REDUCTION PROGRAM
FY19 TYNDALL II
W912DY-19-P-0053
DATE: APRIL 2020

Site

PRIORITY BUILDINGS
TYNDALL AIR FORCE BASE
FLORIDA
BUILDING: DEPLOYMENT PROCESS CENTER
BUILDING #: 370

AIRQUEST ENVIRONMENTAL, INC.
6851 SW 45TH STREET
FT. LAUDERDALE, FLORIDA 33314
AIRQUEST PROJECT 15671

Appendix III
Soil Boring Log and
Soil Boring Location Photographs

BORING LOG

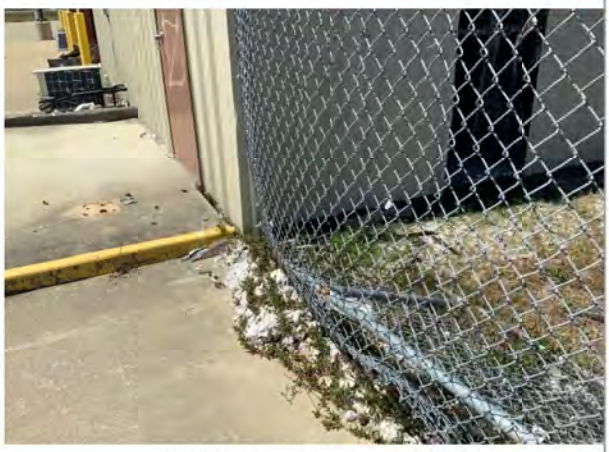
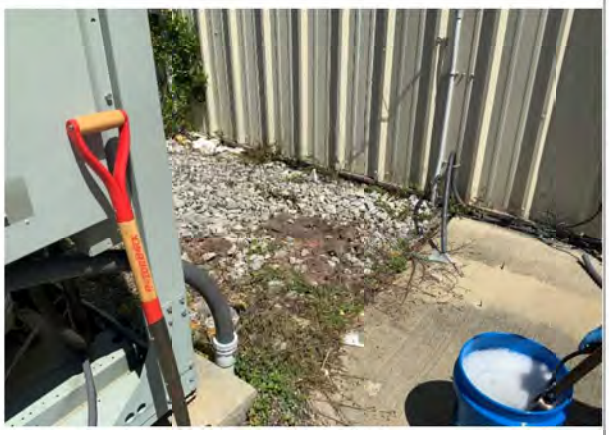
Boring Number: Building 370-1,2			
Site Name: Tyndall AFB, Florida	Borehole Start Date: 04/02/20 End Date:	Borehole Start Time: 11:55 End Time:	
Environmental Contractor: AirQuest Environmental Inc.	Geologist's Name: Ted Smith	Environmental Technician's A. A.	
Drilling Company: AirQuest Environmental Inc.	Pavement Thickness (inches): N/A	Borehole Diameter (inches): 2 in.	Borehole Depth (feet): 24 in.
Drilling Method(s):	Direct Push	Hand Auger ✓	
Disposition of Drill Cuttings: Backfill			
Borehole Completion: Backfill and compacted with	Concrete	Asphalt	Drill Cuttings

Sample Type	Sample Depth Interval (feet)	Sample Recovery (inches)	Depth (feet)	Sample Description (include grain size based on USCS, odors, staining, and other remarks)	USCS Symbol	Moisture Content
	0			Slab / Pavement / Grass / Dirt		
	6"		6"	SAND: SP, Very dark grayish brown, 10YR 3/2, fine to very fine-grained quartz. Organic stained.	SP	Dry
			12"		SP	Slightly Damp
			18"			
	24"		24"			

Sample Type Codes: **PH** = Post Hole; **HA** = Hand Auger; **SS** = Split Spoon; **ST** = Shelby Tube; **DP** = Direct Push; **SC** = Sonic Core; **DC** = Drill Cuttings

Moisture Content Codes: **D** = Dry; **M** = Moist; **W** = Wet; **S** = Saturated

AIRQUEST ENVIRONMENTAL, INC.

Soil Photolog Bld 370- DEPLOYMENT PROCESSING CENTER Tyndall Air Force Base	AirQuest Environmental, Inc. Project #15671 April 2020
 Soil Boring Location #1	 Soil Boring Location #2
 Soil Boring Location #3	 Soil Boring Location #4

Appendix IV
Soil Laboratory Report and Chain of Custody Record

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Pensacola
3355 McLemore Drive
Pensacola, FL 32514
Tel: (850)474-1001

Laboratory Job ID: 400-186240-4
Laboratory Sample Delivery Group: Building 370
Client Project/Site: Tyndall AFB Project No.15671

For:
Air Quest Environmental Inc
6851 SW 45th Street
Fort Lauderdale, Florida 33314

Attn: Teresa A Thomas

Mark Swafford

Authorized for release by:
4/10/2020 10:10:16 AM

Mark Swafford, Project Manager II
(850)471-6207
mark.swafford@testamericainc.com

Table of Contents

Job ID: 400-186240-4

Laboratory: Eurofins TestAmerica, Pensacola

Narrative

Job Narrative
400-186240-4

Comments
No additional comments.

Receipt
The samples were received on 4/3/2020 10:45 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 0.0° C, 4.5° C and 5.7° C.

GC Semi VOA
Method 8081B: The continuing calibration verification (CCV) associated with batch 400-485220 recovered outside acceptance criteria, low biased, for 4,4'-DDT, Endrin aldehyde, Heptachlor and Methoxychlor. A reporting limit (RL) standard was analyzed, and the target analyte was detected. Since the associated samples were non-detect for this analyte, the data have been reported.

Method 8081B: The continuing calibration verification (CCV) associated with batch 400-485220 recovered above the upper control limit for 4,4'-DDE. The samples associated with this CCV were non-detects and/or recovered below the reporting limit (RL) for the affected analytes; therefore, the data have been reported.

Method 8081B: The following sample was diluted due to the nature of the sample matrix: OCP-370.1 (400-186240-29). Elevated reporting limits (RLs) are provided.

Method 8081B: The continuing calibration verification (CCV) associated with batch 400-485240 recovered outside acceptance criteria, low biased, for 4,4'-DDT, Endosulfan II, Endosulfan sulfate, Endrin ketone, Methoxychlor and Toxaphene. A reporting limit (RL) standard was analyzed, and the target analytes were detected. Since the associated samples were non-detect for these analytes, the data have been reported.

Method 8081B: The following samples were diluted due to the nature of the sample matrix: OCP-370.2 (400-186240-30), OCP-370.3 (400-186240-31), OCP-370.4 (400-186240-32), OCP-370.5 (400-186240-33), OCP-370.6 (400-186240-34), OCP-370.7 (400-186240-35) and OCP-370.8 (400-186240-36). Elevated reporting limits (RLs) are provided.

Method 8081B: The following samples were diluted due to the nature of the sample matrix: OCP-370.6 EQUIPMENT BLK (400-186240-37) and OCP-370. FIELD BLK (400-186240-38). Elevated reporting limits (RLs) are provided.

Method 8081B: The continuing calibration verification (CCV) associated with batch 400-485364 recovered outside acceptance criteria, low biased, for 4,4'-DDT, Methoxychlor, Endrin ketone Endrin aldehyde and Toxaphene. A reporting limit (RL) standard was analyzed, and the target analyte was detected. Since the associated samples were non-detect for this analyte, the data have been reported.

Method 8081B: The following sample was diluted due to the nature of the sample matrix: OCP-370.8 (400-186240-36). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: Air Quest Environmental Inc
Project/Site: Tyndall AFB Project No.15671

Job ID: 400-186240-4
SDG: Building 370

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
400-186240-29	OCP-370.1	Solid	04/02/20 11:48	04/03/20 10:45	
400-186240-30	OCP-370.2	Solid	04/02/20 11:52	04/03/20 10:45	
400-186240-31	OCP-370.3	Solid	04/02/20 11:55	04/03/20 10:45	
400-186240-32	OCP-370.4	Solid	04/02/20 11:59	04/03/20 10:45	
400-186240-33	OCP-370.5	Solid	04/02/20 12:05	04/03/20 10:45	
400-186240-34	OCP-370.6	Solid	04/02/20 12:10	04/03/20 10:45	
400-186240-35	OCP-370.7	Solid	04/02/20 12:14	04/03/20 10:45	
400-186240-36	OCP-370.8	Solid	04/02/20 12:18	04/03/20 10:45	
400-186240-37	OCP-370.6 EQUIPMENT BLK	Water	04/02/20 12:09	04/03/20 10:45	
400-186240-38	OCP-370. FIELD BLK	Water	04/02/20 12:09	04/03/20 10:45	

Client Sample Results

Client: Air Quest Environmental Inc
Project/Site: Tyndall AFB Project No.15671

Job ID: 400-186240-4
SDG: Building 370

Client Sample ID: OCP-370.1

Date Collected: 04/02/20 11:48
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-29

Matrix: Solid
Percent Solids: 97.1

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.00097	U	0.010	0.00097	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
4,4'-DDE	0.0014	U	0.0087	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
4,4'-DDT	0.0039	U	0.0087	0.0039	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Aldrin	0.0031	U	0.0087	0.0031	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
alpha-BHC	0.0012	U	0.0087	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
beta-BHC	0.0025	U	0.0087	0.0025	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
cis-Chlordane	0.0014	U	0.0087	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
delta-BHC	0.0016	U	0.0087	0.0016	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Dieldrin	**0.0027**	**I**	0.0087	0.0018	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Endosulfan I	0.0011	U	0.0087	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Endosulfan II	0.0012	U	0.0087	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Endosulfan sulfate	0.0011	U	0.0087	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Endrin	0.00097	U	0.0087	0.00097	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Endrin aldehyde	0.0015	U	0.0087	0.0015	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Endrin ketone	0.0018	U	0.0087	0.0018	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
gamma-BHC (Lindane)	0.0011	U	0.0087	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Heptachlor	0.0012	U	0.0087	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Heptachlor epoxide	0.0023	U	0.0087	0.0023	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Methoxychlor	0.0017	U	0.0087	0.0017	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
Toxaphene	0.15	U	0.87	0.15	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5
trans-Chlordane	0.0014	U	0.0087	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 09:19	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*82*		*26 - 129*	*04/06/20 10:09*	*04/08/20 09:19*	*5*
Tetrachloro-m-xylene	*49*		*31 - 122*	*04/06/20 10:09*	*04/08/20 09:19*	*5*

Client Sample Results

Client: Air Quest Environmental Inc
Project/Site: Tyndall AFB Project No.15671

Job ID: 400-186240-4
SDG: Building 370

Client Sample ID: OCP-370.2

Date Collected: 04/02/20 11:52
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-30

Matrix: Solid
Percent Solids: 94.6

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.0010	U	0.011	0.0010	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
4,4'-DDE	0.0014	U	0.0090	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
4,4'-DDT	0.0041	U	0.0090	0.0041	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Aldrin	0.0032	U	0.0090	0.0032	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
alpha-BHC	0.0013	U	0.0090	0.0013	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
beta-BHC	0.0026	U	0.0090	0.0026	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
cis-Chlordane	0.0015	U	0.0090	0.0015	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
delta-BHC	0.0017	U	0.0090	0.0017	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Dieldrin	0.0019	U	0.0090	0.0019	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Endosulfan I	0.0011	U	0.0090	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Endosulfan II	0.0012	U	0.0090	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Endosulfan sulfate	0.0011	U	0.0090	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Endrin	0.0010	U	0.0090	0.0010	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Endrin aldehyde	0.0015	U	0.0090	0.0015	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Endrin ketone	0.0018	U	0.0090	0.0018	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
gamma-BHC (Lindane)	0.0012	U	0.0090	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Heptachlor	0.0013	U	0.0090	0.0013	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Heptachlor epoxide	0.0024	U	0.0090	0.0024	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Methoxychlor	0.0017	U	0.0090	0.0017	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
Toxaphene	0.15	U	0.90	0.15	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5
trans-Chlordane	0.0014	U	0.0090	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 09:47	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*48*		*26 - 129*	*04/06/20 10:09*	*04/08/20 09:47*	*5*
Tetrachloro-m-xylene	*51*		*31 - 122*	*04/06/20 10:09*	*04/08/20 09:47*	*5*

Client Sample ID: OCP-370.3

Date Collected: 04/02/20 11:55
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-31

Matrix: Solid
Percent Solids: 95.8

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.00095	U	0.010	0.00095	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
4,4'-DDE	0.0013	U	0.0085	0.0013	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
4,4'-DDT	0.0038	U	0.0085	0.0038	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Aldrin	0.0030	U	0.0085	0.0030	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
alpha-BHC	0.0012	U	0.0085	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
beta-BHC	0.0025	U	0.0085	0.0025	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
cis-Chlordane	0.0014	U	0.0085	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
delta-BHC	0.0016	U	0.0085	0.0016	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Dieldrin	0.0018	U	0.0085	0.0018	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Endosulfan I	0.0010	U	0.0085	0.0010	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Endosulfan II	0.0011	U	0.0085	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Endosulfan sulfate	0.0010	U	0.0085	0.0010	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Endrin	0.00095	U	0.0085	0.00095	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Endrin aldehyde	0.0014	U	0.0085	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Endrin ketone	0.0017	U	0.0085	0.0017	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
gamma-BHC (Lindane)	0.0011	U	0.0085	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Heptachlor	0.0012	U	0.0085	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Heptachlor epoxide	0.0022	U	0.0085	0.0022	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Methoxychlor	0.0016	U	0.0085	0.0016	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
Toxaphene	0.14	U	0.85	0.14	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5
trans-Chlordane	0.0013	U	0.0085	0.0013	mg/Kg	☼	04/06/20 10:09	04/08/20 10:49	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*46*		*26 - 129*	*04/06/20 10:09*	*04/08/20 10:49*	*5*
Tetrachloro-m-xylene	*54*		*31 - 122*	*04/06/20 10:09*	*04/08/20 10:49*	*5*

Client Sample ID: OCP-370.4

Date Collected: 04/02/20 11:59
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-32

Matrix: Solid
Percent Solids: 93.0

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.0010	U	0.011	0.0010	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
4,4'-DDE	0.0014	U	0.0091	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
4,4'-DDT	0.0041	U	0.0091	0.0041	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Aldrin	0.0033	U	0.0091	0.0033	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
alpha-BHC	0.0013	U	0.0091	0.0013	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
beta-BHC	0.0027	U	0.0091	0.0027	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
cis-Chlordane	0.0015	U	0.0091	0.0015	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
delta-BHC	0.0017	U	0.0091	0.0017	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Dieldrin	0.0019	U	0.0091	0.0019	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Endosulfan I	0.0011	U	0.0091	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Endosulfan II	0.0012	U	0.0091	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Endosulfan sulfate	0.0011	U	0.0091	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Endrin	0.0010	U	0.0091	0.0010	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Endrin aldehyde	0.0016	U	0.0091	0.0016	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Endrin ketone	0.0019	U	0.0091	0.0019	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
gamma-BHC (Lindane)	0.0012	U	0.0091	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Heptachlor	0.0013	U	0.0091	0.0013	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Heptachlor epoxide	0.0024	U	0.0091	0.0024	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Methoxychlor	0.0018	U	0.0091	0.0018	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
Toxaphene	0.16	U	0.91	0.16	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5
trans-Chlordane	0.0014	U	0.0091	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 11:20	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*42*		*26 - 129*	*04/06/20 10:09*	*04/08/20 11:20*	*5*
Tetrachloro-m-xylene	*50*		*31 - 122*	*04/06/20 10:09*	*04/08/20 11:20*	*5*

Client Sample ID: OCP-370.5

Date Collected: 04/02/20 12:05
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-33

Matrix: Solid
Percent Solids: 93.0

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.00096	U	0.010	0.00096	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
4,4'-DDE	0.0014	U	0.0086	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
4,4'-DDT	0.0039	U	0.0086	0.0039	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Aldrin	0.0031	U	0.0086	0.0031	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
alpha-BHC	0.0012	U	0.0086	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
beta-BHC	0.0025	U	0.0086	0.0025	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
cis-Chlordane	0.0014	U	0.0086	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
delta-BHC	0.0016	U	0.0086	0.0016	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Dieldrin	0.0018	U	0.0086	0.0018	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Endosulfan I	0.0011	U	0.0086	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Endosulfan II	0.0012	U	0.0086	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Endosulfan sulfate	0.0011	U	0.0086	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Endrin	0.00096	U	0.0086	0.00096	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Endrin aldehyde	0.0015	U	0.0086	0.0015	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Endrin ketone	0.0018	U	0.0086	0.0018	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
gamma-BHC (Lindane)	0.0011	U	0.0086	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Heptachlor	0.0012	U	0.0086	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Heptachlor epoxide	0.0023	U	0.0086	0.0023	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Methoxychlor	0.0017	U	0.0086	0.0017	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
Toxaphene	0.15	U	0.86	0.15	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5
trans-Chlordane	0.0014	U	0.0086	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 11:51	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*39*		*26 - 129*	*04/06/20 10:09*	*04/08/20 11:51*	*5*
Tetrachloro-m-xylene	*50*		*31 - 122*	*04/06/20 10:09*	*04/08/20 11:51*	*5*

Client Sample ID: OCP-370.6

Date Collected: 04/02/20 12:10
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-34

Matrix: Solid
Percent Solids: 92.7

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.00098	U	0.010	0.00098	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
4,4'-DDE	0.0014	U	0.0087	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
4,4'-DDT	0.0040	U	0.0087	0.0040	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Aldrin	0.0031	U	0.0087	0.0031	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
alpha-BHC	0.0012	U	0.0087	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
beta-BHC	0.0026	U	0.0087	0.0026	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
cis-Chlordane	0.0014	U	0.0087	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
delta-BHC	0.0016	U	0.0087	0.0016	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Dieldrin	0.0019	U	0.0087	0.0019	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Endosulfan I	0.0011	U	0.0087	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Endosulfan II	0.0012	U	0.0087	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Endosulfan sulfate	0.0011	U	0.0087	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Endrin	0.00098	U	0.0087	0.00098	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Endrin aldehyde	0.0015	U	0.0087	0.0015	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Endrin ketone	0.0018	U	0.0087	0.0018	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
gamma-BHC (Lindane)	0.0011	U	0.0087	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Heptachlor	0.0012	U	0.0087	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Heptachlor epoxide	0.0023	U	0.0087	0.0023	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Methoxychlor	0.0017	U	0.0087	0.0017	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
Toxaphene	0.15	U	0.87	0.15	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5
trans-Chlordane	0.0014	U	0.0087	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 12:22	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*43*		*26 - 129*	*04/06/20 10:09*	*04/08/20 12:22*	*5*
Tetrachloro-m-xylene	*43*		*31 - 122*	*04/06/20 10:09*	*04/08/20 12:22*	*5*

Client Sample Results

Client: Air Quest Environmental Inc
Project/Site: Tyndall AFB Project No.15671

Job ID: 400-186240-4
SDG: Building 370

Client Sample ID: OCP-370.7

Date Collected: 04/02/20 12:14
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-35

Matrix: Solid
Percent Solids: 96.5

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.00097	U	0.010	0.00097	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
4,4'-DDE	**0.0021**	**I**	0.0086	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
4,4'-DDT	0.0039	U	0.0086	0.0039	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Aldrin	0.0031	U	0.0086	0.0031	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
alpha-BHC	0.0012	U	0.0086	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
beta-BHC	0.0025	U	0.0086	0.0025	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
cis-Chlordane	0.0014	U	0.0086	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
delta-BHC	0.0016	U	0.0086	0.0016	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Dieldrin	**0.0031**	**I**	0.0086	0.0018	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Endosulfan I	0.0011	U	0.0086	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Endosulfan II	0.0012	U	0.0086	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Endosulfan sulfate	0.0011	U	0.0086	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Endrin	0.00097	U	0.0086	0.00097	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Endrin aldehyde	0.0015	U	0.0086	0.0015	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Endrin ketone	0.0018	U	0.0086	0.0018	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
gamma-BHC (Lindane)	0.0011	U	0.0086	0.0011	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Heptachlor	0.0012	U	0.0086	0.0012	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Heptachlor epoxide	0.0023	U	0.0086	0.0023	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Methoxychlor	0.0017	U	0.0086	0.0017	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
Toxaphene	0.15	U	0.86	0.15	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5
trans-Chlordane	0.0014	U	0.0086	0.0014	mg/Kg	☼	04/06/20 10:09	04/08/20 12:53	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*43*		*26 - 129*	*04/06/20 10:09*	*04/08/20 12:53*	*5*
Tetrachloro-m-xylene	*52*		*31 - 122*	*04/06/20 10:09*	*04/08/20 12:53*	*5*

Client Sample ID: OCP-370.8

Date Collected: 04/02/20 12:18
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-36

Matrix: Solid
Percent Solids: 95.5

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.00098	U	0.010	0.00098	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
4,4'-DDE	0.0014	U	0.0088	0.0014	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
4,4'-DDT	0.0040	U	0.0088	0.0040	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Aldrin	0.0031	U	0.0088	0.0031	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
alpha-BHC	0.0012	U	0.0088	0.0012	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
beta-BHC	0.0026	U	0.0088	0.0026	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
cis-Chlordane	0.0014	U	0.0088	0.0014	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
delta-BHC	0.0016	U	0.0088	0.0016	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Dieldrin	0.0019	U	0.0088	0.0019	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Endosulfan I	0.0011	U	0.0088	0.0011	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Endosulfan II	0.0012	U	0.0088	0.0012	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Endosulfan sulfate	0.0011	U	0.0088	0.0011	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Endrin	0.00098	U	0.0088	0.00098	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Endrin aldehyde	0.0015	U	0.0088	0.0015	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Endrin ketone	0.0018	U	0.0088	0.0018	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
gamma-BHC (Lindane)	0.0011	U	0.0088	0.0011	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Heptachlor	0.0012	U	0.0088	0.0012	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Heptachlor epoxide	0.0023	U	0.0088	0.0023	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Methoxychlor	0.0017	U	0.0088	0.0017	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
Toxaphene	0.15	U	0.88	0.15	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5
trans-Chlordane	0.0014	U	0.0088	0.0014	mg/Kg	☼	04/06/20 10:09	04/09/20 14:56	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*73*		*26 - 129*	*04/06/20 10:09*	*04/09/20 14:56*	*5*
Tetrachloro-m-xylene	*48*		*31 - 122*	*04/06/20 10:09*	*04/09/20 14:56*	*5*

Client: Air Quest Environmental Inc
Project/Site: Tyndall AFB Project No.15671

Job ID: 400-186240-4
SDG: Building 370

Client Sample ID: OCP-370.6 EQUIPMENT BLK

Date Collected: 04/02/20 12:09
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-37

Matrix: Water

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.012	U	0.21	0.012	ug/L		04/06/20 10:45	04/09/20 06:24	10
4,4'-DDE	0.0091	U	0.21	0.0091	ug/L		04/06/20 10:45	04/09/20 06:24	10
4,4'-DDT	0.016	U	0.21	0.016	ug/L		04/06/20 10:45	04/09/20 06:24	10
Aldrin	0.012	U	0.21	0.012	ug/L		04/06/20 10:45	04/09/20 06:24	10
alpha-BHC	0.015	U	0.21	0.015	ug/L		04/06/20 10:45	04/09/20 06:24	10
cis-Chlordane	0.017	U	0.21	0.017	ug/L		04/06/20 10:45	04/09/20 06:24	10
beta-BHC	0.012	U	0.21	0.012	ug/L		04/06/20 10:45	04/09/20 06:24	10
delta-BHC	0.0087	U	0.21	0.0087	ug/L		04/06/20 10:45	04/09/20 06:24	10
Dieldrin	0.012	U	0.21	0.012	ug/L		04/06/20 10:45	04/09/20 06:24	10
Endosulfan I	0.012	U	0.21	0.012	ug/L		04/06/20 10:45	04/09/20 06:24	10
Endosulfan II	0.031	U	0.21	0.031	ug/L		04/06/20 10:45	04/09/20 06:24	10
Endosulfan sulfate	0.0087	U	0.21	0.0087	ug/L		04/06/20 10:45	04/09/20 06:24	10
Endrin	0.012	U	0.21	0.012	ug/L		04/06/20 10:45	04/09/20 06:24	10
Endrin aldehyde	0.012	U	0.21	0.012	ug/L		04/06/20 10:45	04/09/20 06:24	10
Endrin ketone	0.016	U	0.21	0.016	ug/L		04/06/20 10:45	04/09/20 06:24	10
gamma-BHC (Lindane)	0.10	U	0.21	0.10	ug/L		04/06/20 10:45	04/09/20 06:24	10
trans-Chlordane	0.013	U	0.21	0.013	ug/L		04/06/20 10:45	04/09/20 06:24	10
Heptachlor	0.013	U	0.21	0.013	ug/L		04/06/20 10:45	04/09/20 06:24	10
Heptachlor epoxide	0.013	U	0.21	0.013	ug/L		04/06/20 10:45	04/09/20 06:24	10
Methoxychlor	0.017	U	0.21	0.017	ug/L		04/06/20 10:45	04/09/20 06:24	10
Toxaphene	1.2	U	12	1.2	ug/L		04/06/20 10:45	04/09/20 06:24	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*54*		*10 - 130*	*04/06/20 10:45*	*04/09/20 06:24*	*10*
Tetrachloro-m-xylene	*49*		*43 - 130*	*04/06/20 10:45*	*04/09/20 06:24*	*10*

Client: Air Quest Environmental Inc
Project/Site: Tyndall AFB Project No.15671

Job ID: 400-186240-4
SDG: Building 370

Client Sample ID: OCP-370. FIELD BLK
Date Collected: 04/02/20 12:09
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-38
Matrix: Water

Method: 8081B - Organochlorine Pesticides (GC)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.012	U	0.20	0.012	ug/L		04/06/20 10:45	04/09/20 05:59	10
4,4'-DDE	0.0087	U	0.20	0.0087	ug/L		04/06/20 10:45	04/09/20 05:59	10
4,4'-DDT	0.015	U	0.20	0.015	ug/L		04/06/20 10:45	04/09/20 05:59	10
Aldrin	0.012	U	0.20	0.012	ug/L		04/06/20 10:45	04/09/20 05:59	10
alpha-BHC	0.014	U	0.20	0.014	ug/L		04/06/20 10:45	04/09/20 05:59	10
cis-Chlordane	0.017	U	0.20	0.017	ug/L		04/06/20 10:45	04/09/20 05:59	10
beta-BHC	0.012	U	0.20	0.012	ug/L		04/06/20 10:45	04/09/20 05:59	10
delta-BHC	0.0083	U	0.20	0.0083	ug/L		04/06/20 10:45	04/09/20 05:59	10
Dieldrin	0.012	U	0.20	0.012	ug/L		04/06/20 10:45	04/09/20 05:59	10
Endosulfan I	0.012	U	0.20	0.012	ug/L		04/06/20 10:45	04/09/20 05:59	10
Endosulfan II	0.029	U	0.20	0.029	ug/L		04/06/20 10:45	04/09/20 05:59	10
Endosulfan sulfate	0.0083	U	0.20	0.0083	ug/L		04/06/20 10:45	04/09/20 05:59	10
Endrin	0.012	U	0.20	0.012	ug/L		04/06/20 10:45	04/09/20 05:59	10
Endrin aldehyde	0.011	U	0.20	0.011	ug/L		04/06/20 10:45	04/09/20 05:59	10
Endrin ketone	0.015	U	0.20	0.015	ug/L		04/06/20 10:45	04/09/20 05:59	10
gamma-BHC (Lindane)	0.099	U	0.20	0.099	ug/L		04/06/20 10:45	04/09/20 05:59	10
trans-Chlordane	0.013	U	0.20	0.013	ug/L		04/06/20 10:45	04/09/20 05:59	10
Heptachlor	0.012	U	0.20	0.012	ug/L		04/06/20 10:45	04/09/20 05:59	10
Heptachlor epoxide	0.013	U	0.20	0.013	ug/L		04/06/20 10:45	04/09/20 05:59	10
Methoxychlor	0.016	U	0.20	0.016	ug/L		04/06/20 10:45	04/09/20 05:59	10
Toxaphene	1.2	U	12	1.2	ug/L		04/06/20 10:45	04/09/20 05:59	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl	*55*		*10 - 130*	*04/06/20 10:45*	*04/09/20 05:59*	*10*
Tetrachloro-m-xylene	*45*		*43 - 130*	*04/06/20 10:45*	*04/09/20 05:59*	*10*

Lab Chronicle

Client: Air Quest Environmental Inc
Project/Site: Tyndall AFB Project No.15671

Job ID: 400-186240-4
SDG: Building 370

Client Sample ID: OCP-370.1
Date Collected: 04/02/20 11:48
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-29
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	485074	04/06/20 11:25	KRA	TAL PEN

Client Sample ID: OCP-370.1
Date Collected: 04/02/20 11:48
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-29
Matrix: Solid
Percent Solids: 97.1

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3546			485049	04/06/20 10:09	SHB	TAL PEN
Total/NA	Analysis	8081B		5	485220	04/08/20 09:19	DS	TAL PEN

Client Sample ID: OCP-370.2
Date Collected: 04/02/20 11:52
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-30
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	485074	04/06/20 11:25	KRA	TAL PEN

Client Sample ID: OCP-370.2
Date Collected: 04/02/20 11:52
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-30
Matrix: Solid
Percent Solids: 94.6

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3546			485049	04/06/20 10:09	SHB	TAL PEN
Total/NA	Analysis	8081B		5	485240	04/08/20 09:47	DHJ	TAL PEN

Client Sample ID: OCP-370.3
Date Collected: 04/02/20 11:55
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-31
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	485074	04/06/20 11:25	KRA	TAL PEN

Client Sample ID: OCP-370.3
Date Collected: 04/02/20 11:55
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-31
Matrix: Solid
Percent Solids: 95.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3546			485049	04/06/20 10:09	SHB	TAL PEN
Total/NA	Analysis	8081B		5	485240	04/08/20 10:49	DHJ	TAL PEN

Client Sample ID: OCP-370.4
Date Collected: 04/02/20 11:59
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-32
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	485074	04/06/20 11:25	KRA	TAL PEN

Lab Chronicle

Client: Air Quest Environmental Inc
Project/Site: Tyndall AFB Project No.15671

Job ID: 400-186240-4
SDG: Building 370

Client Sample ID: OCP-370.4
Date Collected: 04/02/20 11:59
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-32
Matrix: Solid
Percent Solids: 93.0

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3546			485049	04/06/20 10:09	SHB	TAL PEN
Total/NA	Analysis	8081B		5	485240	04/08/20 11:20	DHJ	TAL PEN

Client Sample ID: OCP-370.5
Date Collected: 04/02/20 12:05
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-33
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	485074	04/06/20 11:25	KRA	TAL PEN

Client Sample ID: OCP-370.5
Date Collected: 04/02/20 12:05
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-33
Matrix: Solid
Percent Solids: 93.0

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3546			485049	04/06/20 10:09	SHB	TAL PEN
Total/NA	Analysis	8081B		5	485240	04/08/20 11:51	DHJ	TAL PEN

Client Sample ID: OCP-370.6
Date Collected: 04/02/20 12:10
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-34
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	485074	04/06/20 11:25	KRA	TAL PEN

Client Sample ID: OCP-370.6
Date Collected: 04/02/20 12:10
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-34
Matrix: Solid
Percent Solids: 92.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3546			485049	04/06/20 10:09	SHB	TAL PEN
Total/NA	Analysis	8081B		5	485240	04/08/20 12:22	DHJ	TAL PEN

Client Sample ID: OCP-370.7
Date Collected: 04/02/20 12:14
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-35
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	485074	04/06/20 11:25	KRA	TAL PEN

Lab Chronicle

Client: Air Quest Environmental Inc
Project/Site: Tyndall AFB Project No.15671

Job ID: 400-186240-4
SDG: Building 370

Client Sample ID: OCP-370.7
Date Collected: 04/02/20 12:14
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-35
Matrix: Solid
Percent Solids: 96.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3546			485049	04/06/20 10:09	SHB	TAL PEN
Total/NA	Analysis	8081B		5	485240	04/08/20 12:53	DHJ	TAL PEN

Client Sample ID: OCP-370.8
Date Collected: 04/02/20 12:18
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-36
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	485074	04/06/20 11:52	KRA	TAL PEN

Client Sample ID: OCP-370.8
Date Collected: 04/02/20 12:18
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-36
Matrix: Solid
Percent Solids: 95.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3546			485049	04/06/20 10:09	SHB	TAL PEN
Total/NA	Analysis	8081B		5	485451	04/09/20 14:56	DS	TAL PEN

Client Sample ID: OCP-370.6 EQUIPMENT BLK
Date Collected: 04/02/20 12:09
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-37
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3520C			485061	04/06/20 10:45	JRW	TAL PEN
Total/NA	Analysis	8081B		10	485364	04/09/20 06:24	DS	TAL PEN

Client Sample ID: OCP-370. FIELD BLK
Date Collected: 04/02/20 12:09
Date Received: 04/03/20 10:45

Lab Sample ID: 400-186240-38
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3520C			485061	04/06/20 10:45	JRW	TAL PEN
Total/NA	Analysis	8081B		10	485364	04/09/20 05:59	DS	TAL PEN

Laboratory References:

TAL PEN = Eurofins TestAmerica, Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

Accreditation/Certification Summary

Client: Air Quest Environmental Inc
Project/Site: Tyndall AFB Project No.15671

Job ID: 400-186240-4
SDG: Building 370

Laboratory: Eurofins TestAmerica, Pensacola

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Florida	NELAP	E81010	06-30-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
Moisture		Solid	Percent Moisture
Moisture		Solid	Percent Solids

Method Summary

Client: Air Quest Environmental Inc
Project/Site: Tyndall AFB Project No.15671

Job ID: 400-186240-4
SDG: Building 370

Method	Method Description	Protocol	Laboratory
8081B	Organochlorine Pesticides (GC)	SW846	TAL PEN
Moisture	Percent Moisture	EPA	TAL PEN
3520C	Liquid-Liquid Extraction (Continuous)	SW846	TAL PEN
3546	Microwave Extraction	SW846	TAL PEN

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PEN = Eurofins TestAmerica, Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

Qualifiers

GC Semi VOA

Qualifier	Qualifier Description
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
U	Indicates that the compound was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Eurofins TestAmerica, Pensacola
3355 McLemore Drive
Pensacola, FL 32514
Phone: 850-474-1001 Fax: 850-478-2671

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Client Information	Sampler: Ted Smith	Lab PM: Swafford, Mark H	Carrier Tracking No(s):	COC No: 400-93700-33999.4
Client Contact: Traci-Anne Boyle	Phone: 863/450.6603	E-Mail: mark.swafford@testamericainc.com		Page: Page 4 of 9
Company: Air Quest Environmental Inc		Analysis Requested		Job #: 15671
Address: 6851 SW 45th Street	Due Date Requested:			Preservation Codes:
City: Fort Lauderdale	TAT Requested (days): 5-day turnaround			A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
State, Zip: FL, 33314				
Phone:	PO #: Project No.15671			
Email: traci@airquestinc.com	WO #:			Other:
Project Name: Tyndall AFB Project No.15671	Project #: 40011417			
Site:	SSOW#:			

400-186240 COC

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8081B - Pesticides	Total Number of containers	Special Instructions/Note:
		Preservation Code:					N		
OCP-370.1	4/2/20	1248	G	Solid			✓		
OCP-370.2		1152	G	Solid			✓		
OCP-370.3		1155	G	Solid			✓		
OCP-370.4		1159	G	Solid			✓		
OCP-370.5		1205	G	Solid			✓		
OCP-370.6		1210	G	Solid			✓		
OCP-370.7		1214	G	Solid			✓		
OCP-370.8		1218	G	Solid			✓		
OCP-370.6 Equip Blk.		1209	G	~~Solid~~ Water			✓		
OCP-370.6 Field Blk.	↓	1209	G	~~Solid~~ Water			✓		
				Solid					

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	4/3/20; 1045		Kathy Avery	4-3-20 1045	ETA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks: 0.0C, 5.7C, 4.5C IR

Ver: 01/16/2019

Login Sample Receipt Checklist

Client: Air Quest Environmental Inc

Job Number: 400-186240-4
SDG Number: Building 370

Login Number: 186240
List Number: 1
Creator: Gore, Beija K

List Source: Eurofins TestAmerica, Pensacola

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.0 °C, 5.7 °C, 4.5 °C IR 7
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
02/19

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 273	Standards For Universal Waste Management
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Co-mingle

The practice of placing unrelated materials together in a single container, usually for benefits of convenience and speed.

1.2.2 Construction Waste

Waste generated by construction activities, such as scrap materials, damaged or spoiled materials, temporary and expendable construction materials, and other waste generated by the workforce during construction activities.

1.2.3 Demolition Debris/Waste

Waste generated from demolition activities, including minor incidental demolition waste materials generated as a result of Intentional dismantling of all or portions of a building, to include clearing of building contents that have been destroyed or damaged.

1.2.4 Disposal

Depositing waste in a solid waste disposal facility, usually a managed landfill, regulated in the US under the Resource Conservation and Recovery Act (RCRA).

1.2.5 Diversion

The practice of diverting waste from disposal in a landfill, by means of eliminating or minimizing waste, or reuse of materials.

1.2.6 Final Construction Waste Diversion Report

A written assertion by a material recovery facility operator identifying

constituent materials diverted from disposal, usually including summary tabulations of materials, weight in short-ton.

1.2.7 Recycling

The series of activities, including collection, separation, and processing, by which products or other materials are diverted from the solid waste stream for use in the form of raw materials in the manufacture of new products sold or distributed in commerce, or the reuse of such materials as substitutes for goods made of virgin materials, other than fuel.

1.2.8 Reuse

The use of a product or materials again for the same purpose, in its original form or with little enhancement or change.

1.2.9 Salvage

Usable, salable items derived from buildings undergoing demolition or deconstruction, parts from vehicles, machinery, other equipment, or other components.

1.2.10 Source Separation

The practice of administering and implementing a management strategy to identify and segregate unrelated waste at the first opportunity.

1.3 CONSTRUCTION WASTE (INCLUDES DEMOLITION DEBRIS/WASTE)

Divert a minimum of 60 percent by weight of the project construction waste and demolition debris/waste from the landfill. Follow applicable industry standards in the management of waste. Apply sound environmental principles in the management of waste. (1) Practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction waste and demolition debris/waste from landfills and incinerators and to facilitate the recycling or reuse of excess construction materials.

1.4 CONSTRUCTION WASTE MANAGEMENT

Implement a construction waste management program for the project. Take a pro-active, responsible role in the management of construction construction waste, recycling process, disposal of demolition debris/waste, and require all subcontractors, vendors, and suppliers to participate in the construction waste management program. Establish a process for clear tracking, and documentation of construction waste and demolition debris/waste.

1.4.1 Implementation of Construction Waste Management Program

Develop and document how the construction waste management program will be implemented in a construction waste management plan. Submit a Construction Waste Management Plan to the Contracting Officer for approval. Construction waste and demolition debris/waste materials include un-used construction materials not incorporated in the final work, as well as demolition debris/waste materials from demolition activities or deconstruction activities. In the management of waste, consider the availability of viable markets, the condition of materials, the ability to provide material in suitable condition and in a quantity acceptable to

available markets, and time constraints imposed by internal project completion mandates.

1.4.2 Oversight

The Quality Control Manager, as specified in Section 01 45 00.00 10 QUALITY CONTROL, is responsible for overseeing and documenting results from executing the construction waste management plan for the project.

1.4.3 Special Programs

Implement any special programs involving rebates or similar incentives related to recycling of construction waste and demolition debris/waste materials. Retain revenue or savings from salvaged or recycling, unless otherwise directed. Ensure firms and facilities used for recycling, reuse, and disposal are permitted for the intended use to the extent required by federal, state, and local regulations.

1.4.4 Special Instructions

Provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the projects. Designation of single source separating or commingling will be clearly marked on the containers.

1.4.5 Waste Streams

Delineate waste streams and characterization, including estimated material types and quantities of waste, in the construction waste management plan. Manage all waste streams associated with the project. Typical waste streams are listed below. Include additional waste steams not listed:

a. Land Clearing Debris
b. Asphalt
c. Masonry and CMU
d. Concrete
e. Metals (e.g. banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, bronze, etc.)
f. Wood (nails and staples allowed)
g. Glass
h. Paper
i. Plastics (PET, HDPE,PVC,LDPE,PP,PS, Other)
j. Gypsum
k. Non-hazardous paint and paint cans
l. Carpet
m. Ceiling Tiles
n. Insulation
o. Beverage Containers

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Waste Management Plan; G

SD-06 Test Reports

Quarterly Reports

Annual Report

SD-11 Closeout Submittals

Final Construction Waste Diversion Report; S

1.6 MEETINGS

Conduct Construction Waste Management meetings. After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the Contracting Officer to discuss the proposed construction waste management plan and to develop a mutual understanding relative to the management of the construction waste management program and how waste diversion requirements will be met.

The requirements of this meeting may be fulfilled during the coordination and mutual Understanding meeting outlined in Section 01 45 00.00 10 QUALITY CONTROL. At a minimum, discuss and document waste management goals at following meetings:

a. Preconstruction meeting.

b. Regular site and Quality Control meetings.

c. Work safety meeting (if applicable).

1.7 CONSTRUCTION WASTE MANAGEMENT PLAN

Submit Construction Waste Management Plan within 15 days after contract award. Revise and resubmit Construction Waste Management Plan until it receives final approval from the Contracting Officer, in order for construction to begin. Execute demolition or deconstruction activities in accordance with Section 02 41 00 DEMOLITION. Manage demolition debris/waste or deconstruction materials in accordance with the approved construction waste management plan.

An approved construction waste management plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Ensure all subcontractors receive a copy of the approved Construction Waste Management Plan. The plan demonstrates how to meet the project waste diversion requirement. Also, include the following in the plan:

a. Identify the names of individuals responsible for waste management and waste management tracking, along with roles and responsibilities on the project..

b. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.

c. Description of the regular meetings to be held to address waste

management.

d. Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of materials.

e. Name of landfill and/or incinerator to be used.

f. Identification of local and regional re-use programs, including non-profit organizations such as schools, local housing agencies, and organization that accept used materials such as material exchange networks and resale stores. Include the name, location, phone number for each re-use facility identified, and provide a copy of the permit or license for each facility.

g. List of specific materials, by type and quantity, that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Identify the recycling facilities by name, address, and phone number.

h. Identification of materials that cannot be recycled or reused with an explanation or justification, to be approved by the Contracting Officer.

i. Description of the means by which any materials identified in item (g) above will be protected from contamination.

j. Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).

k. Copy of training plan for subcontractors and other services to prevent contamination by co-mingling materials identified for diversion and waste materials.

l. Identification of at least 5 construction or demolition material streams for diversion.

m. Detailed plan and distribution of waste diversion between buildings, when project is a part of a campus.

n. Facilities or subcontractors offering construction waste transport on-site or off-site must ensure that proper shipping orders, bill of lading, manifests, or other shipping documents containing waste diversion information meet requirements of 40 CFR 273 Universal Waste Management, 49 CFR 173 Shippers - General Requirements for Shipments and Packagings, and 49 CFR 178 Specifications for Packaging. Individuals signing manifests or other shipping documents should meet the minimum training requirements.

o. List each supplier who deliver construction materials, in bulk, or package products in returnable containers or returnable packaging, or have take-back programs. List each program and the applicable material to actively monitor and track to assist in meeting waste diversion requirements on the project.

p. Identify any local jurisdiction requirements for waste management.

Include those requirements, points of contact, etc.

Distribute copies of the waste management plan to each subcontractor, Quality Control Manager, Environmental Manager, and the Contracting Officer.

1.8 RECORDS (DOCUMENTATION)

1.8.1 General

Maintain records to document the types and quantities of waste generated and diverted though re-use, recycling and/or sale to third parties; through disposal to a landfill or incinerator facility. Provide explanations for any materials not recycled, reused or sold. Collect and retain manifests, weight tickets, sales receipts, and invoices specifically identifying diverted project waste materials or disposed materials.

1.8.2 Accumulated

Maintain a running record of materials generated and diverted from landfill disposal, including accumulated diversion rates for the project. Make records available to the Contracting Officer during construction or incidental demolition activities. Provide a copy of the diversion records to the Contracting Officer upon completion of the construction, incidental demolitions or minor deconstruction activities.

1.9 REPORTS

1.9.1 General

Maintain current construction waste diversion information on site for periodic inspection by the Contracting Officer. Include in the quarterly reports, annual reports and final reports: the project name, contract information, information for waste generated, diverted and disposed of for the current reporting period and show cumulative totals for the project. Reports must identify quantifies of waste by type and disposal method. Also include in each report, supporting documentation to include manifests, weigh tickets, receipts, and invoices specifically identifying the project and waste material type and weighted sum.

1.9.2 Quarterly Reporting

Provide cumulative reports at the end of each quarter (December, March, June, and September, corresponding with the federal fiscal year for reporting purposes). Submit quarterly reports not later than 15 calendar days after the preceding quarter has ended. Submit Quarterly Reports to the appropriate office or identified point of contact.

1.9.3 Annual Reporting

Provide a cumulative construction waste diversion report annually. Submit annual report not later than 30 calendar days after the preceding fourth quarter has ended. Provide copy of annual construction waste diversion report to the installation POC.

1.10 FINAL CONSTRUCTION WASTE DIVERSION REPORT

A Final Construction Waste Diversion Report is required at the end of the project. Provide Final Construction Waste Diversion Report 60 days prior

to the Beneficial Occupancy Date (BOD).

1.11 COLLECTION

Collect, store, protect, and handle reusable and recyclable materials at the site in a manner which prevents contamination, and provides protection from the elements to preserve their usefulness and monetary value. Provide receptacles and storage areas designated specifically for recyclable and reusable materials and label them clearly and appropriately to prevent contamination from other waste materials. Keep receptacles or storage areas neat and clean.

Train subcontractors and other service providers to either separate waste streams or use the co-mingling method as described in the construction waste management plan. Handle hazardous waste and hazardous materials in accordance with applicable regulations and coordinate with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS and Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS. Separate materials by one of the following methods described herein:

1.11.1 Source Separation Method

Separate waste products and materials that are recyclable from trash and sort as described below into appropriately marked separate containers and then transport to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process). Separate materials into the category types as defined in the construction waste management plan.

1.11.2 Co-Mingled Method

Place waste products and recyclable materials into a single container and then transport to an authorized recycling facility, which meets all applicable requirements to accept and dispose of recyclable materials in accordance with all applicable local, state and federal regulations. The Co-mingled materials must be sorted and processed in accordance with the approved construction waste management plan.

1.11.3 Other Methods

Other methods proposed by the Contractor may be used when approved by the Contracting Officer.

1.12 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the Contracting Officer and in compliance with waste management procedures as described in the waste management plan. Except as otherwise specified in other sections of the specifications, dispose of in accordance with the following:

1.12.1 Reuse

Give first consideration to reusing construction and demolition materials as a disposition strategy. Recover for reuse materials, products, and components as described in the approved construction waste management plan. Coordinate with the Contracting Officer to identify onsite reuse

opportunities or material sales or donation available through Government resale or donation programs. Sale of recovered materials is not allowed on the Installation.

1.12.2 Recycle

Recycle non-hazardous construction and demolition/debris materials that are not suitable for reuse. Track rejection of contaminated recyclable materials by the recycling facility. Rejected recyclables materials will not be counted as a percentage of diversion calculation. Recycle all fluorescent lamps, HID lamps, mercury (Hg) -containing thermostats and ampoules, and PCBs-containing ballasts and electrical components as directed by the Contracting Officer. Do not crush lamps on site as this creates a hazardous waste stream with additional handling requirements.

1.12.3 Compost

Consider composting on site if a reasonable amount of compostable materials will be available and a utilization of compostable material can be determined and appropriately planned for. Compostable materials include plant materials, sawdust and certain food scraps. Composting as a strategy must be explicitly addressed in the Construction Waste Management Plan submitted for approval to ensure it is feasible.

1.12.4 Waste

Dispose by landfill or incineration only those waste materials with no practical use, economic benefit, or recycling opportunity.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used. -- End of Section --

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA
08/15

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E1971	(2005; R 2011) Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-10 Operation and Maintenance Data

O&M Database ; G

Training Plan ; G

Training Outline ; G

Training Content ; G

SD-11 Closeout Submittals

Training Video Recording ; G

Validation of Training Completion ; G

1.3 OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data for the provided equipment, product, or system, defining the importance of system interactions, troubleshooting, and long-term preventive operation and maintenance. Compile, prepare, and aggregate O&M data to include clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit in accordance with this section and Section 01 33 00 SUBMITTAL PROCEDURES.

1.3.1 Package Quality

Documents must be fully legible. Operation and Maintenance data must be

consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions.

1.3.2 Package Content

Provide data package content in accordance with paragraph SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES. Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Use Data Package 3 for commissioned items without a specified data package requirement in the individual technical sections. Provide a Data Package 3 instead of Data Package 1 or 2, as specified in the individual technical section, for items that are commissioned.

1.3.3 Changes to Submittals

Provide manufacturer-originated changes or revisions to submitted data if a component of an item is so affected subsequent to acceptance of the O&M Data. Submit changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data within 30 calendar days of the notification of this change requirement.

1.3.4 Commissioning Authority Review and Approval

Submit the commissioned systems and equipment submittals to the Commissioning Authority (CxA) to review for completeness and applicability. Obtain validation from the CxA that the systems and equipment provided meet the requirements of the Contract documents and design intent, particularly as they relate to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. The CxA communicates deficiencies to the Contracting Officer. Submit the O&M manuals to the Contracting Officer upon a successful review of the corrections, and with the CxA recommendation for approval and acceptance of these O&M manuals. This work is in addition to the normal review procedures for O&M data.

1.4 O&M DATABASE

Develop an editable, electronic spreadsheet based on the equipment in the Operation and Maintenance Manuals that contains the information required to start a preventive maintenance program. As a minimum, provide list of system equipment, location installed, warranty expiration date, manufacturer, model, and serial number.

1.5 OPERATION AND MAINTENANCE MANUAL FILE FORMAT

Assemble data packages into electronic Operation and Maintenance Manuals. Assemble each manual into a composite electronically indexed file using the most current version of Adobe Acrobat or similar software capable of producing PDF file format. Provide compact disks (CD) or data digital versatile disk (DVD) as appropriate, so that each one contains operation, maintenance and record files, project record documents, and training videos. Include a complete electronically linked operation and maintenance directory.

1.5.1 Organization

Bookmark Product and Drawing Information documents using the current version of CSI Masterformat numbering system, and arrange submittals using the specification sections as a structure. Use CSI Masterformat and UFGS numbers along with descriptive bookmarked titles that explain the content of the information that is being bookmarked.

1.5.2 CD or DVD Label and Disk Holder or Case

Provide the following information on the disk label and disk holder or case:

a. Building Number

b. Project Title

c. Activity and Location

d. Construction Contract Number

e. Prepared For: (Contracting Agency)

f. Prepared By: (Name, title, phone number and email address)

g. Include the disk content on the disk label

h. Date

i. Virus scanning program used

1.6 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

The following are a detailed description of the data package items listed in paragraph SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES.

1.6.1 Operating Instructions

Provide specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.6.1.1 Safety Precautions and Hazards

List personnel hazards and equipment or product safety precautions for operating conditions. List all residual hazards identified in the Activity Hazard Analysis provided under Section 01 35 26 GOVERNMENT SAFETY REQUIREMENTS. Provide recommended safeguards for each identified hazard.

1.6.1.2 Operator Prestart

Provide procedures required to install, set up, and prepare each system for use.

1.6.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.

1.6.1.4 Normal Operations

Provide Control Diagrams with data to explain operation and control of systems and specific equipment. Provide narrative description of Normal Operating Procedures.

1.6.1.5 Emergency Operations

Provide Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Provide Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.6.1.6 Operator Service Requirements

Provide instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gauge readings.

1.6.1.7 Environmental Conditions

Provide a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.6.1.8 Operating Log

Provide forms, sample logs, and instructions for maintaining necessary operating records.

1.6.1.9 Additional Requirements for HVAC Control Systems

Provide Data Package 5 and the following for control systems:

a. Narrative description on how to perform and apply functions, features, modes, and other operations, including unoccupied operation, seasonal changeover, manual operation, and alarms. Include detailed technical manual for programming and customizing control loops and algorithms.

b. Full as-built sequence of operations.

c. Copies of checkout tests and calibrations performed by the Contractor (not Cx tests).

d. Full points list. Provide a listing of rooms with the following information for each room:

(1) Floor

(2) Room number

(3) Room name

(4) Air handler unit ID

(5) Reference drawing number

(6) Air terminal unit tag ID

(7) Heating or cooling valve tag ID

(8) Minimum cfm

(9) Maximum cfm

e. Full print out of all schedules and set points after testing and acceptance of the system.

f. Full as-built print out of software program.

g. Marking of system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.

1.6.2 Preventive Maintenance

Provide the following information for preventive and scheduled maintenance to minimize repairs for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.6.2.1 Lubrication Data

Include the following preventive maintenance lubrication data, in addition to instructions for lubrication required under paragraph OPERATOR SERVICE REQUIREMENTS:

a. A table showing recommended lubricants for specific temperature ranges and applications.

b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.

c. A Lubrication Schedule showing service interval frequency.

1.6.2.2 Preventive Maintenance Plan, Schedule, and Procedures

Provide manufacturer's schedule for routine preventive maintenance, inspections, condition monitoring (predictive tests) and adjustments required to ensure proper and economical operation and to minimize repairs. Provide instructions stating when the systems should be retested. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

a. Define the anticipated time required to perform each of each test (work-hours), test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements within the schedule. Provide a remarks column for the testing validation procedure referencing operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Delineate procedures for preventive maintenance, inspection, adjustment, lubrication and cleaning necessary

to minimize repairs.

b. Repair requirements must inform operators how to check out, troubleshoot, repair, and replace components of the system. Include electrical and mechanical schematics and diagrams and diagnostic techniques necessary to enable operation and troubleshooting of the system after acceptance.

1.6.2.3 Cleaning Recommendations

Provide environmentally preferable cleaning recommendations in accordance with ASTM E1971.

1.6.3 Repair

Provide manufacturer's recommended procedures and instructions for correcting problems and making repairs for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.6.3.1 Troubleshooting Guides and Diagnostic Techniques

Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.6.3.2 Wiring Diagrams and Control Diagrams

Provide point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.6.3.3 Repair Procedures

Provide instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.6.3.4 Removal and Replacement Instructions

Provide step-by-step procedures and a list of required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Use a combination of text and illustrations.

1.6.3.5 Spare Parts and Supply Lists

Provide lists of spare parts and supplies required for repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.6.3.6 Repair Work-Hours

Provide manufacturer's projection of repair work-hours including requirements by type of craft. Identify, and tabulate separately, repair that requires the equipment manufacturer to complete or to participate.

1.6.4 Real Property Equipment

Provide a list of installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. In the "EQUIPMENT-IN-PLACE LIST" include, as applicable, the following for each piece of equipment installed: description of item, location (by room number), model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. Submit the final list 30 days after transfer of the completed facility.

1.6.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.6.5.1 Product Submittal Data

Provide a copy of SD-03 Product Data submittals documented with the required approval.

1.6.5.2 Manufacturer's Instructions

Provide a copy of SD-08 Manufacturer's Instructions submittals documented with the required approval.

1.6.5.3 O&M Submittal Data

Provide a copy of SD-10 Operation and Maintenance Data submittals documented with the required approval.

1.6.5.4 Parts Identification

Provide identification and coverage for the parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing must show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Group the parts shown in the listings by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog.

1.6.5.5 Warranty Information

List and explain the various warranties and clearly identify the servicing

and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components of the system.

1.6.5.6 Extended Warranty Information

List all warranties for products, equipment, components, and sub-components whose duration exceeds one year. For each warranty listed, indicate the applicable specification section, duration, start date, end date, and the point of contact for warranty fulfillment. Also, list or reference the specific operation and maintenance procedures that must be performed to keep the warranty valid.

1.6.5.7 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.6.5.8 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components. Provide final set points.

1.6.5.9 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms. Provide final set points.

1.6.5.10 Field Test Reports

Provide a copy of Field Test Reports (SD-06) submittals documented with the required approval.

1.6.5.11 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

1.7 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Provide the O&M data packages specified in individual technical sections. The information required in each type of data package follows:

1.7.1 Data Package 1

a. Safety precautions and hazards

b. Cleaning recommendations

c. Maintenance and repair procedures

d. Warranty information

e. Extended warranty information

f. Contractor information

g. Spare parts and supply list

1.7.2 Data Package 2

a. Safety precautions and hazards

b. Normal operations

c. Environmental conditions

d. Lubrication data

e. Preventive maintenance plan, schedule, and procedures

f. Cleaning recommendations

g. Maintenance and repair procedures

h. Removal and replacement instructions

i. Spare parts and supply list

j. Parts identification

k. Warranty information

l. Extended warranty information

m. Contractor information

1.7.3 Data Package 3

a. Safety precautions and hazards

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Environmental conditions

g. Operating log

h. Lubrication data

i. Preventive maintenance plan, schedule, and procedures

j. Cleaning recommendations

k. Troubleshooting guides and diagnostic techniques

l. Wiring diagrams and control diagrams

m. Maintenance and repair procedures

n. Removal and replacement instructions

o. Spare parts and supply list

p. Product submittal data

q. O&M submittal data

r. Parts identification

s. Warranty information

t. Extended warranty information

u. Testing equipment and special tool information

v. Testing and performance data

w. Contractor information

x. Field test reports

1.7.4 Data Package 4

a. Safety precautions and hazards

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Operator service requirements

g. Environmental conditions

h. Operating log

i. Lubrication data

j. Preventive maintenance plan, schedule, and procedures

k. Cleaning recommendations

l. Troubleshooting guides and diagnostic techniques

m. Wiring diagrams and control diagrams

n. Repair procedures

o. Removal and replacement instructions

p. Spare parts and supply list

q. Repair work-hours

r. Product submittal data

s. O&M submittal data

t. Parts identification

u. Warranty information

v. Extended warranty information

w. Personnel training requirements

x. Testing equipment and special tool information

y. Testing and performance data

z. Contractor information

aa. Field test reports

1.7.5 Data Package 5

a. Safety precautions and hazards

b. Operator prestart

c. Start-up, shutdown, and post-shutdown procedures

d. Normal operations

e. Environmental conditions

f. Preventive maintenance plan, schedule, and procedures

g. Troubleshooting guides and diagnostic techniques

h. Wiring and control diagrams

i. Maintenance and repair procedures

j. Removal and replacement instructions

k. Spare parts and supply list

l. Product submittal data

m. Manufacturer's instructions

n. O&M submittal data

o. Parts identification

p. Testing equipment and special tool information

q. Warranty information

r. Extended warranty information

s. Testing and performance data

t. Contractor information

u. Field test reports

v. Additional requirements for HVAC control systems

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 TRAINING

Prior to acceptance of the facility by the Contracting Officer for Beneficial Occupancy, provide comprehensive training for the systems and equipment specified in the technical specifications. The training must be targeted for the building maintenance personnel, and applicable building occupants. Instructors must be well-versed in the particular systems that they are presenting. Address aspects of the Operation and Maintenance Manual submitted in accordance with Section 01 78 00 CLOSEOUT SUBMITTALS. Training must include classroom or field lectures based on the system operating requirements. The location of classroom training requires approval by the Contracting Officer.

3.1.1 Training Plan

Submit a written training plan to the Contracting Officer for approval at least 60 calendar days prior to the scheduled training. Training plan must be approved by the Quality Control Manager (QC) prior to forwarding to the Contracting Officer. Also, coordinate the training schedule with the Contracting Officer and QC. Include within the plan the following elements:

a. Equipment included in training

b. Intended audience

c. Location of training

d. Dates of training

e. Objectives

f. Outline of the information to be presented and subjects covered including description

g. Start and finish times and duration of training on each subject

h. Methods (e.g. classroom lecture, video, site walk-through, actual operational demonstrations, written handouts)

i. Instructor names and instructor qualifications for each subject

j. List of texts and other materials to be furnished by the Contractor

that are required to support training

k. Description of proposed software to be used for video recording of training sessions.

3.1.2 Training Content

The core of this training must be based on manufacturer's recommendations and the operation and maintenance information. The QC is responsible for overseeing and approving the content and adequacy of the training. Spend 95 percent of the instruction time during the presentation on the OPERATION AND MAINTENANCE DATA. Include the following for each system training presentation:

a. Start-up, normal operation, shutdown, unoccupied operation, seasonal changeover, manual operation, controls set-up and programming, troubleshooting, and alarms.

b. Relevant health and safety issues.

c. Discussion of how the feature or system is environmentally responsive. Advise adjustments and optimizing methods for energy conservation.

d. Design intent.

e. Use of O&M Manual Files.

f. Review of control drawings and schematics.

g. Interactions with other systems.

h. Special maintenance and replacement sources.

i. Tenant interaction issues.

3.1.3 Training Outline

Provide the Operation and Maintenance Manual Files (Bookmarked PDF) and a written course outline listing the major and minor topics to be discussed by the instructor on each day of the course to each trainee in the course. Provide the course outline 14 calendar days prior to the training.

3.1.4 Training Video Recording

Record classroom training session(s) on video. Provide to the Contracting Officer two copies of the training session(s) in DVD video recording format. Capture within the recording, in video and audio, the instructors' training presentations including question and answer periods with the attendees. The recording camera(s) must be attended by a person during the recording sessions to assure proper size of exhibits and projections during the recording are visible and readable when viewed as training.

3.1.5 Unresolved Questions from Attendees

If, at the end of the training course, there are questions from attendees that remain unresolved, the instructor must send the answers, in writing, to the Contracting Officer for transmittal to the attendees, and the training video must be modified to include the appropriate clarifications.

3.1.6 Validation of Training Completion

Ensure that each attendee at each training session signs a class roster daily to confirm Government participation in the training. At the completion of training, submit a signed validation letter that includes a sample record of training for reporting what systems were included in the training, who provided the training, when and where the training was performed, and copies of the signed class rosters. Provide two copies of the validation to the Contracting Officer, and one copy to the Operation and Maintenance Manual Preparer for inclusion into the Manual's documentation.

3.1.7 Quality Control Coordination

Coordinate this training with the QC in accordance with Section 01 45 00.00 10 QUALITY CONTROL, Section 01 45 00.00 40 QUALITY CONTROL.

-- End of Section --

SECTION 01 91 00.15

TOTAL BUILDING COMMISSIONING
02/19

PART 1 GENERAL

1.1 SUMMARY

Commission the building systems listed herein. Employ the services of an independent Commissioning Firm. The Commissioning Firm must be a 1st tier subcontractor of the General or Prime Contractor and must be financially and corporately independent of all other subcontractors. The Commissioning Firm must employ a Lead Commissioning Specialist that coordinates all aspects of the commissioning process. Conform to the commissioning procedures outlined in this specification.

1.2 SYSTEMS TO BE COMMISSIONED

Commission the following systems:

Heating, Ventilating, Air Conditioning, and Refrigeration Systems (HVAC)

Building Automation System

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 180	(2012) Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems
ASHRAE 202	(2013; Addenda B 2018) Commissioning Process for Buildings and Systems

ASSOCIATED AIR BALANCE COUNCIL (AABC)

ACG Commissioning Guideline	(2005) Commissioning Guideline

NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB)

NEBB Commissioning Standard	(2009) Procedural Standards for Whole Building Systems Commissioning of New Construction; 3rd Edition

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1429	(1994) HVAC Systems Commissioning Manual, 1st Edition

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 25-345-1 (2019) Systems Manual

1.4 COMMUNICATION WITH THE GOVERNMENT

The Lead Commissioning Specialist (CxC) must submit all plans, schedules, reports, and documentation directly to the Contracting Officer Representative concurrent with submission to the CQC System Manager. The Lead Commissioning Specialist must have direct communication with the Contracting Officer's Representative regarding all elements of the commissioning process; however, the Government has no direct contract authority with the Lead Commissioning Specialist.

1.5 SEQUENCING AND SCHEDULING

1.5.1 Sequencing

Complete the following prior to starting Functional Performance Tests of mechanical systems:

a. All equipment and systems have been completed, cleaned, flushed, disinfected, calibrated, tested, and operate in accordance with contract documents and construction plans and specifications.

b. Performance Verification Tests of the controls systems have been completed and the Performance Verification Test Report has been submitted and approved in accordance with INSTRUMENTATION AND CONTROL FOR HVAC.

c. Testing, Adjusting, and Balancing has been completed and the Testing, Adjusting, and Balancing Report, has been submitted and approved in accordance with TESTING, ADJUSTING, AND BALANCING FOR HVAC.

d. The building envelope is enclosed according to contract documents with final construction completed.

e. The Pre-Functional Checklists have been submitted and approved.

f. The Certificate of Readiness for mechanical systems has been submitted and approved.

1.5.2 Phasing

The building will be commissioned in phases.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Commissioning Firm; G, DO

Lead Commissioning Specialist; G, DO

Technical Commissioning Specialists; G, DO

SD-06 Test Reports

Interim Construction Phase Commissioning Plan; G, DO

Final Construction Phase Commissioning Plan; G, DO S

Pre-Functional Checklists; G, DO

Issues Log

Commissioning Report; G, DO

Post-Construction Trend Log Report; G, DO

SD-07 Certificates

Certificate of Readiness; G, DO

SD-10 Operation and Maintenance Data

Training Plan; G, RO

Training Attendance Rosters; G, RO

Systems Manual; G, DO

Systems Manual G, DO

Maintenance and Service Life Plans; G, DO

SD-11 Closeout Submittals

Final Commissioning Report; S, DO

1.7 COMMISSIONING FIRM

Provide a Commissioning Firm that is certified in commissioning by one of the following: the AABC Commissioning Group (ACG); the National Environmental Balancing Bureau (NEBB); the International Certification Board/Testing, Adjusting, and Balancing Bureau (ICB/TABB), the Building Commissioning Association (BCA); the Association of Energy Engineers (AEE). The Commissioning Firm must be certified in all systems to be commissioned to the extent such certifications are available from the certifying body. Describe any lapses in certification or disciplinary action taken by the certifying body against the proposed Commissioning Firm or Lead Commissioning Specialist in detail. Any firm or commissioning professional that has been the subject of disciplinary action by the certifying body within the five years preceding contract award is not eligible to perform any duties related to commissioning.

a. Submit the Commissioning Firm's certification of qualifications including the name of the firm and certifications no later than 60 calendar days after Notice to Proceed. Submit an electronic copy.

b. The Commissioning Firm's and Commissioning Specialists' certifications must be maintained for the entire duration of the duties specified herein. If, for any reason, the firm or a specialist loses a

certification during this period, immediately notify the Contracting Officer's Representative and submit another Commissioning Firm or Commissioning Specialist for approval. All work specified in this specification section performed by the Commissioning Firm or associated Commissioning Specialists is invalid if the Commissioning Firm or Commissioning Specialist loses its certification prior to contract completion and must be performed by an approved successor.

c. The Commissioning Firm must oversee and assist the General or Prime Contractor with the work specified herein.

1.7.1 Lead Commissioning Specialist

The Commissioning Firm must provide a Lead Commissioning Specialist (CxC) that has a minimum of five years of commissioning experience, including two projects of similar size and complexity, and that is one of the following: a NEBB qualified Systems Commissioning Administrator (SCA); ACG Certified Commissioning Authority (CxA); ICB/TABB Certified Commissioning Supervisor; BCA Certified Commissioning Professional (CCP); AEE Certified Building Commissioning Professional (CBCP); University of Wisconsin-Madison Qualified Commissioning Process Provider (QCxP); ASHRAE Building Commissioning Professional (BCxP).

a. Submit the Lead Commissioning Specialist's certification of qualifications including the name of the specialist and firm; certifications; years of experience; and a listing of representative projects of similar size and complexity no later than 60 calendar days after Notice to Proceed. Submit one hard copy and an electronic copy.

b. The Lead Commissioning Specialists certifications must be maintained for the entire duration of the duties specified herein. If, for any reason, the specialist loses a certification during this period, immediately notify the Contracting Officer's Representative and submit another Lead Commissioning Specialist for approval. All work specified in this specification section to be performed by the Lead Commissioning Specialist is invalid if the Lead Commissioning Specialist loses its certification prior to contract completion and must be performed by an approved successor.

c. The Lead Commissioning Specialist must lead and oversee the commissioning work specified herein and be the primary point of contact for the Government regarding the commissioning work. One of the Technical Commissioning Specialists may be the Lead Commissioning Specialist provided that all of the qualification requirements are met.

1.7.2 Technical Commissioning Specialists

Technical Commissioning Specialists, employed by the Commissioning Firm and that have the following qualifications, must perform the technical work specified herein associated with each system to be commissioned:

a. Mechanical Technical Commissioning Specialist: The technical work associated with mechanical systems including Heating, Ventilating, Air Conditioning, and Refrigeration Systems; Building Automation System; Plumbing Systems; must be performed by a Commissioning Specialist certified by NEBB, ACG, ICB/TABB, or BCA in the commissioning of HVAC systems with five years of experience in the commissioning of HVAC systems.

b. Submit the Technical Commissioning Specialist's certification of qualifications including the name of the specialist and firm; certifications; years of experience; and a listing of representative projects of similar size and complexity no later than 60 calendar days after Notice to Proceed. Submit an electronic copy.

1.7.3 Commissioning Standard

Comply with the requirements of the commissioning standard under which the Commissioning Firm and Specialists qualifications are approved. When the firm and specialists are certified by BCA, AEE, ASHRAE, or the University of Wisconsin-Madison, comply with the requirements of one of the acceptable standards unless otherwise stated herein. The acceptable standards are ACG Commissioning Guideline, NEBB Commissioning Standard, SMACNA 1429, or ASHRAE 202. Comply with applicable NETA testing standards for electrical systems.

a. Implement all recommendations and suggested practices contained in the Commissioning Standard and electrical test standards.

b. Use the Commissioning Standard for all aspects of Commissioning, including calibration of instruments.

c. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the Commissioning Standard, adhere to the manufacturer calibration recommendations.

d. All quality assurance provisions of the Commissioning Standard such as performance guarantees are part of this contract.

e. The Commissioning Specialists must develop commissioning procedures for any systems or system components not covered in the Commissioning Standard.

f. Use any new requirements, recommendations, and procedures published or adopted prior to contract solicitation by the body responsible for the Commissioning Standard.

1.8 SUSTAINABILITY THIRD PARTY CERTIFICATION (TPC)

The Commissioning Specialists must execute and document the commissioning activities required of the Commissioning Authority for the purposes of complying with the Third Party Certification (TPC) requirements for the project. Provide all commissioning documentation required to meet the TPC requirements.

1.9 ISSUES LOG

The Lead Commissioning Specialist must develop and maintain an Issues Log for tracking and resolution of all deficiencies discovered through submittal reviews, inspection, and testing. Include the date of final resolution of issues as confirmed by the Commissioning Specialist. Submit the Issues Log on a monthly basis at a minimum. At any point during construction, any commissioning team member finding deficiencies may communicate those deficiencies in writing to the Commissioning Specialist for inclusion into the Issues Log.

Track construction deficiencies identified in the Issues Log.

1.10 CERTIFICATE OF READINESS

Prior to scheduling Functional Performance Tests for each system, issue a Certificate of Readiness for the system certifying that the system is ready for Functional Performance Testing. The Certificate of Readiness must include, for each system to be commissioned, all equipment and system start-up reports; Performance Verification Test Reports; completed Pre-Functional Checklists; Testing, Adjusting, and Balancing (TAB) Report; HVAC Controls Start-Up Reports to the extent applicable to the system. The Contractor; the Lead Commissioning Specialist; the Contractor's Quality Control Representative; the Mechanical, Electrical, Controls, and TAB subcontractor representatives must sign and date the Certificate of Readiness. Submit the Certificate of Readiness for each system no later than 14 calendar days prior to Functional Performance Tests of that system. Submit an electronic copy. Do not schedule Functional Performance Tests for a system until the Certificate of Readiness for that system receives approval by the Government.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.1 CONSTRUCTION PHASE

3.1.1 Construction Commissioning Coordination Meeting

The Lead Commissioning Specialist must lead a Construction Commissioning Coordination Meeting within 60 days of contract notice to proceed to discuss the commissioning process including contract requirements, lines of communication, roles and responsibilities, schedules, documentation requirements, inspection and test procedures, and logistics as specified in this specification section. The Contractor's Superintendent or Project Manager, the Contractor's Quality Control Representative, and the Government must attend this meeting. Invite the User and a Base Civil Engineer Office Representative to attend this meeting.

3.1.2 Construction Phase Commissioning Plan

3.1.2.1 Interim Construction Phase Commissioning Plan

The Lead Commissioning Specialist (CxC) must prepare the Interim Construction Phase Commissioning Plan. Submit the Interim Construction Phase Commissioning Plan no later than 30 calendar days after the Construction Commissioning Coordination Meeting and no later than 14 days prior to the start of construction of the building envelope. Submit an electronic copy.

Identify the commissioning and testing standards and outline the overall commissioning process, the commissioning schedule, the commissioning team members and responsibilities, lines of communication, documentation requirements for the construction phase of the project in the Interim Construction Phase Commissioning Plan.

3.1.2.1.1 Checklists

Download example Pre-Functional Checklists and Functional Performance Test Checklists for specification section 01 91 00.15 TOTAL BUILDING

COMMISSIONING at the following location: http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics- The checklists submitted in the Interim and Final Construction Phase Commissioning Plans must contain the same level of detail shown in the examples. The submitted checklists are not required to match the format of the examples.

3.1.2.2 Final Construction Phase Commissioning Plan

The Lead Commissioning Specialist (CxC) must prepare the Final Construction Phase Commissioning Plan. Submit the Final Construction Phase Commissioning Plan no later than 30 calendar days prior to the start of Pre-Functional Checks. Submit an electronic copy. Once approved, file the approved plan in the Sustainability eNotebook.

Include the information provided in the Interim Construction Phase Commissioning Plan. In addition, the Technical Commissioning Specialist must develop the Pre-Functional Checklists and Functional Performance Test Checklists for each building, for each system required to be commissioned, and for each component for inclusion in the Final Construction Phase Commissioning Plan.

3.1.2.2.1 Pre-Functional Checklists

The Pre-Functional Checklists must include items for physical inspection or testing that demonstrate that installation and start-up of equipment and systems is complete. Refer to paragraph Pre-Functional Checks for more information.

3.1.2.2.2 Functional Performance Test Checklists

Functional Performance Test Checklists must include procedures that explain, step-by-step, the actions and expected results that will demonstrate that the system performs in accordance with the contract. Refer to paragraph Functional Performance Tests for more information. Include the following sections and details appropriate to the systems being tested in the Functional Performance Test Checklists:

a. Notable system features including information about controls to facilitate understanding of system operation

b. Conclusions and recommendations. Conclusions must clearly indicate if system does or does not perform in accordance with contract requirements. Recommendation must clearly indicate that the system should or should not be accepted by the Government.

c. Test conditions including date, beginning and ending time, and beginning and ending outdoor air conditions

d. Attendees

e. Identification of the equipment involved in the test

f. Control system feature identification

g. Point-to-point observations including demonstrating system flow meters and sensors have been calibrated and are correctly displayed on the Operator work station

h. Actuator operation observations demonstrating actuator responses to commands from the control system

i. As-found condition of the system operation

j. List of test items with step numbers along with the corresponding feature or control operation, intended test procedure, expected system response, and pass/fail indication.

k. Space for comments for each test item.

3.1.3 Construction Submittals

Provide all submittals associated with the systems to be commissioned, including shop drawings; equipment submittals; test plans, procedures, and reports; and resubmittal's to the Commissioning Specialists. The Technical Commissioning Specialist must review the submittals to the extent necessary verify that the equipment and system installation will comply with the contract requirements and the requirements of the Basis of Design and the Owner's Project Requirements Document.

3.1.4 Inspection and Testing

Demonstrate that all system components have been installed, that each control device and item of equipment operates, and that the systems operate and perform, including interactive operation between systems, in accordance with contract documents and the Owner's Project Requirements. Requirements in related specification sections are independent from the requirements of this section and do not satisfy any of the requirements specified in this specification section. Provide all materials, services, and labor required to perform the Pre-Functional Checks and Functional Performance Tests.

3.1.4.1 Commissioning Team

Provide a commissioning representative for each sub-contractor associated with the systems to be commissioned. Each commissioning representative is responsible for coordination of their respective sub-contractor's execution of the commissioning activities and participation in the inspection and testing required by this specification section. The designers listed below are the designers of record for their respective systems. Substitutes must be approved by the Contracting Officer's Representative .

3.1.4.1.1 Mechanical System Pre-Functional Checks Team

The following team members must participate in Pre-Functional checks of mechanical systems:

Designation	Function
CxM	Mechanical System Technical Commissioning Specialist
QAR	Contracting Officer's Quality Assurance Representative
CQC	Contractor's Quality Control Personnel
MC	Contractor's Mechanical Commissioning Representative

Designation	Function
EC	Contractor's Electrical Commissioning Representative
CC	Contractor's Controls Commissioning Representative
TABC	Contractor's TAB Commissioning Representative
PC	Contractor's Plumbing Commissioning Representative
IC	Contractor's Irrigation Commissioning Representative

3.1.4.1.2 Mechanical Systems Test Team

The following team members must participate in Functional Performance of mechanical systems:

Designation	Function
CxM	Mechanical System Technical Commissioning Specialist
QAR	Contracting Officer's Quality Assurance Representative
CQC	Contractor's Quality Control Personnel
MC	Contractor's Mechanical Commissioning Representative
EC	Contractor's Electrical Commissioning Representative
CC	Contractor's Controls Commissioning Representative
TABC	Contractor's TAB Commissioning Representative
PC	Contractor's Plumbing Commissioning Representative
IC	Contractor's Irrigation Commissioning Representative

3.1.4.1.3 Other Pre-Functional and Functional Performance Participants

The following may participate as team members during Pre-Functional Checks and Functional Performance Testing:

Designation	Function
BCE	Base Civil Engineer Office Representative
User	Using Agent's Representative

3.1.4.2 Pre-Functional Checks

Pre-Functional Checklists from the approved Final Construction Phase Commissioning Plan must be completed by the commissioning team. Complete one Pre-Functional Checklist for each individual item of equipment or

system for each system required to be commissioned including, but not limited to, ductwork, piping, equipment, fixtures (lighting and plumbing), and controls. Indicate commissioning team member inspection and acceptance of each Pre-Functional Checklist item by initials. Acceptance of each Pre-Functional Checklist item by each team member indicates that item conforms to the construction contract requirements in their area of responsibility. Technical Commissioning Specialist acceptance of each Pre-Functional Checklist item indicates that each item has been installed correctly and in accordance with contract documents and the Owner's Project Requirements. Submit the completed and initialed Pre-Functional Checklists no later than 7 calendar days after completion of inspection of all checklists items for each system. Submit an electronic copy. Include manufacturer start-up checklists associated with equipment with the submission of the Pre-Functional Checklists.

3.1.4.3 Testing, Adjusting, and Balancing (TAB) Report and Field Acceptance Testing

The Mechanical System Technical Commissioning Specialist must review the pre-final TAB Report required by TESTING, ADJUSTING, AND BALANCING FOR HVAC. Identify any deficiencies to the Contracting Officer's Representative and the Contractor's Quality Control Personnel. Resolve all deficiencies prior to TAB Field Acceptance Testing.

The Mechanical System Technical Commissioning Specialist must witness the TAB Field Acceptance Testing specified by TESTING, ADJUSTING, AND BALANCING FOR HVAC. Include a certification by the Mechanical Technical Specialist that no outstanding deficiencies exist in the systems relative to Testing, Adjusting, and Balancing with the final TAB Report submittal.

3.1.4.4 HVAC Controls Test Reports

The Mechanical System Technical Commissioning Specialist must review the Start-Up Testing Report and the PVT Procedures and Reports required by INSTRUMENTATION AND CONTROL FOR HVAC. Include a certification by the Mechanical System Technical Commissioning Specialist that the submittals contain no deficiencies or that the submittals do not indicate any deficiencies in the HVAC systems or HVAC control systems with each of these submittals.

3.1.4.5 Tests

3.1.4.5.1 Functional Performance Tests

Schedule Functional Performance Tests for each system only after the Certificate of Readiness has been approved by the Government for the system. Correct all deficiencies identified through any prior review, inspection, or test activity before the start of Functional Performance Tests.

a. Functional Performance Tests must be performed with the Contracting Officer's Quality Assurance Representative present.

b. Abort Functional Performance Tests when any system deficiency prevents the successful completion of the test.

c. Technical Commissioning Specialists must lead and document all Functional Performance Tests for the systems to be commissioned with the Contractor and appropriate sub-contractors performing the

Functional Performance Tests. The representatives listed in the paragraph Commissioning Team must attend the tests. Abort Functional Performance Tests when any required commissioning team member is not present for the test.

3.1.4.5.1.1 Checklist

Use the Functional Performance Test Checklists from the approved Final Construction Phase Commissioning Plan to guide the Functional Performance Tests. Functional Performance Tests must be performed for each item of equipment and each system required to be commissioned and verify all sensor calibrations, control responses, safeties, interlocks, operating modes, sequences of operation, capacities, lighting levels, and all other performance requirements comply with construction contract regardless of the specific items listed within the Functional Performance Test provided. Testing must progress from equipment or components to subsystems to systems to interlocks and connections between systems. The order of components and systems to be tested must be determined by the Technical Commissioning Specialists.

3.1.4.5.1.2 Acceptance

Indicate acceptance of each item of equipment and systems tested by signature of each commissioning team member for each Functional Performance Test. The Contractor's Quality Control Representative and the Technical Commissioning Specialists must indicate acceptance after the equipment and systems are free of deficiencies.

3.1.4.5.2 HVAC Test Methods

Perform Functional Performance Tests in accordance with the following:

3.1.4.5.2.1 Prior to Testing

Prior to testing operating modes, sequences of operation, interlocks, and safeties, complete control point-to-point observations, test sensor calibrations, and test actuator commands.

3.1.4.5.2.2 Simulating Conditions

Over-writing control input values through the controls system is not acceptable, unless approved by the Contracting Officer's Representative . Identify proposed exceptions in a protocol submitted to the Contracting Officer's Representative for approval. Before simulating conditions, overwriting values (if approved), or changing set-points, calibrate all sensors, transducers and devices. Below are several examples of exceptions that would be considered acceptable:

a. When varying static pressures inside ductwork can not be simulated within the duct, and where a sensor signals the controls system to initiate sequences at various duct static pressures, it is acceptable to simulate the various pressures with a Pneumatic Squeeze-Bulb Type Signaling Device with gauge temporarily attached to the sensing tube leading to the transmitter. It is not acceptable to reset the various set-points, nor to simulate an electric analog signal (unless approved as noted above).

b. Dirty filter pressure drops can be simulated using sheets of cardboard at filter face.

c. Freeze-stat safeties can be simulated by packing portion of sensor with ice.

d. High outside air temperatures can be simulated with a hair blower.

e. High entering cooling coil temperatures can be used to simulate entering cooling coil conditions.

f. Do not use signal generators to simulate sensor signals unless approved by the Contracting Officer's Representative , as noted above, for special cases.

g. Control set points can be altered. For example, to see the air conditioning compressor lockout work at an outside air temperature below 55 degrees F, when the outside air temperature is above 55 degrees F, temporarily change the lockout set point to be 0 degrees F above the current outside air temperature. Caution: Set points are not to be raised or lowered to a point such that damage to the components, systems, or the building structure and/or contents will occur.

h. Test duct mounted smoke detectors in accordance with the manufacturer's recommendations. Perform the tests with air system at minimum airflow condition in ductwork.

i. Test current sensing relays used for fan and pump status signals to control system to indicate unit failure and run status by resetting the set point on the relay to simulate a lost belt or unit failure while the unit is running. Confirm that the failure alarm was generated and received at the control system. After the test is conducted, return the set point to its original set-point or a set-point as indicated by the Contracting Officer's Representative .

3.1.4.5.2.3 Setup

Perform each test under conditions that simulate actual conditions as close as is practically possible. Provide all necessary materials and system modifications to produce the necessary flows, pressures, temperatures, and other conditions necessary to execute the test according to the specified conditions. At completion of the test, return the affected building equipment and systems to their pre-test condition.

3.1.4.5.3 Sample Strategy

3.1.4.5.4 Seasonal Tests

3.1.4.5.4.1 Initial Functional Performance Tests

Perform Initial Functional Performance Tests as soon as all contract work is completed, regardless of the season. Develop and implement means of artificial loading to demonstrate, to a reasonable level of confidence, the ability of the HVAC systems to handle peak seasonal loads.

3.1.4.5.4.2 Full-Load Conditions

In addition to the Initial Functional Performance Tests, perform Functional Performance Tests of HVAC systems under full-load conditions during peak heating and cooling seasons during outdoor air condition design extremes. Test cooling equipment and systems with the building fully occupied when

performing the Functional Performance Tests during peak cooling season.

Schedule Seasonal Functional Performance Tests in coordination with the Government.

3.1.4.5.4.3 System Acceptance

Systems may be partially accepted by the Government prior to seasonal testing if they comply with all construction contract that can be tested during initial Functional Performance Tests. All Functional Performance Test procedures must be completed prior to full systems acceptance.

3.1.4.5.5 Aborted Tests and Re-Testing

Abort Functional Performance Tests or Seasonal Tests if any deficiency prevents successful completion of the test or if any required commissioning team member is not present for the test. Reimburse the Government for all costs associated with effort lost due to re-testing due to test failures and aborted tests. These costs must include salary, travel costs, and per diem for Government commissioning team members. Re-test only after all deficiencies identified during the original tests have been corrected.

3.1.4.5.5.1 100 Percent Sample

Systems or equipment for which 100 percent sample size are tested fail if one or more of the test procedures results in discovery of a deficiency and the deficiency cannot be resolved within 5 minutes during the test.

Re-test to the extent necessary to confirm that the deficiencies have been corrected without negatively impacting the performance of the rest of the system.

3.1.5 Training Plan

Develop a training plan which identifies all training required by specification sections associated with commissioned systems. Include a matrix listing each training requirement, content of the training, the trainer name, trainer contact information, and schedule and location of training. Submit an electronic copy of the Training Plan to the Commissioning Specialists and the Government no later than 30 calendar days prior to the associated training.

Document training attendance using training attendance rosters and provide completed attendance rosters to the Commissioning Specialists and the Government no later than 7 calendar days following the completion of training for each system to be commissioned. Submit an electronic copy.

3.1.6 Systems Manual

Prepare and submit a Systems Manual including a signed certification or letter from the Technical Commissioning Specalists and the Lead Commissioning Specialist stating that the Systems Manual is complete, clear, and accurate. The Systems Manual, for all commissioned systems, must conform to Appendix A SYSTEMS MANUAL ORGANIZATION AND CONTENT to ER 25-345-1, available at the USACE Publications website at the following location:
https://www.publications.usace.army.mil/USACE-Publications/Engineer-Regulations/
Update and resubmit the Systems Manual based on any corrective action taken during the warranty period.

Submit Systems Manual no later than 30 calendar days following completion of Functional Performance Tests. Submit an electronic copy.

3.1.7 Maintenance and Service Life Plans

3.1.7.1 Maintenance Plan

Prepare and submit a Maintenance Plan for the project mechanical, electrical, plumbing, and fire protection systems. Prepare the HVAC and refrigeration sections of the Maintenance Plan in accordance with ASHRAE 180. Develop required inspection and maintenance tasks similar to Section 5 of ASHRAE 180 for the other commissioned systems and fire protection systems.

Submit the Maintenance Plan no later than 30 calendar days following the completion of Functional Performance Tests. Submit an electronic copy.

3.2 COMMISSIONING REPORT

Following the completion of Functional Performance Tests, with the exception of Seasonal Tests, the Lead Commissioning Specialist must prepare a Commissioning Report.

a. Include an executive summary describing the overall commissioning process, the results of the commissioning process, any outstanding deficiencies and recommended resolutions, and any seasonal testing that must be scheduled for a later date. Indicate, in the executive summary, whether the systems meet the requirements of the construction contract and the Owner's Project Requirements.

b. Detail any deficiencies discovered during the commissioning process and the corrective actions taken in the report. Include the completed Pre-Functional Checklists, Functional Performance Test Checkliststhe Commissioning Plans, the Issues Log, Performance Verification Test Reports, Training Attendance Rosters, the Design Review Report, the final TAB Report.

c. Submit the Commissioning Report no later than 14 calendar days following commissioning team acceptance of all Functional Performance Tests with the exception of Seasonal Tests. Submit an electronic copy.

d. Following any Seasonal Tests or Post-Construction Activities, update the Final Commissioning Report to reflect any changes and resubmit. File the approved, updated, Final Commissioning Report in the Sustainability eNotebook.

3.3 POST-CONSTRUCTION SUPPORT

3.3.1 Post-Construction Endurance Test

Perform an Endurance Test in accordance with the paragraph Endurance Test in INSTRUMENTATION AND CONTROL FOR HVAC once during the peak heating season and once during the peak cooling season during outdoor air condition extremes with the exception that network bandwidth usage measurement and recording is not required.

The Mechanical System Commissioning Specialists must review the trend logs from the Endurance Tests to ensure that the systems have stable operation and operate as required by the construction contract, and the Owner's

Project Requirements Document. The Commissioning Specialists must provide a Post-Construction Trend Log Report that identifies any deficiencies noted in operation, recommendations for correction, and includes a graphical representation of the trends. Provide one Trend Log Report for the peak cooling season and one Trend Log Report for the peak heating season. Submit one hard copy and one electronic copy of the Post-Construction Trend Log Reports no later than 14 calendar days following receipt of the trend log data by the Commissioning Specialist.

3.3.2 Post-Construction Site Visit

The Commissioning Specialists must visit the building site concurrent with the 9 month warranty inspection to inspect building system equipment and review building operation with the building operating/maintenance staff. The Commissioning Specialists must identify any deficiency of the building systems to operate in accordance with the contract requirements and the Owner's Project Requirements. The Commissioning Specialists must advise the Contracting Officer's Representative of any identified deficiencies and the proposed corrective action. Submit an updated commissioning report and systems manual documenting the results of the post-construction inspection.

-- End of Section --

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SECTION 01 91 00.15 10

TOTAL BUILDING COMMISSIONING
05/19

PART 1 GENERAL

1.1 SUMMARY

Commission the building systems listed herein. Employ the services of an independent Commissioning Firm. The Commissioning Firm must be a 1st tier subcontractor of the General or Prime Contractor and must be financially and corporately independent of all other subcontractors. The Commissioning Firm must employ a Lead Commissioning Specialist that coordinates all aspects of the commissioning process. Conform to the commissioning procedures outlined in this specification.

1.2 SYSTEMS TO BE COMMISSIONED

Commission the following systems:

Heating, Ventilating, Air Conditioning, and Refrigeration Systems (HVAC)
Building Automation System
Lighting Systems

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 202	(2013; Addenda B 2018) Commissioning Process for Buildings and Systems

ASSOCIATED AIR BALANCE COUNCIL (AABC)

ACG Commissioning Guideline	(2005) Commissioning Guideline

NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB)

NEBB Commissioning Standard	(2009) Procedural Standards for Whole Building Systems Commissioning of New Construction; 3rd Edition

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

ANSI/SMACNA 014	(2013) HVAC Systems Commissioning Manual, 2nd Edition

1.4 COMMUNICATION WITH THE GOVERNMENT

The Lead Commissioning Specialist (CxC) must submit all plans, schedules, reports, and documentation directly to the Contracting Officer

Representative concurrent with submission to the CQC System Manager. The Lead Commissioning Specialist must have direct communication with the Contracting Officer's Representative regarding all elements of the commissioning process; however, the Government has no direct contract authority with the Lead Commissioning Specialist.

1.5 SEQUENCING AND SCHEDULING

1.5.1 Sequencing

Complete the following prior to starting Functional Performance Tests of mechanical systems:

a. All equipment and systems have been completed, cleaned, flushed, disinfected, calibrated, tested, and operate in accordance with contract documents and construction plans and specifications.

b. Performance Verification Tests of the controls systems have been completed and the Performance Verification Test Report has been submitted and approved in accordance with Specification Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC.

c. Testing, Adjusting, and Balancing has been completed and the Testing, Adjusting, and Balancing Report, has been submitted and approved in accordance with Specification Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC.

d. The building envelope is enclosed according to contract documents with final construction completed.

e. The Pre-Functional Checklists have been submitted and approved.

f. The Certificate of Readiness for mechanical systems has been submitted and approved.

Complete the following prior to starting Functional Performance Tests of the electrical systems:

a. All electrical, power generation, and lighting equipment and systems have been completed, calibrated, tested, and operate in accordance with contract documents and construction plans and specifications.

b. The building envelope is enclosed according to contract documents with final construction completed.

c. Ceiling tiles, floor coverings, and window coverings are in place.

d. The Certificate of Readiness for electrical systems has been submitted and approved.

1.5.2 Project Schedule

Include the following tasks in the project schedule. Ensure sufficient time is scheduled to accommodate the requirements of this specification section. The order of items listed below is not intended to imply a specified sequence:

a. Submission and approval of the Commissioning Firm and Commissioning Specialist

b. Submission and approval of the Testing, Adjusting, and Balancing (TAB) Firm and TAB Specialist specified in Specification Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC

c. Submission of the Design Review Report specified herein.

d. Submission of the Design Review Report specified in Specification Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC.

e. Submission and approval of the Construction Phase Commissioning Plan

f. Factory Acceptance Testing for each of the systems to be commissioned as required by technical specifications

g. Manufacturer's Equipment Start-Up for each of the systems to be commissioned.

h. Submission and approval of the TAB Schematic Drawings, Report Forms, and Procedures specified in Specification Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC.

i. Testing, Adjusting, and Balancing (TAB) Field Work required by Specification Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC

j. Submission and approval of the TAB Report specified in Specification Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC

k. TAB Field Acceptance Testing required by Specification Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC

l. Submission and approval of the Start-Up Testing Report specified in Specification Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC.

m. Submission and approval of the Performance Verification Test Procedures specified in Specification Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC.

n. Performance Verification Tests required by Specification Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC

o. Performance Verification Test Report specified in Specification Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC

p. Pre-Functional Checklist Submittal

q. Functional Performance Testing for each system to be commissioned

s. Post-Test Deficiency Correction for each system to be commissioned

t. Re-Testing

u. Training for each of the systems to be commissioned

v. Submission and approval of the Commissioning Report

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Commissioning Firm; G

Lead Commissioning Specialist; G

Technical Commissioning Specialists; G

SD-06 Test Reports

Design Review Report; G

Interim Construction Phase Commissioning Plan; G

Final Construction Phase Commissioning Plan; G

Pre-Functional Checklists; G

Issues Log

Commissioning Report; G

SD-07 Certificates

Certificate of Readiness; G

SD-10 Operation and Maintenance Data

Training Plan; G

Training Attendance Rosters; G

SD-11 Closeout Submittals

Final Commissioning Report; G

1.7 COMMISSIONING FIRM

Provide a Commissioning Firm that is certified in commissioning by one of the following: the AABC Commissioning Group (ACG); the National Environmental Balancing Bureau (NEBB); the International Certification Board/Testing, Adjusting, and Balancing Bureau (ICB/TABB), the Building Commissioning Association (BCA); the Association of Energy Engineers (AEE). The Commissioning Firm must be certified in all systems to be commissioned to the extent such certifications are available from the certifying body. Describe any lapses in certification or disciplinary action taken by the certifying body against the proposed Commissioning Firm or Lead Commissioning Specialist in detail. Any firm or commissioning professional that has been the subject of disciplinary action by the certifying body within the five years preceding contract award is not eligible to perform any duties related to commissioning.

a. Submit the Commissioning Firm's certification of qualifications

including the name of the firm and certifications no later than 60 calendar days after Notice to Proceed. Submit one hard copy and an electronic copy.

b. The Commissioning Firm's and Commissioning Specialists' certifications must be maintained for the entire duration of the duties specified herein. If, for any reason, the firm or a specialist loses a certification during this period, immediately notify the Contracting Officer's Representative and submit another Commissioning Firm or Commissioning Specialist for approval. All work specified in this specification section performed by the Commissioning Firm or associated Commissioning Specialists is invalid if the Commissioning Firm or Commissioning Specialist loses its certification prior to contract completion and must be performed by an approved successor.

c. The Commissioning Firm must oversee and assist the General or Prime Contractor with the work specified herein.

1.7.1 Lead Commissioning Specialist

The Commissioning Firm must provide a Lead Commissioning Specialist (CxC) that has a minimum of five years of commissioning experience, including two projects of similar size and complexity, and that is one of the following: a NEBB qualified Systems Commissioning Administrator (SCA); ACG Certified Commissioning Authority (CxA); ICB/TABB Certified Commissioning Supervisor; BCA Certified Commissioning Professional (CCP); AEE Certified Building Commissioning Professional (CBCP); University of Wisconsin-Madison Qualified Commissioning Process Provider (QCxP); Building Commissioning Professional (BCxP).

a. Submit the Lead Commissioning Specialist's certification of qualifications including the name of the specialist and firm; certifications; years of experience; and a listing of representative projects of similar size and complexity no later than 60 calendar days after Notice to Proceed. Submit one hard copy and an electronic copy.

b. The Lead Commissioning Specialists certifications must be maintained for the entire duration of the duties specified herein. If, for any reason, the specialist loses a certification during this period, immediately notify the Contracting Officer's Representative and submit another Lead Commissioning Specialist for approval. All work specified in this specification section to be performed by the Lead Commissioning Specialist is invalid if the Lead Commissioning Specialist loses its certification prior to contract completion and must be performed by an approved successor.

c. The Lead Commissioning Specialist must lead and oversee the commissioning work specified herein and be the primary point of contact for the Government regarding the commissioning work. One of the Technical Commissioning Specialists may be the Lead Commissioning Specialist provided that all of the qualification requirements are met.

1.7.2 Technical Commissioning Specialists

Technical Commissioning Specialists, employed by the Commissioning Firm and that have the following qualifications, must perform the technical work specified herein associated with each system to be commissioned:

a. Mechanical Technical Commissioning Specialist: The technical work

associated with mechanical systems including Heating, Ventilating, Air Conditioning, and Refrigeration Systems; Building Automation System; must be performed by a Commissioning Specialist certified by NEBB, ACG, ICB/TABB, or BCA in the commissioning of HVAC systems with five years of experience in the commissioning of HVAC systems.

b. Electrical Technical Commissioning Specialist: The technical work associated with electrical systems including Lighting Systems must be performed by a Commissioning Specialist certified by NEBB, ACG, ICB/TABB, or BCA with five years of experience in the commissioning of electrical systems.

c. Submit the Technical Commissioning Specialist's certification of qualifications including the name of the specialist and firm; certifications; years of experience; and a listing of representative projects of similar size and complexity no later than 60 calendar days after Notice to Proceed. Submit one hard copy and an electronic copy.

1.7.3 Commissioning Standard

Comply with the requirements of the commissioning standard under which the Commissioning Firm and Specialists qualifications are approved. When the firm and specialists are certified by BCA, AEE, ASHRAE, or the University of Wisconsin-Madison, comply with the requirements of one of the acceptable standards unless otherwise stated herein. The acceptable standards are ACG Commissioning Guideline, NEBB Commissioning Standard, ANSI/SMACNA 014, or ASHRAE 202. Comply with applicable NETA testing standards for electrical systems.

a. Implement all recommendations and suggested practices contained in the Commissioning Standard and electrical test standards.

b. Use the Commissioning Standard for all aspects of Commissioning, including calibration of instruments.

c. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the Commissioning Standard, adhere to the manufacturer calibration recommendations.

d. All quality assurance provisions of the Commissioning Standard such as performance guarantees are part of this contract.

e. The Commissioning Specialists must develop commissioning procedures for any systems or system components not covered in the Commissioning Standard.

f. Use any new requirements, recommendations, and procedures published or adopted prior to contract solicitation by the body responsible for the Commissioning Standard.

1.8 ISSUES LOG

The Lead Commissioning Specialist must develop and maintain an Issues Log for tracking and resolution of all deficiencies discovered through submittal reviews, inspection, and testing. Include the date of final resolution of issues as confirmed by the Commissioning Specialist. Submit the Issues Log on a monthly basis at a minimum. At any point during construction, any commissioning team member finding deficiencies may communicate those deficiencies in writing to the Commissioning Specialist

for inclusion into the Issues Log.

1.9 CERTIFICATE OF READINESS

Prior to scheduling Functional Performance Tests for each system, issue a Certificate of Readiness for the system certifying that the system is ready for Functional Performance Testing. The Certificate of Readiness must include, for each system to be commissioned, all equipment and system start-up reports; Performance Verification Test Reports; completed Pre-Functional Checklists; Testing, Adjusting, and Balancing (TAB) Report; HVAC Controls Start-Up Reports to the extent applicable to the system. The Contractor; the Lead Commissioning Specialist; the Contractor's Quality Control Representative; the Mechanical, Electrical, Controls, and TAB subcontractor representatives must sign and date the Certificate of Readiness. Submit the Certificate of Readiness for each system no later than 14 calendar days prior to Functional Performance Tests of that system. Submit one hard copy and an electronic copy. Do not schedule Functional Performance Tests for a system until the Certificate of Readiness for that system receives approval by the Government.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.1 CONSTRUCTION PHASE

3.1.1 Construction Commissioning Coordination Meeting

The Lead Commissioning Specialist must lead a Construction Commissioning Coordination Meeting no later than 14 days after approval of the Commissioning Firm and Commissioning Specialists to discuss the commissioning process including contract requirements, lines of communication, roles and responsibilities, schedules, documentation requirements, inspection and test procedures, and logistics as specified in this specification section. The Contractor's Superintendent or Project Manager, the Contractor's Quality Control Representative, and the Government must attend this meeting. Invite the User and a Base Civil Engineer Office Representative to attend this meeting.

3.1.2 Construction Phase Commissioning Plan

3.1.2.1 Interim Construction Phase Commissioning Plan

The Lead Commissioning Specialist (CxC) must prepare the Interim Construction Phase Commissioning Plan. Submit the Interim Construction Phase Commissioning Plan no later than 30 calendar days after the Construction Commissioning Coordination Meeting and no later than 14 days prior to the start of construction of the building envelope. Submit one hard copy and an electronic copy.

Identify the commissioning and testing standards and outline the overall commissioning process, the commissioning schedule, the commissioning team members and responsibilities, lines of communication, documentation requirements for the construction phase of the project in the Interim Construction Phase Commissioning Plan.

3.1.2.1.1 Checklists

Download example Pre-Functional Checklists and Functional Performance Test Checklists for specification section 01 91 00.15 10 TOTAL BUILDING COMMISSIONING at the following location: http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphics-
The checklists submitted in the Interim and Final Construction Phase Commissioning Plans must contain the same level of detail shown in the examples. The submitted checklists are not required to match the format of the examples.

3.1.2.2 Final Construction Phase Commissioning Plan

The Lead Commissioning Specialist (CxC) must prepare the Final Construction Phase Commissioning Plan. Submit the Final Construction Phase Commissioning Plan no later than 30 calendar days prior to the start of Pre-Functional Checks. Submit one hard copy and an electronic copy. Once approved, file the approved plan in the Sustainability eNotebook.

Include the information provided in the Interim Construction Phase Commissioning Plan. In addition, the Technical Commissioning Specialist must develop the Pre-Functional Checklists and Functional Performance Test Checklists for each building, for each system required to be commissioned, and for each component for inclusion in the Final Construction Phase Commissioning Plan.

3.1.2.2.1 Pre-Functional Checklists

The Pre-Functional Checklists must include items for physical inspection or testing that demonstrate that installation and start-up of equipment and systems is complete. Refer to paragraph Pre-Functional Checks for more information.

3.1.2.2.2 Functional Performance Test Checklists

Functional Performance Test Checklists must include procedures that explain, step-by-step, the actions and expected results that will demonstrate that the system performs in accordance with the contract. Refer to paragraph Functional Performance Tests for more information. Include the following sections and details appropriate to the systems being tested in the Functional Performance Test Checklists:

a. Notable system features including information about controls to facilitate understanding of system operation

b. Conclusions and recommendations. Conclusions must clearly indicate if system does or does not perform in accordance with contract requirements. Recommendation must clearly indicate that the system should or should not be accepted by the Government.

c. Test conditions including date, beginning and ending time, and beginning and ending outdoor air conditions

d. Attendees

e. Identification of the equipment involved in the test

f. Control system feature identification

g. Point-to-point observations including demonstrating system flow meters and sensors have been calibrated and are correctly displayed on the Operator work station

h. Actuator operation observations demonstrating actuator responses to commands from the control system

i. As-found condition of the system operation

j. List of test items with step numbers along with the corresponding feature or control operation, intended test procedure, expected system response, and pass/fail indication.

k. Space for comments for each test item.

3.1.3 Design Review

The Lead Commissioning Specialist and Technical Commissioning Specialists must review the construction contract plans and specifications, the Owner's Project Requirements Document, and the Basis of Design. The Owner's Project Requirements Document and Basis of Design documents are not contract documents and are provided for commissioning review purposes only.

a. Advise the Contracting Officer's Representative of any discrepancies between the Basis of Design and Owner's Project Requirements, deficiencies of the design to comply with the Owner's Project Requirements or Basis of Design, and deficiencies that would prevent the building systems and features from operating or performing effectively and from being adequately maintainable.

b. The Commissioning Specialists must provide a Design Review Report individually listing each deficiency and the corresponding proposed corrective action necessary for proper system operation or performance. Submit one hard copy and an electronic copy of the report to the Contracting Officer's Representative no later than 14 days after approval of the Commissioning Specialists.

c. The Lead Commissioning Specialist must participate in a meeting to discuss any items contained in the report no later than 14 calendar days after submission of the report.

3.1.4 Construction Submittals

Provide all submittals associated with the systems to be commissioned, including shop drawings; equipment submittals; test plans, procedures, and reports; and resubmittal's to the Commissioning Specialists. The Technical Commissioning Specialist must review the submittals to the extent necessary verify that the equipment and system installation will comply with the contract requirements and the requirements of the Basis of Design and the Owner's Project Requirements Document.

3.1.5 Inspection and Testing

Demonstrate that all system components have been installed, that each control device and item of equipment operates, and that the systems operate and perform, including interactive operation between systems, in accordance with contract documents and the Owner's Project Requirements. Requirements in related specification sections are independent from the requirements of this section and do not satisfy any of the requirements specified in this

specification section. Provide all materials, services, and labor required to perform the Pre-Functional Checks and Functional Performance Tests.

3.1.5.1 Commissioning Team

Provide a commissioning representative for each sub-contractor associated with the systems to be commissioned. Each commissioning representative is responsible for coordination of their respective sub-contractor's execution of the commissioning activities and participation in the inspection and testing required by this specification section. The designers listed below are the designers of record for their respective systems. Substitutes must be approved by the Contracting Officer's Representative.

3.1.5.1.1 Mechanical System Pre-Functional Checks Team

The following team members must participate in Pre-Functional checks of mechanical systems:

Designation	Function
CxM	Mechanical System Technical Commissioning Specialist
QAR	Contracting Officer's Quality Assurance Representative
CQC	Contractor's Quality Control Personnel
MC	Contractor's Mechanical Commissioning Representative
EC	Contractor's Electrical Commissioning Representative
CC	Contractor's Controls Commissioning Representative
TABC	Contractor's TAB Commissioning Representative

3.1.5.1.2 Electrical System Pre-Functional Checks Team

The following team members must participate in Pre-Functional checks of electrical systems:

Designation	Function
CxE	Electrical System Technical Commissioning Specialist
QAR	Contracting Officer's Quality Assurance Representative
CQC	Contractor's Quality Control Personnel
EC	Contractor's Electrical Commissioning Representative

3.1.5.1.3 Mechanical Systems Test Team

The following team members must participate in Functional Performance of mechanical systems:

Designation	Function
CxM	Mechanical System Technical Commissioning Specialist
QAR	Contracting Officer's Quality Assurance Representative
CQC	Contractor's Quality Control Personnel
MC	Contractor's Mechanical Commissioning Representative
EC	Contractor's Electrical Commissioning Representative
CC	Contractor's Controls Commissioning Representative
TABC	Contractor's TAB Commissioning Representative

3.1.5.1.4 Electrical Systems Test Team

The following team members must participate in Functional Performance Testing of electrical systems:

Designation	Function
CxE	Electrical System Technical Commissioning Specialist
QAR	Contracting Officer's Quality Assurance Representative
CQC	Contractor's Quality Control Personnel
EC	Contractor's Electrical Commissioning Representative

3.1.5.1.5 Other Pre-Functional and Functional Performance Participants

The following may participate as team members during Pre-Functional Checks and Functional Performance Testing:

Designation	Function
BCE	Base Civil Engineer Office Representative
User	Using Agent's Representative

3.1.5.2 Pre-Functional Checks

Pre-Functional Checklists from the approved Final Construction Phase Commissioning Plan must be completed by the commissioning team. Complete one Pre-Functional Checklist for each individual item of equipment or system for each system required to be commissioned including, but not limited to, ductwork, piping, equipment, fixtures (lighting and plumbing), and controls. Indicate commissioning team member inspection and acceptance of each Pre-Functional Checklist item by initials. Acceptance of each Pre-Functional Checklist item by each team member indicates that item conforms to the construction contract requirements in their area of responsibility. Technical Commissioning Specialist acceptance of each Pre-Functional Checklist item indicates that each item has been installed

correctly and in accordance with contract documents and the Owner's Project Requirements. Submit the completed and initialed Pre-Functional Checklists no later than 7 calendar days after completion of inspection of all checklists items for each system. Submit one hard copy and an electronic copy. Include manufacturer start-up checklists associated with equipment with the submission of the Pre-Functional Checklists.

3.1.5.3 Testing, Adjusting, and Balancing (TAB) Report and Field Acceptance Testing

The Mechanical System Technical Commissioning Specialist must review the pre-final TAB Report required by Specification Section 23 05 93 TESTING, ADJUSTING, AND BALANCING FOR HVAC. Identify any deficiencies to the Contracting Officer's Representative and the Contractor's Quality Control Personnel. Resolve all deficiencies prior to TAB Field Acceptance Testing.

3.1.5.4 HVAC Controls Test Reports

The Mechanical System Technical Commissioning Specialist must review the Start-Up Testing Report and the PVT Procedures and Reports required by Specification Section 23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC. Include a certification by the Mechanical System Technical Commissioning Specialist that the submittals contain no deficiencies or that the submittals do not indicate any deficiencies in the HVAC systems or HVAC control systems with each of these submittals.

3.1.5.5 Tests

3.1.5.5.1 Functional Performance Tests

Schedule Functional Performance Tests for each system only after the Certificate of Readiness has been approved by the Government for the system. Correct all deficiencies identified through any prior review, inspection, or test activity before the start of Functional Performance Tests.

a. Functional Performance Tests must be performed with the Contracting Officer's Quality Assurance Representative present.

b. Abort Functional Performance Tests when any system deficiency prevents the successful completion of the test.

c. Technical Commissioning Specialists must lead and document all Functional Performance Tests for the systems to be commissioned with the Contractor and appropriate sub-contractors performing the Functional Performance Tests. The representatives listed in the paragraph Commissioning Team must attend the tests. Abort Functional Performance Tests when any required commissioning team member is not present for the test.

3.1.5.5.1.1 Checklist

Use the Functional Performance Test Checklists from the approved Final Construction Phase Commissioning Plan to guide the Functional Performance Tests. Functional Performance Tests must be performed for each item of equipment and each system required to be commissioned and verify all sensor calibrations, control responses, safeties, interlocks, operating modes, sequences of operation, capacities, lighting levels, and all other performance requirements comply with construction contract regardless of

the specific items listed within the Functional Performance Test provided. Testing must progress from equipment or components to subsystems to systems to interlocks and connections between systems. The order of components and systems to be tested must be determined by the Technical Commissioning Specialists.

3.1.5.5.1.2 Acceptance

Indicate acceptance of each item of equipment and systems tested by signature of each commissioning team member for each Functional Performance Test. The Contractor's Quality Control Representative and the Technical Commissioning Specialists must indicate acceptance after the equipment and systems are free of deficiencies.

3.1.5.5.2 HVAC Test Methods

Perform Functional Performance Tests in accordance with the following:

3.1.5.5.2.1 Prior to Testing

Prior to testing operating modes, sequences of operation, interlocks, and safeties, complete control point-to-point observations, test sensor calibrations, and test actuator commands.

3.1.5.5.2.2 Simulating Conditions

Over-writing control input values through the controls system is not acceptable, unless approved by the Contracting Officer's Representative. Identify proposed exceptions in a protocol submitted to the Contracting Officer's Representative for approval. Before simulating conditions, overwriting values (if approved), or changing set-points, calibrate all sensors, transducers and devices. Below are several examples of exceptions that would be considered acceptable:

a. When varying static pressures inside ductwork can not be simulated within the duct, and where a sensor signals the controls system to initiate sequences at various duct static pressures, it is acceptable to simulate the various pressures with a Pneumatic Squeeze-Bulb Type Signaling Device with gauge temporarily attached to the sensing tube leading to the transmitter. It is not acceptable to reset the various set-points, nor to simulate an electric analog signal (unless approved as noted above).

b. Dirty filter pressure drops can be simulated using sheets of cardboard at filter face.

c. Freeze-stat safeties can be simulated by packing portion of sensor with ice.

d. High outside air temperatures can be simulated with a hair blower.

e. High entering cooling coil temperatures can be used to simulate entering cooling coil conditions.

f. Do not use signal generators to simulate sensor signals unless approved by the Contracting Officer's Representative, as noted above, for special cases.

g. Control set points can be altered. For example, to see the air

conditioning compressor lockout work at an outside air temperature below 55 degrees F, when the outside air temperature is above 55 degrees F, temporarily change the lockout set point to be 0 degrees F above the current outside air temperature. Caution: Set points are not to be raised or lowered to a point such that damage to the components, systems, or the building structure and/or contents will occur.

h. Test duct mounted smoke detectors in accordance with the manufacturer's recommendations. Perform the tests with air system at minimum airflow condition in ductwork.

i. Test current sensing relays used for fan and pump status signals to control system to indicate unit failure and run status by resetting the set point on the relay to simulate a lost belt or unit failure while the unit is running. Confirm that the failure alarm was generated and received at the control system. After the test is conducted, return the set point to its original set-point or a set-point as indicated by the Contracting Officer's Representative.

3.1.5.5.2.3 Setup

Perform each test under conditions that simulate actual conditions as close as is practically possible. Provide all necessary materials and system modifications to produce the necessary flows, pressures, temperatures, and other conditions necessary to execute the test according to the specified conditions. At completion of the test, return the affected building equipment and systems to their pre-test condition.

3.1.5.5.3 Aborted Tests and Re-Testing

Abort Functional Performance Tests or Seasonal Tests if any deficiency prevents successful completion of the test or if any required commissioning team member is not present for the test. The Contractor is responsible fo reimbursing the Government for all costs associated with effort lost due to re-testing due to test failures and aborted tests. These costs must include salary, travel costs, and per diem for Government commissioning team members. Re-test only after all deficiencies identified during the original tests have been corrected.

3.1.5.5.3.1 100 Percent Sample

Systems or equipment for which 100 percent sample size are tested fail if one or more of the test procedures results in discovery of a deficiency and the deficiency cannot be resolved within 5 minutes during the test.

Re-test to the extent necessary to confirm that the deficiencies have been corrected without negatively impacting the performance of the rest of the system.

3.1.6 Training Plan

Develop a training plan which identifies all training required by specification sections associated with commissioned systems. Include a matrix listing each training requirement, content of the training, the trainer name, trainer contact information, and schedule and location of training. Submit one hard copy and an electronic copy of the Training Plan to the Commissioning Specialists and the Government no later than 30 calendar days prior to the associated training.

Document training attendance using training attendance rosters and provide completed attendance rosters to the Commissioning Specialists and the Government no later than 7 calendar days following the completion of training for each system to be commissioned. Submit one hard copy and an electronic copy..

3.2 COMMISSIONING REPORT

Following the completion of Functional Performance Tests, with the exception of Seasonal Tests, the Lead Commissioning Specialist must prepare a Commissioning Report.

a. Include an executive summary describing the overall commissioning process, the results of the commissioning process, any outstanding deficiencies and recommended resolutions, and any seasonal testing that must be scheduled for a later date. Indicate, in the executive summary, whether the systems meet the requirements of the construction contract and the Owner's Project Requirements.

b. Detail any deficiencies discovered during the commissioning process and the corrective actions taken in the report. Include the completed Pre-Functional Checklists, Functional Performance Test Checkliststhe Commissioning Plans, the Issues Log, Performance Verification Test Reports, Training Attendance Rosters, the Design Review Report, the final TAB Report.

c. Submit the Commissioning Report no later than 14 calendar days following commissioning team acceptance of all Functional Performance Tests with the exception of Seasonal Tests. Submit three hard copies and an electronic copy.

d. Following any Seasonal Tests or Post-Construction Activities, update the Final Commissioning Report to reflect any changes and resubmit.

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SECTION 02 41 00

DEMOLITION
05/10, CHG 2: 02/19

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)

AHRI Guideline K	(2009) Guideline for Containers for Recovered Non-Flammable Fluorocarbon Refrigerants

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 145	(1991; R 2012) Standard Specification for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
AASHTO T 180	(2017) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.6	(2006) Safety & Health Program Requirements for Demolition Operations - American National Standard for Construction and Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. DEFENSE LOGISTICS AGENCY (DLA)

DLA 4145.25	(Jun 2000; Reaffirmed Oct 2010) Storage and Handling of Liquefied and Gaseous Compressed Gases and Their Full and Empty Cylinders http://www.aviation.dla.mil/UserWeb/aviationengineering/

U.S. DEPARTMENT OF DEFENSE (DOD)

DOD 4000.25-1-M	(2006) MILSTRIP - Military Standard Requisitioning and Issue Procedures
MIL-STD-129	(2014; Rev R; Change 1 2018; Change 2

	2019) Military Marking for Shipment and Storage

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1	(2016; Rev L; Change 2) Obstruction Marking and Lighting

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 82	Protection of Stratospheric Ozone
49 CFR 173.301	Shipment of Compressed Gases in Cylinders and Spherical Pressure Vessels

1.2 PROJECT DESCRIPTION

1.2.1 Definitions

1.2.1.1 Demolition

Demolition is the process of wrecking or taking out any load-supporting structural member of a facility together with any related handling and disposal operations.

1.2.1.2 Deconstruction

Deconstruction is the process of taking apart a facility with the primary goal of preserving the value of all useful building materials.

1.2.1.3 Demolition Plan

Demolition Plan is the planned steps and processes for managing demolition activities and identifying the required sequencing activities and disposal mechanisms.

1.2.1.4 Deconstruction Plan

Deconstruction Plan is the planned steps and processes for dismantling all or portions of a structure or assembly, to include managing sequencing activities, storage, re-installation activities, salvage and disposal mechanisms.

1.2.2 Demolition/Deconstruction Plan

Prepare a Demolition Plan and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Coordinate with Waste Management Plan in accordance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

Include statements affirming Contractor inspection of the existing roof deck and its suitability to perform as a safe working platform or if inspection reveals a safety hazard to workers, state provisions for securing the safety of the workers throughout the performance of the work.

Provide procedures for safe conduct of the work in accordance with EM 385-1-1. Plan shall be approved by Contracting Officer prior to work beginning.

1.2.3 General Requirements

Do not begin demolition or deconstruction until authorization is received from the Contracting Officer. Remove rubbish and debris from the project site; do not allow accumulations inside or outside the building. The work includes demolition, , salvage of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from Government property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Contracting Officer. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 ITEMS TO REMAIN IN PLACE

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items as approved by the Contracting Officer. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract. Do not overload structural elements pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

1.3.2 Weather Protection

For portions of the building to remain, protect building interior and materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas.

1.3.3 Trees

Protect trees within the project site which might be damaged during demolition or deconstruction, and which are indicated to be left in place, by a 6 foot high fence. Erect and secure fence a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Contracting Officer.

1.3.4 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. Prior to start of work, utilities serving each area of alteration or removal will be shut off by the Government and disconnected and sealed by the Contractor unless otherwise noted and indicated on Contract Documents.

1.3.5 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished or deconstructed, unless directed otherwise by the Contracting Officer. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted .

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals
Demolition Plan; G
Deconstruction Plan; G
Existing Conditions

SD-07 Certificates

Notification; G

SD-11 Closeout Submittals

Receipts

1.6 QUALITY ASSURANCE

Submit timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the State's environmental protection agency local air pollution control district/agency and the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSP A10.6. Comply with

the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

1.6.1 Dust and Debris Control

Prevent the spread of dust and debris to occupied portions of the building and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements as often as necessary to control the spread of debris that may result in foreign object damage potential to aircraft.

1.7 PROTECTION

1.7.1 Traffic Control Signs

a. Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Contracting Officer prior to beginning such work.

Provide a minimum of 2 FAA type L-810 steady burning red obstruction lights on temporary structures (including cranes) over 100 feet, but less than 200 ft, above ground level. The use of LED based obstruction lights are not permitted. For temporary structures (including cranes) over 200 ft above ground level provide obstruction lighting in accordance with FAA AC 70/7460-1. Light construction and installation shall comply with FAA AC 70/7460-1. Lights shall be operational during periods of reduced visibility, darkness, and as directed by the Contracting Officer. Maintain the temporary services during the period of construction and remove only after permanent services have been installed and tested and are in operation.

1.7.2 Protection of Personnel

Before, during and after the demolition work continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the project site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.8 FOREIGN OBJECT DAMAGE (FOD)

Aircraft and aircraft engines are subject to FOD from debris and waste material lying on airfield pavements. Remove all such materials that may appear on operational aircraft pavements due to the Contractor's operations. If necessary, the Contracting Officer may require the Contractor to install a temporary barricade at the Contractor's expense to control the spread of FOD potential debris. The barricade shall include a fence covered with a fabric designed to stop the spread of debris. Anchor the fence and fabric to prevent displacement by winds or jet/prop blasts. Remove barricade when no longer required.

1.9 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to be relocated which are damaged by the Contractor with new undamaged items as

approved by the Contracting Officer.

1.10 EXISTING CONDITIONS

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document. Submit survey results.

PART 2 PRODUCTS

2.1 FILL MATERIAL

a. Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill basements, voids, depressions or excavations resulting from demolition or deconstruction of structures.

b. Fill material shall conform to the definition of satisfactory soil material as defined in AASHTO M 145, Soil Classification Groups A-1, A-2-4, A-2-5 and A-3. In addition, fill material shall be free from roots and other organic matter, trash, debris, frozen materials, and stones larger than 2 inches in any dimension.

c. Proposed fill material must be sampled and tested by an approved soil testing laboratory, as follows:

Soil classification	AASHTO M 145
Moisture-density relations	AASHTO T 180, Method B or D

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures onsite for reuse. Existing construction scheduled to be removed for reuse shall be disassembled. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Materials shall be designated for reuse onsite whenever possible.

3.1.1 Structures

a. Remove existing structures indicated to be removed to grade.

b. Demolish structures in a systematic manner from the top of the structure to the ground. Complete demolition work above each tier or floor before the supporting members on the lower level are disturbed.

Demolish Deconstruct concrete and masonry walls in small sections. Remove structural framing members and lower to ground by means of derricks, platforms hoists, or other suitable methods as approved by the Contracting Officer.

c. Locate demolition and deconstruction equipment throughout the structure and remove materials so as to not impose excessive loads to supporting walls, floors, or framing.

d. Building, or the remaining portions thereof, not exceeding 80 feet in height may be demolished by the mechanical method of demolition.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2.2 Disconnecting Existing Utilities

Remove existing utilities as indicated uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered but are not indicated on the drawings, notify the Contracting Officer prior to further work in that area. Remove meters and related equipment and deliver to a location on the station in accordance with instructions of the Contracting Officer.

3.1.3 Chain Link Fencing

Remove chain link fencing, gates and other related salvaged items scheduled for removal and transport to designated areas. Remove gates as whole units. Cut chain link fabric to 25 foot lengths and store in rolls off the ground.

3.1.4 Paving and Slabs

Remove concrete and asphaltic concrete paving and slabs including aggregate base to a depth of 12 inches unless indicated otherwise. Provide neat sawcuts at limits of pavement removal as indicated. Pavement and slabs designated to be recycled and utilized in this project shall be moved, ground and stored as directed by the Contracting Officer. Pavement and slabs not to be used in this project shall be removed from the Installation at Contractor's expense.

3.1.5 Concrete

Saw concrete along straight lines to a depth of a minimum 2 inch. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete.

3.1.6 Structural Steel

Dismantle structural steel at field connections and in a manner that will prevent bending or damage. Salvage for recycle structural steel, steel joists, girders, angles, plates, columns and shapes. Flame-cutting torches are permitted when other methods of dismantling are not practical.

3.1.7 Miscellaneous Metal

Scrap metal shall become the Contractor's property.

3.1.8 Air Conditioning Equipment

Remove air conditioning, refrigeration, and other equipment containing refrigerants without releasing chlorofluorocarbon refrigerants to the atmosphere in accordance with the Clean Air Act Amendment of 1990. Recover all refrigerants prior to removing air conditioning, refrigeration, and other equipment containing refrigerants and dispose of in accordance with the paragraph entitled "Disposal of Ozone Depleting Substance (ODS)."

3.1.9 Mechanical Equipment and Fixtures

3.1.9.1 Piping

Disconnect piping at unions, flanges and valves, and fittings as required to reduce the pipe into straight lengths for practical storage. Store salvaged piping according to size and type. If the piping that remains can become pressurized due to upstream valve failure, end caps, blind flanges, or other types of plugs or fittings with a pressure gage and bleed valve shall be attached to the open end of the pipe to ensure positive leak control. Carefully dismantle piping that previously contained gas, gasoline, oil, or other dangerous fluids, with precautions taken to prevent injury to persons and property. Store piping outdoors until all fumes and residues are removed. Box prefabricated supports, hangers, plates, valves, and specialty items according to size and type. Wrap sprinkler heads individually in plastic bags before boxing. Classify piping not designated for salvage, or not reusable, as scrap metal.

3.1.9.2 Ducts

Classify removed duct work as scrap metal.

3.1.9.3 Fixtures, Motors and Machines

Remove and salvage fixtures, motors and machines associated with plumbing, heating, air conditioning, refrigeration, and other mechanical system installations. Salvage, box and store auxiliary units and accessories with the main motor and machines. Tag salvaged items for identification, storage, and protection from damage. Classify non-porcelain broken, damaged, or otherwise unserviceable units and not caused to be broken, damaged, or otherwise unserviceable as debris to be disposed of by the Contractor.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition or deconstruction work in areas occupied by structures to be demolished or deconstructed until all demolition and

deconstruction in the area has been completed and debris removed. Fill holes, open basements and other hazardous openings.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition, deconstruction, and removal procedures, and authorization by the Contracting Officer to begin demolition and deconstruction. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.3.2 Reuse of Materials and Equipment

Remove and store materials and equipment listed in the Demolition Plan or indicated to be reused or relocated to prevent damage, and reinstall as the work progresses.

3.3.3 Salvaged Materials and Equipment

Remove materials and equipment that are listed in the Demolition Plan indicated and specified to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site, as directed within by the Contracting Officer.

a. Salvage items and material to the maximum extent possible.

b. Store all materials salvaged for the Contractor as approved by the Contracting Officer and remove from Government property before completion of the contract. Coordinate the salvaged materials with tracking requirements in accordance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL. Capture salvaged materials in the diversion calculations for the project.

c. Remove salvaged items to remain the property of the Government in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage must be repaired or replaced to match existing items. Properly identify the contents of containers.

d. Remove the following items reserved as property of the using service prior to commencement of work under this contract.

e. Remove historical items in a manner to prevent damage. Deliver the following historical items to the Government for disposition: Corner stones, contents of corner stones, and document boxes wherever located on the site.

f. Remove and capture all Class I ODS refrigerants in accordance with the Clean Air Act Amendment of 1990, and turn in to the as directed by the Commanding Officer.

3.3.4 Disposal of Ozone Depleting Substance (ODS)

Class I and Class II ODS are defined in Section, 602(a) and (b), of The Clean Air Act. Prevent discharge of Class I and Class II ODS to the atmosphere. Place recovered ODS in cylinders meeting AHRI Guideline K suitable for the type ODS (filled to no more than 80 percent capacity) and provide appropriate labeling. Recovered ODS shall be removed from Government property and disposed of in accordance with 40 CFR 82. Products, equipment and appliances containing ODS in a sealed, self-contained system (e.g. residential refrigerators and window air conditioners) shall be disposed of in accordance with 40 CFR 82. Submit Receipts or bills of lading, as specified. Submit a shipping receipt or bill of lading for all containers of ozone depleting substance (ODS) shipped to the Defense Depot, Richmond, Virginia.

3.3.4.1 Special Instructions

No more than one type of ODS is permitted in each container. A warning/hazardous label shall be applied to the containers in accordance with Department of Transportation regulations. All cylinders including but not limited to fire extinguishers, spheres, or canisters containing an ODS shall have a tag with the following information:

a. Activity name and unit identification code

b. Activity point of contact and phone number

c. Type of ODS and pounds of ODS contained

d. Date of shipment

e. National stock number (for information, call (804) 279-4525).

3.3.4.2 Fire Suppression Containers

Deactivate fire suppression system cylinders and canisters with electrical charges or initiators prior to shipment. Also, safety caps must be used to cover exposed actuation mechanisms and discharge ports on these special cylinders.

3.3.5 Transportation Guidance

Ship all ODS containers in accordance with MIL-STD-129, DLA 4145.25 (also referenced one of the following: Army Regulation 700-68, Naval Supply Instruction 4440.128C, Marine Corps Order 10330.2C, and Air Force Regulation 67-12), 49 CFR 173.301, and DOD 4000.25-1-M.

3.4 CLEANUP

Remove debris and rubbish from basement and similar excavations. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.5 DISPOSAL OF REMOVED MATERIALS

3.5.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials

resulting from removal operations with all applicable federal, state and local regulations as contractually specified in the Waste Management Plan. Storage of removed materials on the project site is prohibited.

3.5.2 Burning on Government Property

Burning of materials removed from demolished and deconstructed structures will not be permitted on Government property.

3.5.3 Removal to Spoil Areas on Government Property

Transport noncombustible materials removed from demolition and deconstruction structures to designated spoil areas on Government property.

3.5.4 Removal from Government Property

Transport waste materials removed from demolished and deconstructed structures, except waste soil, from Government property for legal disposal. Dispose of waste soil as directed.

3.6 REUSE OF SALVAGED ITEMS

Recondition salvaged materials and equipment designated for reuse before installation. Replace items damaged during removal and salvage operations or restore them as necessary to usable condition.

-- End of Section --

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SECTION 02 61 13

EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL
02/10, CHG 1: 02/21

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D1556/D1556M	(2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D2167	(2015) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2487	(2017; E 2020) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D5434	(2012) Field Logging of Subsurface Explorations of Soil and Rock
ASTM D6938	(2017a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926	Safety and Health Regulations for Construction
40 CFR 302	Designation, Reportable Quantities, and Notification

1.2 DESCRIPTION OF WORK

The work consists of excavation and temporary storage of contaminated material. Submit a Work Plan as specified below. This project is located within Environmental Restoration Program (ERP) TU205 (LOX Plant), Installation Restoration Program (IRP) FR0038 (OSI Facility), and ERP OW217 (PMEL Facility). Work shall comply with provisions on Section 01 57 19 Temporary Controls, The Tyndall ERP Guidelines and other Environment Documents included as attachments to the Specifications and Sheet CE101 for

each project respectively.Notify the Contracting Officer within 24 hours, and before excavation, if contaminated material is discovered that has not been previously identified or if other discrepancies between data provided and actual field conditions are discovered. Backfill material is not available onsite. Required sampling and chemical analysis shall be conducted in accordance with Section 01 57 19 Temporary Controls.

1.2.1 Scheduling

Notify the Contracting Officer 15 calendar days prior to the start of excavation of contaminated material. Contractor shall be responsible for contacting regulatory agencies in accordance with the applicable reporting requirements.

1.2.2 Work Plan

Submit a Work Plan within 15 calendar days after notice to proceed and not less than 10 days before the preconstruction meeting.. No work at the site, with the exception of site inspections and surveys, shall be performed until the Work Plan is approved. No adjustment for time or money will be made if resubmittals of the Work Plan are required due to deficiencies in the plan. At a minimum, the Work Plan shall include:

a. Schedule of activities.

b. Method of excavation and equipment to be used.

c. Shoring or side-wall slopes proposed.

d. Dewatering plan.

e. Storage methods and locations for liquid and solid contaminated material.

f. Borrow sources and haul routes.

g. Decontamination procedures.

h. Spill contingency plan.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Work Plan; G

SD-02 Shop Drawings

Surveys

SD-06 Test Reports

Compaction

Closure Report; G

1.4 REGULATORY REQUIREMENTS

1.4.1 Permits and Licenses

Obtain required federal, state, and local permits for excavation and storage of contaminated material. Permits shall be obtained at no additional cost to the Government.

1.4.2 Air Emissions

Air emissions shall be monitored and controlled in accordance with Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS.

PART 2 PRODUCTS

2.1 SPILL RESPONSE MATERIALS

Provide appropriate spill response materials including, but not limited to the following: containers, adsorbents, shovels, and personal protective equipment. Spill response materials shall be available at all times when contaminated materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of materials and contaminants being handled.

2.2 BACKFILL

Backfill material shall be obtained from offsite sources approved by the Contracting Officer. Backfill shall be classified in accordance with ASTM D2487 as GW, GP, GM, GC, SW, SP, SM, SC, and shall be free from roots and other organic matter, trash, debris, snow, ice or frozen materials. A minimum of one set of classification tests shall be performed per borrow source. Do not use material for backfill until borrow source chemical and physical test results have been submitted and approved.

PART 3 EXECUTION

3.1 SURVEYS

Perform surveys immediately prior to and after excavation of contaminated material to determine the volume of contaminated material removed. Also, perform surveys immediately after backfill of each excavation. Provide cross-sections on 25 foot intervals and at break points for all excavated areas. Locations of confirmation samples shall also be surveyed and shown on the drawings.

3.2 EXISTING STRUCTURES AND UTILITIES

No excavation shall be performed until site utilities have been field located. Take the necessary precautions to ensure no damage occurs to existing structures and utilities. Damage to existing structures and utilities resulting from the Contractor's operations shall be repaired at no additional cost to the Government. Utilities encountered that were not previously shown or otherwise located shall not be disturbed without approval from the Contracting Officer.

3.3 CLEARING

Clearing shall be performed to the limits shown on the drawings in accordance with Section 31 11 00 CLEARING AND GRUBBING.

3.4 CONTAMINATED MATERIAL REMOVAL

3.4.1 Excavation

Excavation shall be performed in a manner that will limit spills and the potential for contaminated material to be mixed with uncontaminated material. An excavation log describing visible signs of contamination encountered shall be maintained for each area of excavation. Excavation logs shall be prepared in accordance with ASTM D5434.

3.4.2 Shoring

If workers must enter the excavation, it shall be evaluated, shored, sloped or braced as required by EM 385-1-1 and 29 CFR 1926 section 650.

3.4.3 Dewatering

Surface water shall be diverted to prevent entry into the excavation. Dewatering shall be limited to that necessary to assure adequate access, a safe excavation, prevent the spread of contamination, and to ensure that compaction requirements can be met. No dewatering shall be performed without prior approval of the Contracting Officer.

3.5 CONFIRMATION SAMPLING AND ANALYSIS

The Contracting Officer shall be present to inspect the removal of contaminated material from each site. After all material suspected of being contaminated has been removed, the excavation shall be examined for evidence of contamination. xcavation of additional material shall be as directed by the Contracting Officer.

Samples shall be collected at a frequency as directed by the Contracting Officer. A minimum of one sample shall be collected from the bottom of the excavation. Based on test results, propose any additional excavation which may be required to remove material which is contaminated above action levels. Additional excavation shall be subject to approval by the Contracting Officer. Locations of samples shall be marked in the field and documented on the as-built drawings.

3.6 CONTAMINATED MATERIAL STORAGE

Material shall be placed in temporary storage after treatment while awaiting test results. The following paragraphs describe acceptable methods of material storage. Storage units shall be in good condition and constructed of materials that are compatible with the material or liquid to be stored. If multiple storage units are required, each unit shall be clearly labeled with an identification number and a written log shall be kept to track the source of contaminated material in each temporary storage unit.

3.6.1 Stockpiles

Stockpiles shall be constructed to isolate stored contaminated material from the environment. . Stockpiles shall be constructed to include:

a. A chemically resistant geomembrane liner free of holes and other damage. Non-reinforced geomembrane liners shall have a minimum thickness of 20 mils. Scrim reinforced geomembrane liners shall have a minimum weight of 40 lbs/1000 square feet. The ground surface on which the geomembrane is to be placed shall be free of rocks greater than 0.5 inches in diameter and any other object which could damage the membrane.

b. Geomembrane cover free of holes or other damage to prevent precipitation from entering the stockpile. Non-reinforced geomembrane covers shall have a minimum thickness of 10 mils. Scrim reinforced geomembrane covers shall have a minimum weight of 26 lbs/1000 square feet. The cover material shall be extended over the berms and anchored or ballasted to prevent it from being removed or damaged by wind.

c. Berms surrounding the stockpile, a minimum of 12 inches in height. Vehicle access points shall also be bermed.

d. The liner system shall be sloped to allow collection of leachate. Storage and removal of liquid which collects in the stockpile, in accordance with paragraph Liquid Storage.

3.6.2 Roll-Off Units

Roll-off units used to temporarily store contaminated material shall be water tight. A cover shall be placed over the units to prevent precipitation from contacting the stored material.

3.6.3 Liquid Storage

Liquid collected from excavations and stockpiles shall be temporarily stored in 55 gallon barrels. Liquid storage containers shall be water-tight and shall be located as indicated on the Environmental Work Plan.

3.7 SAMPLING

3.7.1 Sampling of Stored Material

Samples of stored material shall be collected at a frequency of once per 50 cubic yards.

Stored material with contaminant levels that exceed the action levels shall be treated offsite. Analyses for contaminated material to be taken to an offsite treatment facility shall conform to local, state, and federal criteria as well as to the requirements of the treatment facility. Documentation of all analyses performed shall be furnished to the Contracting Officer. Additional sampling and analyses to the extent required by the approved offsite treatment, storage or disposal (TSD) facility shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government.

3.7.2 Sampling Liquid

Liquid collected from excavations decontamination facilities shall be sampled at a frequency of once for every 100 gal of liquid collected.

Liquid with contaminant levels that exceed action levels shall be treated offsite. Analyses for contaminated liquid to be taken to an offsite

treatment facility shall conform to local, state, and federal criteria as well as to the requirements of the treatment facility. Documentation of all analyses performed shall be furnished to the Contracting Officer. Additional sampling and analysis to the extent required by the approved offsite treatment, storage or disposal (TSD) facility receiving the material shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government.

3.8 SPILLS

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), pollutant, contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), notify the Contracting Officer immediately. If the spill exceeds the reporting threshold, follow the pre-established procedures as described in the Base Wide Contingency Plan as stated in Section 01 57 19, Temporary Controls for immediate reporting and containment. Immediate containment actions shall be taken to minimize the effect of any spill or leak. Cleanup shall be in accordance with applicable federal, state, and local regulations. As directed by the Contracting Officer, additional sampling and testing shall be performed to verify spills have been cleaned up. Spill cleanup and testing shall be done at no additional cost to the Government.

3.9 BACKFILLING

3.9.1 Confirmation Test Results

Excavations shall be backfilled immediately after all contaminated materials have been removed and confirmation test results have been approved. Backfill shall be placed and compacted to the lines and grades shown on the drawings.

3.9.2 Compaction

Place approved backfill in lifts with a maximum loose thickness of 8 inches. Compact soil per Section 31 00 00 Earthwork. Determine field in-place dry density in accordance with ASTM D1556/D1556M, ASTM D2167, or ASTM D6938. If ASTM D6938 is used, a minimum of one in ten tests shall be checked using ASTM D1556/D1556M or ASTM D2167. Test results from ASTM D1556/D1556M or ASTM D2167 shall govern if there is a discrepancy with the ASTM D6938 test results.

3.10 DISPOSAL REQUIREMENTS

Offsite disposal of contaminated material shall be in accordance with Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

3.11 CLOSURE REPORT

Submit four (4) copies of a Closure Report within 14 calendar days of completing work at the site. The report shall be labeled with the contract number, project name, location, date, name of general Contractor, and the Corps of Engineers District contracting for the work. The Closure Report shall include the following information as a minimum:

a. A cover letter signed by a Professional Engineer registered in the State of Florida who is a responsible company official certifying that all services involved have been performed in accordance with the terms and conditions of the contract documents and regulatory requirements.

b. A narrative report including, but not limited to, the following:

(1) site conditions, ground water elevation, and cleanup criteria;

(2) excavation logs;

(3) field screening readings;

(4) quantity of materials removed from each area of contamination;

(5) quantity of water/product removed during dewatering;

(6) sampling locations and sampling methods;

(7) sample collection data such as time of collection and method of preservation;

(8) sample chain-of-custody forms; and

(9) source of backfill.

c. Copies of all chemical and physical test results.

d. Copies of all manifests and land disposal restriction notifications.

e. Copies of all certifications of final disposal signed by the responsible disposal facility official.

f. Waste profile sheets.

g. Scale drawings showing limits of each excavation, limits of contamination, known underground utilities within 50 feet of excavation, sample locations, and sample identification numbers. On-site stockpile, storage, treatment, loading, and disposal areas shall also be shown on the drawings.

h. Progress Photographs. Color photographs shall be used to document progress of the work. A minimum of four views of the site showing the location of the area of contamination, entrance/exit road, and any other notable site conditions shall be taken before work begins. After work has been started, activities at each work location shall be photographically recorded daily. Photographs shall be a minimum of 3 by 5 inches and shall include:

(1) Soil removal and sampling.

(2) Dewatering operations.

(3) Unanticipated events such as spills and the discovery of additional contaminated material.

(4) Contaminated material/water storage, handling, treatment, and transport.

(5) Site or task-specific employee respiratory and personal protection.

(6) Fill placement and grading.

(7) Post-construction photographs. After completion of work at each site, take a minimum of four views of each excavation site.

A digital version of all photos shown in the report shall be included with the Closure Report. Photographs shall be a minimum of 3 inches by 5 inches and shall be mounted back-to-back in double face plastic sleeves punched to fit standard three ring binders. Each print shall have an information box attached. The box shall be typewritten and arranged as follows:

Project Name:	Direction of View:
Location:	Date/Time:
Photograph No.:	Description of View:

-- End of Section --

SECTION 02 81 00

TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS
11/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

IATA DGR	(2018) Dangerous Goods Regulations

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 279	Standards for the Management of Used Oil
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

49 CFR 107	Hazardous Materials Program Procedures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Hazardous Material

A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated pursuant to the Hazardous Materials Transportation Act, 49 U.S.C. Appendix Section 1801 et seq. The term includes materials designated as hazardous materials under the provisions of 49 CFR 172, Sections .101 and .102 and materials which meet the defining criteria for hazard classes and divisions in 49 CFR 173. EPA designated hazardous wastes are also hazardous materials.

1.2.2 Hazardous Waste

A waste which meets criteria established in RCRA or specified by the EPA in 40 CFR 261 or which has been designated as hazardous by a RCRA authorized state program.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Packaging Notifications

Hazardous Waste Management Plan; G

Onsite Hazardous Waste Management; G

Notices of Non-Compliance and Notices of Violation

SD-06 Test Reports

Recordkeeping; G

Exception Report; G

Spill Response

SD-07 Certificates

Transportation and Disposal Coordinator; G

Training; G

Certification

Shipping Documents and Packagings Certification; G

Security Plan

Certificates of Disposal

Waste Minimization

1.4 QUALITY ASSURANCE

1.4.1 Transportation and Disposal Coordinator

Designate, by position and title, one person to act as the Transportation and Disposal Coordinator (TDC) for this contract. The TDC must serve as the single point of contact for all environmental regulatory matters and have overall responsibility for total environmental compliance at the site including, but not limited to, accurate identification and classification of hazardous waste and hazardous materials; determination of proper shipping names; identification of marking, labeling, packaging and placarding requirements; completion of waste profiles, hazardous waste manifests, asbestos waste shipment records, PCB manifests, bill of ladings, exception and discrepancy reports; and all other environmental documentation. The TDC must have, at a minimum, one year of specialized experience in the management and transportation of hazardous waste and have been Department of Transportation certified under 49 CFR 172, Subpart H.

1.4.2 Training

Hazardous materials employees must be trained, tested, and certified to safely and effectively carry out their assigned duties in accordance with Section 10 57 19 Temporary Controls and attachments to the Specification. Employees transporting hazardous materials or preparing hazardous materials for transportation, including samples, must be trained, tested, and certified in accordance with 49 CFR 172, Subpart H, including security awareness and any applicable security plans. Hazardous material employees must also be trained in accordance with IATA DGR when shipping hazardous materials by air. Employees must be trained, tested, and certified in accordance with 49 CFR 172, Subpart H to determine that shipments do not constitute DOT regulated hazardous materials.

1.4.3 Certification

The hazardous materials transporter must possess a current certificate of registration issued by the Research and Special Programs Administration (RSPA), U.S. Department of Transportation, when required by 49 CFR 107, Subpart G. Submit copies of the certificates or written statements certifying exemption from these requirements.

1.4.4 Laws and Regulations Requirements

Comply with Federal, state, and local laws and regulations which are

applicable. These requirements are amended frequently and compliance with amendments is required as they become effective. Notify the Contracting Officer immediately if compliance exceeds the scope of work or conflicts with specific requirements of the contract.

PART 2 PRODUCTS

2.1 MATERIALS

Provide all the materials required for the packaging, labeling, marking, placarding and transportation of hazardous wastes and hazardous materials in conformance with Department of Transportation standards in Section 01 57 19 - Temporary Controls and Attachments to the Specifications.. Details in this specification must not be construed as establishing the limits of the Contractor's responsibility.

2.1.1 Packagings

Provide containers for packaging hazardous materials/wastes consistent with the authorizations referenced in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 8. Bulk and non-bulk packaging must meet the corresponding specifications in 49 CFR 173 referenced in the Hazardous Materials Table, 49 CFR 172, Section .101. Packaging must conform to the general packaging requirements of Subpart B of 49 CFR 173, to the requirements of 49 CFR 178 at the specified packing group performance level, to the requirements of special provisions of column 7 of the Hazardous Materials Table in 49 CFR 172, Section .101, and be compatible with the material to be packaged as required by 40 CFR 262. Also provide other packaging related materials such as materials used to cushion or fill voids in overpacked containers. The hazardous materials being packaged must not react dangerously with, decompose or ignite the sorbent packaging materials. Additionally, sorbents used to treat free liquids to be disposed of in landfills must be non-biodegradable as specified in 40 CFR 264, Section .314. In addition, packaging notifications will be provided to the Government in accordance with 49 CFR 172, Section .178.2(c) regarding type and dimensions of closures, including gaskets, needed to satisfy performance test requirements.

2.1.2 Markings

Provide markings for each hazardous material/waste package, freight container, and transport vehicle consistent with the requirements of 49 CFR 172, Subpart D and 40 CFR 262, Section .32 (for hazardous waste) 40 CFR 761, and Section .45 (for PCBs). Markings must withstand a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation, without deterioration or substantial color change.

2.1.3 Labeling

Provide primary and subsidiary labels for hazardous materials/wastes consistent with the requirements in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 6. Labels must meet design specifications required by 49 CFR 172, Subpart E including size, shape, color, printing, and symbol requirements. Labels must be durable weather resistant and withstanding a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation, without deterioration or substantial color change.

2.1.4 Placards

For each offsite shipment of hazardous material/waste, provide primary and subsidiary placards consistent with the requirements of 49 CFR 172, Subpart F. Provide placards for each side and each end of bulk packaging, freight containers, transport vehicles, and rail cars requiring such placarding. Placards may be plastic, metal, or other material capable of withstanding, without deterioration, a 30 day exposure to open weather conditions and must meet design requirements specified in 49 CFR 172, Subpart F.

2.1.5 Spill Response Materials

Provide spill response materials including, but not limited to, containers, adsorbent, shovels, and personal protective equipment. Spill response materials must be available at all times when hazardous materials/wastes are being handled or transported. Spill response materials must be compatible with the type of material being handled.

2.2 EQUIPMENT AND TOOLS

Provide miscellaneous equipment and tools necessary to handle hazardous materials and hazardous wastes in a safe and environmentally sound manner.

PART 3 EXECUTION

3.1 HAZARDOUS WASTE MANAGEMENT PLAN

Prepare a Hazardous Waste Management Plan detailing the manner in which hazardous wastes will be managed and describing the types and volumes of hazardous wastes anticipated to be managed. The plan must address both onsite and offsite hazardous waste management. Describe the methods to be used to ensure accurate piece counts or weights of shipments; describe waste minimization methods; identify and describe facilities to be used for treatment, storage, and disposal (TSD); identify areas onsite where hazardous wastes are to be handled; and identify whether transfer facilities are to be used; and if so, how the wastes will be tracked to ultimate disposal. Submit the plan to the Contracting Officer for approval prior to start of work. Submit written documentation of weekly hazardous waste inspections on a monthly basis.

3.2 ONSITE HAZARDOUS WASTE MANAGEMENT

Coordinate the onsite management of all hazardous materials and waste with the installation environmental function and the Contracting Officer. These paragraphs apply to Government owned waste only. The Contractor is responsible for ensuring compliance with Federal, state, and local hazardous waste laws and regulations and verifying those requirements when preparing reports, waste shipment records, hazardous waste manifests, or other documents. Identify hazardous wastes using criteria set forth in 40 CFR 261 or applicable state and local laws, regulations, and ordinances. Comply with generator requirements in applicable state or local law or regulations when accumulating hazardous waste onsite. Onsite accumulation times must be restricted to applicable time frames referenced in applicable state or local law or regulation. Accumulation start dates commence when waste container is transferred into a 90 day accumulation site or permitted storage facility. Only use containers in good condition and compatible with the waste to be stored. Ensure containers are closed except when adding or removing waste, and immediately mark all hazardous waste containers with the words "hazardous waste" and other information

required by applicable state or local law or regulation as soon as the waste is containerized. An additional marking must be placed on containers of "unknowns" designating the date sampled, and the suspected hazard. Inspect containers for signs of deterioration and for responding to any spills or leaks. Inspect all hazardous waste areas weekly and provide written documentation of the inspection. Include date and time of inspection, name of individual conducting the inspection, problems noted, and corrective actions taken on the inspection logs.

3.2.1 Hazardous Waste Classification

Identify, in consultation with the Contracting Officerall waste codes applicable to each hazardous waste stream based on requirements in 40 CFR 261 or applicable state or local law or regulation. Also identify applicable treatment standards in 40 CFR 268 and state land disposal restrictions and make a determination as to whether or not the waste meets or exceeds the standards. Submit waste profiles, analyses, classification and treatment standards information to Contracting Officer for review and approval.

3.3 OFFSITE HAZARDOUS WASTE MANAGEMENT

Coordinate the off site transfer of all hazardous materials and waste with the installation environmental function and the Contracting Officer. Use RCRA Subtitle C permitted facilities which meet the requirements of 40 CFR 264 or facilities operating under interim status which meet the requirements of 40 CFR 265. Do not use offsite treatment, storage, and disposal facilities with significant RCRA violations or compliance problems (such as facilities known to be releasing hazardous constituents into ground water, surface water, soil, or air). Submit Notices of Non-Compliance and Notices of Violation by a Federal, state, or local regulatory agency issued to the Contractor in relation to any work performed under this contract. Immediately provide copies of such notices to the Contracting Officer. Also furnish relevant documents regarding the incident and any information requested by the Contracting Officer, and coordinate its response to the notice with the Contracting Officer or the designated representative prior to submission to the notifying authority. Also furnish a copy to the Contracting Officer of all documents submitted to the regulatory authority, including the final reply to the notice, and all other materials, until the matter is resolved.

3.3.1 Treatment, Storage, and Disposal Facility and Transporter

Provide the Contracting Officer with EPA ID numbers, names, locations, and telephone numbers of TSD facilities and transporters. This information must be contained in the Hazardous Waste Management Plan and be approved by the Contracting Officer prior to waste disposal.

3.3.2 Facility Status Information

Facilities receiving hazardous waste must be permitted in accordance with 40 CFR 270 or operating under interim status in accordance with 40 CFR 265 requirements, or permitted by a state authorized by the Environmental Protection Agency to administer the RCRA permit program. Additionally, prior to using a TSD Facility, contact the EPA Regional Offsite Coordinator specified in 40 CFR 300, Section .440, to determine the facility's status, and document all information necessary to satisfy the requirements of the EPA Offsite policy and submit this information to the Contracting Officer in the Hazardous Waste Management Plan.

3.3.3 Shipping Documents and Packagings Certification

Prior to shipment of any hazardous material offsite and a minimum of 14 days prior to anticipated pickup, provide for review written certification to the Contracting Officer that hazardous materials have been properly packaged, labeled, and marked in accordance with Department of Transportation and EPA requirements. Furnish designated disposal facility packaging assurances not later than 35 days after acceptance of the shipment. The Contractor's TDC must also provide written certification regarding waste minimization efforts documenting that efforts have been taken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.3.4 Transportation

Prior to conducting hazardous materials activities, the Contractor responsible for pre-transportation activities must either certify to the Government that a Security Plan is in place which meets the requirements of 49 CFR 172, Subpart I or in the event that the types or amounts of hazardous materials are excluded from the security planning requirements, a written statement to that effect detailing the basis for the exception. Use manifests for transporting hazardous wastes as required by 40 CFR 263 or applicable state or local law or regulation. Transportation must comply with all requirements in the Department of Transportation referenced regulations in the 49 CFR series. Prepare hazardous waste manifests for each shipment of hazardous waste shipped offsite. Complete manifests using instructions in 40 CFR 262, Subpart B and applicable state or local law or regulation. Submit manifests and waste profiles to Contracting Officer for review and approval. Prepare land disposal restriction notifications as required by 40 CFR 268 or applicable state or local law or regulation for each shipment of hazardous waste. Submit notifications with the manifest to the Contracting Officer for review and approval.

3.3.5 Treatment and Disposal of Hazardous Wastes

Coordinate any off site shipments of hazardous materials or hazardous wastes with the installation environmental function. Initial, or satellite hazardous waste accumulation is limited to 55 gallons (or 1 quart of acutely hazardous waste). Once a waste stream exceeds 55 gallons, it must be transferred to an on-site 90 day (180 day small quantity generator) accumulation area, or a permitted hazardous waste treatment, storage or disposal facility within three days. Ship hazardous wastes only to facilities which are properly permitted to accept the hazardous waste or operating under interim status. Ensure wastes are treated to meet land disposal treatment standards in 40 CFR 268 prior to land disposal. Propose TSD facilities via submission of the Hazardous Waste Management Plan, subject to the approval of the Contracting Officer. Submit Certificates of Disposal documenting the ultimate disposal, destruction or placement of hazardous wastes, polychlorinated biphenyls (PCBs), within 30 days of initial shipment. Receipt of these certificates will be required for final payment.

3.4 RADIOACTIVE MATERIALS MANAGEMENT

Consult with the Contracting Officer, to evaluate, prior to shipment of any material offsite, whether the material is regulated as a hazardous waste in addition to being regulated as a radioactive material. Perform the

evaluation to determine proper shipping descriptions, marking requirements, and other criteria, as described below.

3.4.1 Identification of Proper Shipping Names

Use 49 CFR 172, Section .101 to identify proper shipping names for each hazardous material (including hazardous wastes) to be shipped offsite. Submit proper shipping names to the Contracting Officer in the form of draft shipping documents for review and approval.

3.4.2 Packaging, Labeling, and Marking

Package, label, and mark hazardous materials/wastes using the specified materials and in accordance with the referenced authorizations. Mark each container of hazardous waste of 110 gallons or less with the following:

"HAZARDOUS WASTE - Federal Law Prohibits Improper Disposal.
If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.
Generator's name _____
Manifest Document Number _____".

3.4.3 Shipping Documents

Ensure that each shipment of hazardous material sent offsite is accompanied by properly completed shipping documents. This includes shipments of samples that may potentially meet the definition of a Department of Transportation regulated hazardous material.

3.4.3.1 PCB Waste Shipment Documents

Prepare hazardous waste manifests for each shipment of PCB waste shipped offsite. Complete manifests using instructions in 40 CFR 761, Sections .207 and .208 and other applicable requirements. Submit documents to Contracting Officer for review and approval.

3.4.3.2 Other Hazardous Material Shipment Documents

Prepare a bill of lading for each shipment of hazardous material which is not accompanied by a hazardous waste manifest or asbestos waste shipment record which fulfills the shipping paper requirements. The bill of lading must satisfy the requirements of 49 CFR 172, Subpart C, and 40 CFR 279 if shipping used oil and applicable state or local law or regulation, and must be submitted to the Contracting Officer for review and approval. For laboratory samples and treatability study samples, prepare bills of lading and other documentation as necessary to satisfy conditions of the sample exclusions in 40 CFR 261, Section .4(d) and (e) and any applicable state or local law or regulation. Bill of ladings requiring shipper's certifications must be signed by the GovernmentContractor.

3.5 WASTE MINIMIZATION

Minimize the generation of hazardous waste to the maximum extent practicable and take all necessary precautions to avoid mixing clean and contaminated wastes. Identify and evaluate recycling and reclamation options as alternatives to land disposal. Requirements of 40 CFR 266 apply to: hazardous wastes recycled in a manner constituting disposal; hazardous waste burned for energy recovery; lead-acid battery recycling; and hazardous wastes with economically recoverable precious metals. Submit

written certification that waste minimization efforts have been undertaken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.6 RECORDKEEPING

Maintain adequate records to support information provided to the Contracting Officer regarding exception reports, annual reports, and biennial reports; maintain asbestos waste shipment records for a minimum of 3 years from the date of shipment or any longer period required by applicable law or regulation or other provision of this contract; and maintain bill of ladings for a minimum of 375 days from the date of shipment or longer period required by applicable law or regulation or other provision of this contract. Submit information necessary to file state annual or EPA biennial reports for hazardous waste transported, treated, stored, or disposed of under this contract. Do not forward these data directly to the regulatory agency but to the Contracting Officer at the specified time. Submit the information necessary for filing of the formal reports in the form and format required by the governing Federal or state regulatory agency. A cover letter must accompany the data to include the contract number, Contractor name, and project location. In the events that a manifest copy documenting receipt of hazardous waste at the treatment storage and disposal facility is not received within 35 days of shipment initiation, or that a manifest copy documenting receipt of PCB waste at the designated facility is not received within 35 days of shipment initiation, prepare and submit an exception report to the Contracting Officer within 37 days of shipment initiation.

3.7 SPILL RESPONSE

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), or pollutant or contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), notify the Contracting Officer immediately. Direction from the Contracting Officer concerning a spill or release is not considered a change under the contract. If the spill exceeds a reporting threshold, follow the pre-established procedures for immediate reporting to the Contracting Officer. Comply with applicable requirements of Federal, state, or local laws or regulations regarding any spill incident.

3.8 EMERGENCY CONTACTS

Comply with the emergency contact provisions in 49 CFR 172, Section .604. Whenever the Contractor ships hazardous materials, provide a 24 hr emergency response contact and phone number of a person knowledgeable about the hazardous materials being shipped and who has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information. Monitor the phone on a 24 hour basis at all times when the hazardous materials are in transportation, including during storage incidental to transportation. Ensure that information regarding this emergency contact and phone number are placed on all hazardous material shipping documents. Designate an emergency coordinator and post the following information at areas in which hazardous wastes are managed:

a. The name of the emergency coordinator.

b. Phone number through which the emergency coordinator can be contacted

on a 24 hour basis.

c. The telephone number of the local fire department.

d. The location of fire extinguishers and spill control materials.

Attachment A SAMPLE OFF-SITE POLICY CERTIFICATION MEMO	
Project/Contract #:	
Waste Stream:	
Primary TSD Facility, EPA ID #	
Alter. TSD Facility, EPA ID # and	
EPA Region	Contact
I	888-372-7341
II	212-673-4040
III	800-438-2474 or 215-814-5000
IV	800-241-1754 or 404-562-9900
V	312-353-2000
VI	800-887-6063 or 214-665-2210
VII	800-223-0425
VIII	800-424-8802
IX	415-947-8713
X	800-424-4372 or 206-553-4973
EPA representative contacted:	
EPA representative phone number:	
Date contacted:	
Comment:	
The above EPA representative was contacted on _____. As of that date the above sites were considered acceptable in accordance with the Off-Site	
Date:	Signature:
Phone number:	

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE
02/19

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 121R	(2008) Guide for Concrete Construction Quality Systems in Conformance with ISO 9001
ACI 301	(2016) Specifications for Structural Concrete
ACI 302.1R	(2015) Guide for Concrete Floor and Slab Construction
ACI 304.2R	(2017) Guide to Placing Concrete by Pumping Methods
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	(2010) Guide to Hot Weather Concreting
ACI 306R	(2016) Guide to Cold Weather Concreting
ACI 308.1	(2011) Specification for Curing Concrete
ACI SP-15	(2011) Field Reference Manual: Standard Specifications for Structural Concrete ACI 301-05 with Selected ACI References
ACI SP-2	(2007; Abstract: 10th Edition) ACI Manual of Concrete Inspection

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995; R 2004) Basic Hardboard

ASTM INTERNATIONAL (ASTM)

ASTM A1064/A1064M	(2017) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

ASTM A615/A615M	(2020) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A934/A934M	(2016) Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A996/A996M	(2016) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ASTM C1017/C1017M	(2013; E 2015) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1074	(2011) Standard Practice for Estimating Concrete Strength by the Maturity Method
ASTM C1077	(2017) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1107/C1107M	(2017) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1240	(2020) Standard Specification for Silica Fume Used in Cementitious Mixtures
ASTM C1260	(2014) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1293	(2008; R 2015) Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
ASTM C138/C138M	(2017a) Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2020) Standard Specification for Portland Cement
ASTM C1567	(2013) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602/C1602M	(2018) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM C172/C172M	(2017) Standard Practice for Sampling

	Freshly Mixed Concrete
ASTM C173/C173M	(2016) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C1778	(2016) Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete
ASTM C231/C231M	(2017a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C31/C31M	(2019a) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C311/C311M	(2017) Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C33/C33M	(2018) Standard Specification for Concrete Aggregates
ASTM C330/C330M	(2017a) Standard Specification for Lightweight Aggregates for Structural Concrete
ASTM C39/C39M	(2018) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C42/C42M	(2020) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C494/C494M	(2019) Standard Specification for Chemical Admixtures for Concrete
ASTM C567/C567M	(2014) Determining Density of Structural Lightweight Concrete
ASTM C618	(2019) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C78/C78M	(2018) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C803/C803M	(2003; R 2010) Penetration Resistance of Hardened Concrete
ASTM C873/C873M	(2015) Standard Test Method for Compressive Strength of Concrete Cylinders Cast in Place in Cylindrical Molds

ASTM C900	(2015) Standard Test Method for Pullout Strength of Hardened Concrete
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM C94/C94M	(2020) Standard Specification for Ready-Mixed Concrete
ASTM C989/C989M	(2018a) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM D1751	(2004; E 2013; R 2013) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2018) Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D2628	(1991; R 2016) Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D2835	(1989; R 2017) Standard Specification for Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
ASTM D5759	(2012) Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses
ASTM D6690	(2015) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM E1155	(2014) Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers
ASTM E1643	(2018a) Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
ASTM E1745	(2017) Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
ASTM E329	(2020) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2009; 28th Ed; Errata) Manual of Standard Practice
CRSI RB4.1	(2016) Supports for Reinforcement Used in Concrete

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 1	(2009) DOC Voluntary Product Standard PS 1-07, Structural Plywood

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED NC	(2009) Leadership in Energy and Environmental Design(tm) New Construction Rating System

1.2 DEFINITIONS

a. "Cementitious material" as used herein must include all portland cement, pozzolan, fly ash, slag cement, and .

b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.

c. "Chemical admixtures" are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.

d. "Supplementary cementing materials" (SCM) include coal fly ash, slag cement, natural or calcined pozzolans, and ultra-fine coal ash when used in such proportions to replace the portland cement that result in improvement to sustainability and durability and reduced cost.

e. "Design strength" (f'c) is the specified compressive strength of concrete at time(s) specified in this section to meet structural design criteria.

f. "Mass Concrete" is any concrete system that approaches a maximum temperature of 158 degrees F within the first 72 hours of placement. In addition, it includes all concrete elements with a section thickness of 3 feet or more regardless of temperature.

g. "Mixture proportioning" is the process of designing concrete mixture proportions to enable it to meet the strength, service life and constructability requirements of the project while minimizing the initial and life-cycle cost.

h. "Mixture proportions" are the masses or volumes of individual ingredients used to make a unit measure (cubic meter or cubic yard) of concrete.

i. "Pozzolan" is a siliceous or siliceous and aluminous material, which in itself possesses little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with

calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

j. "Workability (or consistence)" is the ability of a fresh (plastic) concrete mix to fill the form/mould properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and size distribution), cementitious content and age (level of hydration).

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval.Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Concrete Curing Plan

Quality Control Plan; G

Quality Control Personnel Certifications; G

Quality Control Organizational Chart

Laboratory Accreditation; G

Maturity Method Data

SD-02 Shop Drawings

Reinforcing Steel; G

SD-03 Product Data

Joint Sealants; (LEED NC)

Joint Filler; (LEED NC)

Formwork Materials

Recycled Aggregate Materials; (LEED NC)

Cementitious Materials; (LEED NC)

Vapor Barrier System

Concrete Curing Materials

Reinforcement; (LEED NC)

Liquid Chemical Floor Hardeners and Sealers

Admixtures

Nonshrink Grout

SD-05 Design Data

Concrete Mix Design; G

SD-06 Test Reports

Concrete Mix Design; G

Fly Ash

Pozzolan

Slag Cement

Aggregates

Compressive Strength Tests; G

Chloride Ion Concentration

Air Content

Slump Tests

Water

SD-07 Certificates

Reinforcing Bars

Field Testing Technician and Testing Agency

SD-08 Manufacturer's Instructions

Curing Compound

1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

Follow ACI 301, ACI 304R and ASTM A934/A934M requirements and recommendations. Do not deliver concrete until vapor barrier system, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. Do not store concrete curing compounds or sealers with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions, including . Do not store concrete curing compounds or sealers in occupied spaces.

1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

1.6 QUALITY ASSURANCE

1.6.1 Design Data

1.6.1.1 Concrete Mix Design

Sixty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, supplementary cementitious materials, , and admixtures; and applicable reference specifications. Submit mill test and all other test for cement, supplementary cementitious materials, aggregates, and admixtures. Provide documentation of maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Provide mix proportion data using at least three different water-cementitious material ratios for each type of mixture, which produce a range of strength encompassing those required for each type of concrete required. If source material changes, resubmit mix proportion data using revised source material. Provide only materials that have been proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. Indicate clearly in the submittal where each mix design is used when more than one mix design is submitted. Resubmit data on concrete components if the qualities or source of components changes. For previously approved concrete mix designs used within the past twelve months, the previous mix design may be re-submitted without further trial batch testing if accompanied by material test data conducted within the last six months. Obtain mix design approval from the contracting officer prior to concrete placement.

1.6.2 Shop Drawings

1.6.2.1 Reinforcing Steel

Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars. Reproductions of contract drawings are unacceptable.

1.6.3 Control Submittals

1.6.3.1 Concrete Curing Plan

Submit proposed materials, methods and duration for curing concrete elements in accordance with ACI 308.1.

1.6.3.2 Safety Data Sheets

Submit Safety Data Sheets (SDS) for all materials that are regulated for hazardous health effects. SDS must be readily accessible during each work shift to employees when they are at the construction site.

1.6.4 Test Reports

1.6.4.1 Fly Ash and Pozzolan

Submit test results in accordance with ASTM C618 for fly ash and pozzolan. Submit test results performed within 6 months of submittal date.

1.6.4.2 Slag Cement

Submit test results in accordance with ASTM C989/C989M for slag cement. Submit test results performed within 6 months of submittal date.

1.6.5 Quality Control Plan

Develop and submit for approval a concrete quality control program in accordance with the guidelines of ACI 121R and as specified herein. The plan must include approved laboratories. Provide direct oversight for the concrete qualification program inclusive of associated sampling and testing. All quality control reports must be provided to the Contracting Officer, Quality Manager and Concrete Supplier. Maintain a copy of ACI SP-15 and CRSI 10MSP at project site.

1.6.6 Quality Control Personnel Certifications

The Contractor must submit for approval the responsibilities of the various quality control personnel, including the names and qualifications of the individuals in those positions and a quality control organizational chart defining the quality control hierarchy and the responsibility of the various positions. Quality control personnel must be employed by the Contractor.

Submit American Concrete Institute certification for the following:

a. CQC personnel responsible for inspection of concrete operations.

b. Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews.

c. Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.

1.6.6.1 Quality Manager Qualifications

The quality manager must hold a current license as a professional engineer in a U.S. state or territory with experience on at least five similar projects. Evidence of extraordinary proven experience may be considered by the Contracting Officer as sufficient to act as the Quality Manager.

1.6.6.2 Field Testing Technician and Testing Agency

Submit data on qualifications of proposed testing agency and technicians for approval by the Contracting Officer prior to performing testing on concrete.

a. Work on concrete under this contract must be performed by an ACI Concrete Field Testing Technician Grade 1 qualified in accordance with ACI SP-2 or equivalent. Equivalent certification programs must include requirements for written and performance examinations as stipulated in ACI SP-2.

b. Testing agencies that perform testing services on reinforcing steel must meet the requirements of ASTM E329.

c. Testing agencies that perform testing services on concrete materials must meet the requirements of ASTM C1077.

1.6.7 Laboratory Qualifications for Concrete Qualification Testing

The concrete testing laboratory must have the necessary equipment and experience to accomplish required testing. The laboratory must meet the requirements of ASTM C1077 and be Cement and Concrete Reference Laboratory (CCRL) inspected.

1.6.8 Laboratory Accreditation

Laboratory and testing facilities must be provided by and at the expense of the Contractor. The laboratories performing the tests must be accredited in accordance with ASTM C1077, including ASTM C78/C78M and ASTM C1260. The accreditation must be current and must include the required test methods, as specified. Furthermore, the testing must comply with the following requirements:

a. Aggregate Testing and Mix Proportioning: Aggregate testing and mixture proportioning studies must be performed by an accredited laboratory and under the direction of a who is competent in concrete materials and must sign all reports and designs.

b. Acceptance Testing: Furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Furnish and maintain boxes or other facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by ASTM C31/C31M.

c. Contractor Quality Control: All sampling and testing must be performed by an approved, onsite, independent, accredited laboratory.

1.7 ENVIRONMENTAL REQUIREMENTS

Provide space ventilation according to material manufacturer recommendations, at a minimum, during and following installation of concrete curing compound and sealer. Maintain one of the following ventilation conditions during the curing period or for 72 hours after installation:

a. Supply 100 percent outside air 24 hours a day.

b. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 55 degrees F and 84 degrees F and humidity is between 30 percent and 60 percent.

c. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

1.7.1 Submittals for Environmental Performance

a. Provide data indication the percentage of post-industrial pozzolan (fly ash, slag cement) cement substitution as a percentage of the full product composite by weight.

b. Provide data indicating the percentage of post-industrial and post-consumer recycled content aggregate.

c. Provide product data indicating the percentage of post-consumer

recycled steel content in each type of steel reinforcement as a percentage of the full product composite by weight.

d. Provide product data stating the location where all products were manufactured

f. For projects using reusable formwork, provide data showing how formwork is reused.

g. Provide SDS product information data showing that form release agents meet any environmental performance goals such as using vegetable and soy based products.

h. Provide SDS product information data showing that concrete adhesives meet any environmental performance goals including low emitting, low volatile organic compound products.

1.8 SUSTAINABLE DESIGN REQUIREMENTS

1.8.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources.

PART 2 PRODUCTS

2.1 FORMWORK MATERIALS

a. Form-facing material in contact with concrete must be lumber, plywood, tempered concrete-form-grade hardboard, metal, plastic, or . Submit product information on proposed form-facing materials if different from that specified herein.

b. Design formwork to withstand pressure resulting from placement and vibration of concrete and to maintain specified tolerances.

c. Limit deflection of facing materials for concrete surfaces exposed to view to 1/400 of center-to-center spacing of facing supports.

2.1.1 Wood Forms

Use lumber as specified in Section 06 10 00 ROUGH CARPENTRY and as follows. Provide lumber that is square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Provide plywood that complies with NIST PS 1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining.

2.1.1.1 Concrete Form Plywood (Standard Rough)

Provide plywood that conforms to NIST PS 1, B-B, concrete form, not less than 5/8-inch thick.

2.1.1.2 Overlaid Concrete Form Plywood (Standard Smooth)

Provide plywood that conforms to NIST PS 1, B-B, high density form overlay, not less than 5/8-inch thick.

2.1.2 Steel Forms

Provide steel form surfaces that do not contain irregularities, dents, or sags.

2.2 FORMWORK ACCESSORIES

a. Use commercially manufactured formwork accessories, including ties and hangers.

b. Form ties and accessories must not reduce the effective cover of the reinforcement.

2.2.1 Form Ties

a. Use form ties with ends or end fasteners that can be removed without damage to concrete.

b. The breakback distance for ferrous ties must be at least 2 in. for Surface Finish-2.0 or Surface Finish-3.0, as defined in ACI 301.

2.2.2 Biodegradable Form Release Agent

a. Provide product that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

b. Provide form release agent that reduces formwork moisture absorption, and does not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene. Submit documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

c. Submit manufacturer's product data on formwork release agent for use on each form-facing material.

2.2.3 Chamfer Materials

Use lumber materials with dimensions of 3/4 x 3/4 in.

2.3 CONCRETE MATERIALS

2.3.1 Cementitious Materials

2.3.1.1 Portland Cement

a. Unless otherwise specified, provide cement that conforms to ASTM C150/C150M Type I II II(MH) III IV V

b. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

c. Submit information along with evidence demonstrating compliance with referenced standards. Submittals must include types of cementitious materials, manufacturing locations, shipping locations, and certificates showing compliance.

d. Cementitious materials must be stored and kept dry and free from

contaminants.

2.3.1.2 Fly Ash

a. ASTM C618, Class F , except that the maximum allowable loss on ignition must not exceed 3 percent.

b. Fly ash content must be a minimum of 15 percent by weight of cementitious material, provided the fly ash does not reduce the amount of cement in the concrete mix below the minimum requirements of local building codes. Where the use of fly ash cannot meet the minimum level, provide the maximum amount of fly ash permittable that meets the code requirements for cement content. Report the chemical analysis of the fly ash in accordance with ASTM C311/C311M. Evaluate and classify fly ash in accordance with ASTM D5759.

2.3.1.3 Slag cement

ASTM C989/C989M, Grade 100 120. Slag content must be a minimum of 25 percent by weight of cementitious material.

2.3.1.4 Silica Fume

Silica fume must conform to ASTM C1240, including the optional limits on reactivity with cement alkalis. Silica fume may be furnished as a dry, densified material or as slurry. Proper mixing is essential to accomplish proper distribution of the silica fume and avoid agglomerated silica fume which can react with the alkali in the cement resulting in premature and extensive concrete damage. Supervision at the batch plant, finishing, and curing is essential. Provide at the Contractor's expense the services of a manufacturer's technical representative, experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume. This representative must be present on the project prior to and during at least the first 4 days of concrete production and placement using silica fume. A High Range Water Reducing admixture (HRWRA) must be used with silica fume.

2.3.1.5 Other Supplementary Cementitious Materials

Natural pozzolan must be raw or calcined and conform to ASTM C618, Class N, including the optional requirements for uniformity and effectiveness in controlling ASR and must have an ignition loss not exceeding 3 percent. Class N pozzolan for use in mitigating ASR must have a Calcium Oxide (CaO) content of less than 13 percent and total equivalent alkali content less than 3 percent.

Ultra Fine Fly Ash (UFFA) and Ultra Fine Pozzolan (UFP) must conform to ASTM C618, Class F or N, and the following additional requirements:

a. The strength activity index at 28 days of age must be at least 95 percent of the control specimens.

b. The average particle size must not exceed 6 microns.

c. The sum of $SiO_2 + Al_2O_3 + Fe_2O_3$ must be greater than 77 percent.

2.3.2 Water

a. Water or ice must comply with the requirements of ASTM C1602/C1602M.

b. Minimize the amount of water in the mix. Improve workability by adjusting the grading of the aggregate and using admixture rather than by adding water.

c. Water must be potable ; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

d. Protect mixing water and ice from contamination during storage and delivery.

e. Submit test report showing water complies with ASTM C1602/C1602M.

2.3.3 Aggregate

2.3.3.1 Normal-Weight Aggregate

a. Aggregates must conform to ASTM C33/C33M .

b. Aggregates used in concrete must be obtained from the same sources and have the same size range as aggregates used in concrete represented by submitted field test records or used in trial mixtures.

c. Store and handle aggregate in a manner that will avoid segregation and prevents contamination by other materials or other sizes of aggregates. Store aggregates in locations that will permit them to drain freely. Do not use aggregates that contain frozen lumps.

d. Submit types, pit or quarry locations, producers' names, aggregate supplier statement of compliance with ASTM C33/C33M, and ASTM C1293 expansion data not more than 18 months old.

2.3.3.2 Lightweight Aggregate

Lightweight aggregate in accordance with ASTM C330/C330M.

2.3.4 Admixtures

a. Chemical admixtures must conform to ASTM C494/C494M.

b. Air-entraining admixtures must conform to ASTM C260/C260M.

c. Chemical admixtures for use in producing flowing concrete must conform to ASTM C1017/C1017M.

d. Do not use calcium chloride admixtures

f. Admixtures used in concrete must be the same as those used in the concrete represented by submitted field test records or used in trial mixtures.

g. Protect stored admixtures against contamination, evaporation, or damage.

h. To ensure uniform distribution of constituents, provide agitating equipment for admixtures used in the form of suspensions or unstable solutions. Protect liquid admixtures from freezing and from temperature changes that would adversely affect their characteristics.

i. Submit types, brand names, producers' names, manufacturer's technical data sheets, and certificates showing compliance with standards required herein.

2.4 MISCELLANEOUS MATERIALS

2.4.1 Concrete Curing Materials

Provide concrete curing material in accordance with ACI 301 Section 5 and ACI 308.1 Section 2. Submit product data for concrete curing compounds. Submit manufactures instructions for placement of curing compound.

2.4.2 Nonshrink Grout

Nonshrink grout in accordance with ASTM C1107/C1107M.

2.4.3 Floor Finish Materials

2.4.3.1 Liquid Chemical Floor Hardeners and Sealers

a. Hardener must be a colorless aqueous solution containing a blend of inorganic silicate or siliconate material and proprietary components combined with a wetting agent; that penetrates, hardens, and densifies concrete surfaces. Submit manufactures instructions for placement of liquid chemical floor hardener.

b. Use concrete penetrating sealers with a low (maximum 100 grams/liter, less water and less exempt compounds) VOC content. Submit manufactures instructions for placement of sealers.

2.4.4 Expansion/Contraction Joint Filler

ASTM D1751 or ASTM D1752 Type I or Type II. Material must be 1/2 inch thick, unless otherwise indicated.

2.4.5 Joint Sealants

Submit manufacturer's product data, indicating VOC content.

2.4.5.1 Horizontal Surfaces, 3 Percent Slope, Maximum

ASTM D6690 or ASTM C920, Type M, Class 25, Use T.

2.4.5.2 Vertical Surfaces Greater Than 3 Percent Slope

ASTM C920, Type M, Grade NS, Class 25, Use T ..

2.4.5.3 Preformed Polychloroprene Elastomeric Type

ASTM D2628.

2.4.5.4 Lubricant for Preformed Compression Seals

ASTM D2835.

2.4.6 Vapor Intrusion Barrier System

ASTM E1745 Class A polyethylene sheeting, minimum 20 mil thickness. Provide the Drago Wrap system by Stego Industries, LLC or approved

equivalent system.

Consider plastic vapor barriers and adhesives with a high recycled content, low toxicity low VOC (Volatile Organic Compounds) levels.

2.5 CONCRETE MIX DESIGN

2.5.1 Properties and Requirements

a. Use materials and material combinations listed in this section and the contract documents.

b. Cementitious material content must be adequate for concrete to satisfy the specified requirements for strength, w/cm, durability, and finishability described in this section and the contract documents.

c. Selected target slump must meet the requirements this section, the contract documents, and must not exceed 9 in. Concrete must not show visible signs of segregation.

d. The target slump must be enforced for the duration of the project. Determine the slump by ASTM C143/C143M. Slump tolerances must meet the requirements of ACI 117.

e. The nominal maximum size of coarse aggregate for a mixture must not exceed three-fourths of the minimum clear spacing between reinforcement, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

f. Concrete must be air entrained for members assigned to Exposure Class F1, F2, or F3. The total air content must be in accordance with the requirements of the paragraph titled DURABILITY.

g. Measure air content at the point of delivery in accordance with ASTM C173/C173M or ASTM C231/C231M.

h. Concrete for slabs to receive a hard-troweled finish must not contain an air-entraining admixture or have a total air content greater than 3 percent.

i. Concrete properties and requirements for each portion of the structure are specified in the contract drawings.

2.5.2 Durability

2.5.2.1 Alkali-Aggregate Reaction

Do not use any aggregate susceptible to alkali-carbonate reaction (ACR). Use one of the three options below for qualifying concrete mixtures to reduce the potential of alkali-silica reaction (ASR):

a. For each aggregate used in concrete, the expansion result determined in accordance with ASTM C1293 must not exceed 0.04 percent at one year.

b. For each aggregate used in concrete, the expansion result of the aggregate and cementitious materials combination determined in accordance with ASTM C1567 must not exceed 0.10 percent at an age of 16 days.

c. Alkali content in concrete (LBA) must not exceed 4 pounds per cubic yard for moderately reactive aggregate or 3 pounds per cubic yard for highly reactive aggregate. Reactivity must be determined by testing in accordance with ASTM C1293 and categorized in accordance with ASTM C1778. Alkali content is calculated as follows:
LBA = (cement content, pounds per cubic yard) × (equivalent alkali content of portland cement in percent/100 percent)

2.5.2.2 Concrete Temperature

The temperature of concrete as delivered must not exceed 95°F .

2.5.3 Ready-Mix Concrete

Provide concrete that meets the requirements of ASTM C94/C94M.

Ready-mixed concrete manufacturer must provide duplicate delivery tickets with each load of concrete delivered. Provide delivery tickets with the following information in addition to that required by ASTM C94/C94M:

a. Type and brand cement

b. Cement and supplementary cementitious materials content in 94-pound bags per cubic yard of concrete

c. Maximum size of aggregate

d. Amount and brand name of admixtures

e. Total water content expressed by water cementitious material ratio

2.6 REINFORCEMENT

a. Bend reinforcement cold. Fabricate reinforcement in accordance with fabricating tolerances of ACI 117.

b. When handling and storing coated reinforcement, use equipment and methods that do not damage the coating. If stored outdoors for more than 2 months, cover coated reinforcement with opaque protective material.

c. Submit manufacturer's certified test report for reinforcement.

d. Submit placing drawings showing fabrication dimensions and placement locations of reinforcement and reinforcement supports. Placing drawings must indicate locations of splices, lengths of lap splices, and details of mechanical and welded splices.

e. Submit request with locations and details of splices not indicated in Contract Documents.

f. Submit request to place column dowels without using templates.

g. Submit request and procedure to field-bend or straighten reinforcing bars partially embedded in concrete at locations not indicated in Contract Documents. Field bending or straightening of reinforcing bars is permitted where indicated in the Contract Documents

h. Submit request for field cutting, including location and type of bar to

be cut and reason field cutting is required.

2.6.1 Reinforcing Bars

a. Reinforcing bars must be deformed, except spirals, load-transfer dowels, and welded wire reinforcement, which may be plain.

b. ASTM A615/A615M with the bars marked A, Grade 60 ; or ASTM A996/A996M with the bars marked R, Grade 60, or marked A, Grade 60.

c. Submit mill certificates for reinforcing bars.

2.6.2 Welded wire reinforcement

a. Use welded wire reinforcement specified in Contract Documents and conforming to one or more of the specifications given herein.

b. Plain welded wire reinforcement must conform to ASTM A1064/A1064M, with welded intersections spaced no greater than 12 in. apart in direction of principal reinforcement.

c. Deformed welded wire reinforcement must conform to ASTM A1064/A1064M, with welded intersections spaced no greater than 12 in. apart in direction of principal reinforcement.

2.6.3 Reinforcing Bar Supports

a. Provide reinforcement support types within structure as required by Contract Documents. Reinforcement supports must conform to CRSI RB4.1. Submit description of reinforcement supports and materials for fastening coated reinforcement if not in conformance with CRSI RB4.1.

PART 3 EXECUTION

3.1 EXAMINATION

a. Do not begin installation until substrates have been properly constructed; verify that substrates are level.

b. If substrate preparation is the responsibility of another installer, notify Contracting Officer of unsatisfactory preparation before processing.

c. Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify Contracting Officer and wait for instructions before beginning installation.

3.2 PREPARATION

Determine quantity of concrete needed and minimize the production of excess concrete. Designate locations or uses for potential excess concrete before the concrete is poured.

3.2.1 General

a. Surfaces against which concrete is to be placed must be free of debris, loose material, standing water, snow, ice, and other deleterious substances before start of concrete placing.

b. Remove standing water without washing over freshly deposited concrete. Divert flow of water through side drains provided for such purpose.

3.2.2 Subgrade Under Foundations and Footings

a. When subgrade material is semi-porous and dry, sprinkle subgrade surface with water as required to eliminate suction at the time concrete is deposited, or seal subgrade surface by covering surface with specified vapor barrier.

b. When subgrade material is porous, seal subgrade surface by covering surface with specified vapor barrier.

3.2.3 Subgrade Under Slabs on Ground

a. Before construction of slabs on ground, have underground work on pipes and conduits completed and approved.

b. Previously constructed subgrade or fill must be cleaned of foreign materials

c. Finish surface of capillary water barrier under interior slabs on ground must not show deviation in excess of 1/4 inch when tested with a 10-foot straightedge parallel with and at right angles to building lines.

d. Finished surface of subgrade or fill under exterior slabs on ground must not be more than 0.02-foot above or 0.10-foot below elevation indicated.

3.2.4 Edge Forms and Screed Strips for Slabs

a. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface and must be strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment.

b. Align concrete surface to elevation of screed strips by use of strike-off templates or approved compacting-type screeds.

3.2.5 Reinforcement and Other Embedded Items

a. Secure reinforcement, joint materials, and other embedded materials in position, inspected, and approved before start of concrete placing.

b. When concrete is placed, reinforcement must be free of materials deleterious to bond. Reinforcement with rust, mill scale, or a combination of both will be considered satisfactory, provided minimum nominal dimensions, nominal weight, and minimum average height of deformations of a hand-wire-brushed test specimen are not less than applicable ASTM specification requirements.

3.3 FORMS

a. Provide forms, shoring, and scaffolding for concrete placement. Set forms mortar-tight and true to line and grade.

b. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch. Place chamfer strips in corners of formwork to produce beveled edges on permanently exposed surfaces.

c. Provide formwork with clean-out openings to permit inspection and removal of debris.

d. Inspect formwork and remove foreign material before concrete is placed.

e. At construction joints, lap form-facing materials over the concrete of previous placement. Ensure formwork is placed against hardened concrete so offsets at construction joints conform to specified tolerances.

f. Provide positive means of adjustment (such as wedges or jacks) of shores and struts. Do not make adjustments in formwork after concrete has reached initial setting. Brace formwork to resist lateral deflection and lateral instability.

g. Fasten form wedges in place after final adjustment of forms and before concrete placement.

h. Provide anchoring and bracing to control upward and lateral movement of formwork system.

i. Construct formwork for openings to facilitate removal and to produce opening dimensions as specified and within tolerances.

j. Provide runways for moving equipment. Support runways directly on formwork or structural members. Do not support runways on reinforcement. Loading applied by runways must not exceed capacity of formwork or structural members.

k. Position and support expansion joint materials, waterstops, and other embedded items to prevent displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with removable material to prevent concrete entry into voids.

l. Clean surfaces of formwork and embedded materials of mortar, grout, and foreign materials before concrete placement.

3.3.1 Coating

a. Cover formwork surfaces with an acceptable material that inhibits bond with concrete.

b. If formwork release agent is used, apply to formwork surfaces in accordance with manufacturer's recommendations before placing reinforcement. Remove excess release agent on formwork prior to concrete placement.

c. Do not allow formwork release agent to contact reinforcement or hardened concrete against which fresh concrete is to be placed.

3.3.2 Reuse

a. Reuse forms providing the structural integrity of concrete and the aesthetics of exposed concrete are not compromised.

b. Wood forms must not be clogged with paste and must be capable of absorbing high water-cementitious material ratio paste.

c. Remove leaked mortar from formwork joints before reuse.

3.3.3 Forms for Standard Rough Form Finish

Provide formwork in accordance with ACI 301 Section 5 with a surface finish, SF-1.0, for formed surfaces that are to be concealed by other construction.

3.3.4 Forms for Standard Smooth Form Finish

Provide formwork in accordance with ACI 301 Section 5 with a surface finish, SF-3.0, for formed surfaces that are exposed to view.

3.3.5 Form Ties

a. After ends or end fasteners of form ties have been removed, repair tie holes in accordance with ACI 301 Section 5 requirements.

3.3.6 Tolerances for Form Construction

a. Construct formwork so concrete surfaces conform to tolerances in ACI 117.

b. Position and secure sleeves, inserts, anchors, and other embedded items such that embedded items are positioned within ACI 117 tolerances.

c. To maintain specified elevation and thickness within tolerances, install formwork to compensate for deflection and anticipated settlement in formwork during concrete placement. Set formwork and intermediate screed strips for slabs to produce designated elevation, camber, and contour of finished surface before formwork removal. If specified finish requires use of vibrating screeds or roller pipe screeds, ensure that edge forms and screed strips are strong enough to support such equipment.

3.3.7 Removal of Forms and Supports

a. If vertical formed surfaces require finishing, remove forms as soon as removal operations will not damage concrete.

b. Remove top forms on sloping surfaces of concrete as soon as removal will not allow concrete to sag. Perform repairs and finishing operations required. If forms are removed before end of specified curing period, provide curing and protection.

c. Do not damage concrete during removal of vertical formwork for columns, walls, and sides of beams. Perform needed repair and finishing operations required on vertical surfaces. If forms are removed before end of specified curing period, provide curing and protection.

e. Form-facing material and horizontal facing support members may be removed before in-place concrete reaches specified compressive strength if shores and other supports are designed to allow facing removal without deflection of supported slab or member.

3.3.8 Strength of Concrete Required for Removal of Formwork

If removal of formwork, reshoring, or backshoring is based on concrete reaching a specified in-place strength, mold and field-cure cylinders in accordance with ASTM C31/C31M. Test cylinders in accordance with ASTM C39/C39M. Alternatively, use one or more of the methods listed herein to evaluate in-place concrete strength for formwork removal.

a. Tests of cast-in-place cylinders in accordance with ASTM C873/C873M. This option is limited to slabs with concrete depths from 5 to 12 in.

b. Penetration resistance in accordance with ASTM C803/C803M.

c. Pullout strength in accordance with ASTM C900.

d. Maturity method in accordance with ASTM C1074. Submit maturity method data using project materials and concrete mix proportions used on the project to demonstrate the correlation between maturity and compressive strength of laboratory cured test specimens to the Contracting Officer.

3.4 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

a. Unless otherwise specified, placing reinforcement and miscellaneous materials must be in accordance to ACI 301. Provide bars, welded wire reinforcement, wire ties, supports, and other devices necessary to install and secure reinforcement.

b. Reinforcement must not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

c. Nonprestressed cast-in-place concrete members must have concrete cover for reinforcement given in the contract drawings:

3.4.1 General

Provide details of reinforcement that are in accordance with the Contract Documents.

3.4.2 Vapor Barrier System

a. Install in accordance with ASTM E1643 and the product manufacturer's written instructions. Provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. Lap joints a minimum of 6 inches, or the minimum required by the manufacturer and tape with manufacturer's tape. Seal all joints and penetrations as required by the product manufacturer's written instructions.

b. Remove torn, punctured, or damaged vapor barrier material and provide with new vapor barrier prior to placing concrete. Concrete placement must not damage vapor barrier.

3.4.3 Reinforcement Supports

Provide reinforcement support in accordance with CRSI RB4.1 and ACI 301 Section 3 requirements. Supports for coated or galvanized bars must also

be coated with electrically compatible material for a distance of at least 2 inches beyond the point of contact with the bars.

3.4.4 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement and support against displacement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.4.5 Fabrication

Shop fabricate reinforcing bars to conform to shapes and dimensions indicated for reinforcement, and as follows:

a. Provide fabrication tolerances that are in accordance with ACI 117.

b. Provide hooks and bends that are in accordance with the Contract Documents.

Reinforcement must be bent cold to shapes as indicated. Bending must be done in the shop. Rebending of a reinforcing bar that has been bent incorrectly is not be permitted. Bending must be in accordance with standard approved practice and by approved machine methods.

Deliver reinforcing bars bundled, tagged, and marked. Tags must be metal with bar size, length, mark, and other information pressed in by machine. Marks must correspond with those used on the placing drawings.

Do not use reinforcement that has any of the following defects:

a. Bar lengths, depths, and bends beyond specified fabrication tolerances

b. Bends or kinks not indicated on drawings or approved shop drawings

c. Bars with reduced cross-section due to rusting or other cause

Replace defective reinforcement with new reinforcement having required shape, form, and cross-section area.

3.4.6 Placing Reinforcement

Place reinforcement in accordance with ACI 301.

For slabs on grade (over earth or over capillary water barrier) and for footing reinforcement, support bars or welded wire reinforcement on precast concrete blocks, spaced at intervals required by size of reinforcement, to keep reinforcement the minimum height specified above the underside of slab or footing.

Provide reinforcement that is supported and secured together to prevent displacement by construction loads or by placing of wet concrete, and as follows:

a. Provide supports for reinforcing bars that are sufficient in number and have sufficient strength to carry the reinforcement they support, and in accordance with ACI 301 and CRSI 10MSP. Do not use supports to support runways for concrete conveying equipment and similar

construction loads.

b. Equip supports on ground and similar surfaces with sand-plates.

c. Support welded wire reinforcement as required for reinforcing bars.

d. Secure reinforcements to supports by means of tie wire. Wire must be black, soft iron wire, not less than 16 gage.

e. Reinforcement must be accurately placed, securely tied at intersections, and held in position during placing of concrete by spacers, chairs, or other approved supports. Point wire-tie ends away from the form. Unless otherwise indicated, numbers, type, and spacing of supports must conform to the Contract Documents.

f. Bending of reinforcing bars partially embedded in concrete is permitted only as specified in the Contract Documents.

3.4.7 Spacing of Reinforcing Bars

a. Spacing must be as indicated in the Contract Documents.

b. Reinforcing bars may be relocated to avoid interference with other reinforcement, or with conduit, pipe, or other embedded items. If any reinforcing bar is moved a distance exceeding one bar diameter or specified placing tolerance, resulting rearrangement of reinforcement is subject to preapproval by the Contracting Officer.

3.4.8 Concrete Protection for Reinforcement

Additional concrete protection must be in accordance with the Contract Documents.

3.5 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

In accordance with ASTM C94/C94M, ACI 301, ACI 302.1R and ACI 304R, except as modified herein. Batching equipment must be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

3.5.1 Measuring

Make measurements at intervals as specified in paragraphs SAMPLING and TESTING.

3.5.2 Mixing

a. Mix concrete in accordance with ASTM C94/C94M, ACI 301 and ACI 304R.

b. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 84 degrees F.

c. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 84 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit

for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and submitted water-cementitious material ratio are not exceeded and the required concrete strength is still met. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required.

d. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch. Do not reconstitute concrete that has begun to solidify.

e. When fibers are used, add fibers together with the aggregates and never as the first component in the mixer. Fibers must be dispensed into the mixing system using appropriate dispensing equipment and procedure as recommended by the manufacturer.

3.5.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.6 PLACING CONCRETE

Place concrete in accordance with ACI 301 Section 5.

3.6.1 Footing Placement

Concrete for footings may be placed in excavations without forms upon inspection and approval by the Contracting Officer. Excavation width must be a minimum of 4 inches greater than indicated.

3.6.2 Pumping

ACI 304R and ACI 304.2R. Pumping must not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment must not exceed 2 inches at discharge/placement. Do not convey concrete through pipe made of aluminum or aluminum alloy. Avoid rapid changes in pipe sizes. Limit maximum size of course aggregate to 33 percent of the diameter of the pipe. Limit maximum size of well-rounded aggregate to 40 percent of the pipe diameter. Take samples for testing at both the point of delivery to the pump and at the discharge end.

3.6.3 Cold Weather

Cold weather concrete must meet the requirements of ACI 301 unless otherwise specified. Do not allow concrete temperature to decrease below 50 degrees F. Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 37 degrees F in any 1 hour and 50 degrees F per 24 hours after heat application.

3.6.4 Hot Weather

Hot weather concrete must meet the requirements of ACI 301 unless otherwise specified. Maintain required concrete temperature using Figure 4.2 in ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.6.5 Bonding

Surfaces of set concrete at joints, must be roughened and cleaned of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner that exposes the aggregate uniformly and does not leave laitance, loosened particles of aggregate, nor damaged concrete at the surface.

Obtain bonding of fresh concrete that has set as follows:

a. At joints between footings and walls or columns, between walls or columns and the beams or slabs they support, and elsewhere unless otherwise specified; roughened and cleaned surface of set concrete must be dampened, but not saturated, immediately prior to placing of fresh concrete.

b. At joints in exposed-to-view work; at vertical joints in walls; at joints near midpoint of span in girders, beams, supported slabs, other structural members; in work designed to contain liquids; the roughened and cleaned surface of set concrete must be dampened but not saturated and covered with a cement grout coating.

c. Provide cement grout that consists of equal parts of portland cement and fine aggregate by weight with not more than 6 gallons of water per sack of cement. Apply cement grout with a stiff broom or brush to a minimum thickness of 1/16 inch. Deposit fresh concrete before cement grout has attained its initial set.

3.7 WASTE MANAGEMENT

Provide as specified in the Waste Management Plan and as follows.

3.7.1 Mixing Equipment

Before concrete pours, designate on-site area to be paved later in project for cleaning out concrete mixing trucks. Minimize water used to wash equipment.

3.7.2 Hardened, Cured Waste Concrete

3.7.3 Reinforcing Steel

Collect reinforcing steel and place in designated area for recycling.

3.7.4 Other Waste

Identify concrete manufacturer's or supplier's policy for collection or return of construction waste, unused material, deconstruction waste, and/or packaging material. Return excess cement to supplier.

3.8 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

3.8.1 Defects

Repair surface defects in accordance with ACI 301 Section 5.

3.8.2 Not Against Forms (Top of Walls)

Surfaces not otherwise specified must be finished with wood floats to even surfaces. Finish must match adjacent finishes.

3.8.3 Formed Surfaces

3.8.3.1 Tolerances

Tolerances in accordance with ACI 117 and as indicated.

3.8.3.2 As-Cast Rough Form

Provide for surfaces not exposed to public view a surface finish SF-1.0. Patch holes and defects in accordance with ACI 301.

3.8.3.3 Standard Smooth Finish

Provide for surfaces exposed to public view a surface finish SF-3.0. Patch holes and defects in accordance with ACI 301.

3.9 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

In accordance with ACI 301 and ACI 302.1R, unless otherwise specified. Slope floors uniformly to drains where drains are provided. Steel trowel and fine-broom finish concrete slabs that are to receive quarry tile, ceramic tile, or paver tile . Where straightedge measurements are specified, Contractor must provide straightedge.

3.9.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.

3.9.1.1 Scratched

Use for surfaces intended to receive bonded applied cementitious

applications. Finish concrete in accordance with ACI 301 Section 5 for a scratched finish.

3.9.1.2 Floated

Use for Finish concrete in accordance with ACI 301 Section 5 for a floated finish.

3.9.1.3 Concrete Containing Silica Fume

Finish using magnesium floats or darbies.

3.9.1.4 Steel Troweled

Use for floors intended as walking surfaces and for reception of floor coverings. Finish concrete in accordance with ACI 301 Section 5 for a steel troweled finish.

3.9.1.5 Nonslip Finish

Use on surfaces of exterior platforms, steps, and landings; and on exterior and interior pedestrian ramps. Finish concrete in accordance with ACI 301 Section 5 for a dry-shake finish. After the selected material has been embedded by the two floatings, complete the operation with a broomed finish.

3.9.1.6 Broomed

Use on surfaces of exterior walks, platforms, patios, and ramps, unless otherwise indicated. Finish concrete in accordance with ACI 301 Section 5 for a broomed finish.

3.9.2 Flat Floor Finishes

ACI 302.1R. Construct in accordance with one of the methods recommended in Table 7.15.3, "Typical Composite Ff/FL Values for Various Construction Methods." ACI 117 for tolerance tested by ASTM E1155.

a. Specified Conventional Value:

Floor Flatness (Ff) 20 13 minimum
Floor Levelness (FL) 15 10 minimum

3.9.2.1 Measurement of Floor Tolerances

Test slab within 24 hours of the final troweling. Provide tests to Contracting Officer within 12 hours after collecting the data. Floor flatness inspector is required to provide a tolerance report which must include:

a. Key plan showing location of data collected.

b. Results required by ASTM E1155.

3.9.2.2 Remedies for Out of Tolerance Work

Contractor is required to repair and retest any floors not meeting specified tolerances. Prior to repair, Contractor must submit and receive approval for the proposed repair, including product data from any materials proposed. Repairs must not result in damage to structural integrity of the

floor. For floors exposed to public view, repairs must prevent any uneven or unusual coloring of the surface.

3.9.3 Concrete Walks

Provide 4 inches thick minimum. Provide contraction joints spaced every 5 linear feet unless otherwise indicated. Cut contraction joints 1 inch deep, or one fourth the slab thickness whichever is deeper, with a jointing tool after the surface has been finished. Provide 0.5 inch thick transverse expansion joints at changes in direction where sidewalk abuts curb, steps, rigid pavement, or other similar structures; space expansion joints every 50 feet maximum. Give walks a broomed finish. Unless indicated otherwise, provide a transverse slope of 1/48. Limit variation in cross section to 1/4 inch in 5 feet.

3.9.4 Pits and Trenches

Place bottoms and walls monolithically or provide waterstops and keys.

3.9.5 Curbs and Gutters

Provide contraction joints spaced every 10 feet maximum unless otherwise indicated. Cut contraction joints 3/4 inch deep with a jointing tool after the surface has been finished. Provide expansion joints 1/2 inch thick and spaced every 100 feet maximum unless otherwise indicated. Perform pavement finish.

3.9.6 Splash Blocks

Provide at outlets of downspouts emptying at grade. Splash blocks may be precast concrete, and must be 24 inches long, 12 inches wide and 4 inches thick, unless otherwise indicated, with smooth-finished countersunk dishes sloped to drain away from the building.

3.10 JOINTS

3.10.1 Construction Joints

Make and locate joints not indicated so as not to impair strength and appearance of the structure, as approved. Joints must be perpendicular to main reinforcement. Reinforcement must be continued and developed across construction joints. Locate construction joints as follows:

3.10.1.1 Maximum Allowable Construction Joint Spacing

a. In walls at not more than 60 feet in any horizontal direction.

b. In slabs on ground, so as to divide slab into areas not in excess of 1,200 square feet or as indicated in the contract drawings.

3.10.1.2 Construction Joints for Constructability Purposes

a. In walls, at top of footing; at top of slabs on ground; at top and bottom of door and window openings or where required to conform to architectural details; and at underside of deepest beam or girder framing into wall.

b. In columns or piers, at top of footing; at top of slabs on ground; and at underside of deepest beam or girder framing into column or pier.

c. Near midpoint of spans for supported slabs, beams, and girders unless a beam intersects a girder at the center, in which case construction joints in girder must offset a distance equal to twice the width of the beam. Make transfer of shear through construction joint by use of inclined reinforcement.

Provide keyways at least 1-1/2-inches deep in construction joints in walls and slabs and between walls and footings; approved bulkheads may be used for slabs.

3.10.2 Isolation Joints in Slabs on Ground

a. Provide joints at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

b. Fill joints with premolded joint filler strips 1/2 inch thick, extending full slab depth. Install filler strips at proper level below finish floor elevation with a slightly tapered, dress-and-oiled wood strip temporarily secured to top of filler strip to form a groove not less than 3/4 inch in depth where joint is sealed with sealing compound and not less than 1/4 inch in depth where joint sealing is not required. Remove wood strip after concrete has set. Contractor must clean groove of foreign matter and loose particles after surface has dried.

3.10.3 Contraction Joints in Slabs on Ground

a. Provide joints to form panels as indicated.

b. Under and on exact line of each control joint, cut 50 percent of welded wire reinforcement before placing concrete.

c. Sawcut contraction joints into slab on ground in accordance with ACI 301 Section 5.

d. Joints must be 1/8-inch wide by 1/5 to 1/4 of slab depth and formed by inserting hand-pressed fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. After concrete has cured for at least 7 days, the Contractor must remove inserts and clean groove of foreign matter and loose particles.

e. Sawcutting will be limited to within 12 hours after set and at 1/4 slab depth.

3.10.4 Sealing Joints in Slabs on Ground

a. Contraction and control joints which are to receive finish flooring material must be sealed with joint sealing compound after concrete curing period. Slightly underfill groove with joint sealing compound to prevent extrusion of compound. Remove excess material as soon after sealing as possible.

b. Sealed groove must be left ready to receive filling material that is provided as part of finish floor covering work.

3.11 CURING AND PROTECTION

Curing and protection in accordance with ACI 301 Section 5, unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer, hardener, or epoxy coating. Allow curing compound/sealer installations to cure prior to the installation of materials that adsorb VOCs.

3.11.1 Requirements for Type III, High-Early-Strength Portland Cement

The curing periods are required to be not less than one-fourth of those specified for portland cement, but in no case less than 72 hours.

3.11.2 Curing Periods

ACI 301 Section 5, except 10 days for retaining walls, pavement or chimneys. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing are subject to approval by the Contracting Officer.

3.11.3 Curing Formed Surfaces

Accomplish curing of formed surfaces, including undersurfaces of girders, beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed before end of curing period, accomplish final curing of formed surfaces by any of the curing methods specified above, as applicable.

3.11.4 Curing Unformed Surfaces

a. Accomplish initial curing of unformed surfaces, such as monolithic slabs, floor topping, and other flat surfaces, by membrane curing.

b. Accomplish final curing of unformed surfaces by any of curing methods specified, as applicable.

c. Accomplish final curing of concrete surfaces to receive liquid floor hardener of finish flooring by moisture-retaining cover curing.

3.11.5 Temperature of Concrete During Curing

When temperature of atmosphere is 41 degrees F and below, maintain temperature of concrete at not less than 55 degrees F throughout concrete curing period or 45 degrees F when the curing period is measured by

maturity. When necessary, make arrangements before start of concrete placing for heating, covering, insulation, or housing as required to maintain specified temperature and moisture conditions for concrete during curing period.

When the temperature of atmosphere is 80 degrees F and above or during other climatic conditions which cause too rapid drying of concrete, make arrangements before start of concrete placing for installation of wind breaks, of shading, and for fog spraying, wet sprinkling, or moisture-retaining covering of light color as required to protect concrete during curing period.

Changes in temperature of concrete must be uniform and not exceed 37 degrees F in any 1 hour nor 80 degrees F in any 24-hour period.

3.11.6 Protection from Mechanical Injury

During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration and from damage caused by rain or running water.

3.11.7 Protection After Curing

Protect finished concrete surfaces from damage by construction operations.

3.12 FIELD QUALITY CONTROL

3.12.1 Sampling

ASTM C172/C172M. Collect samples of fresh concrete to perform tests specified. ASTM C31/C31M for making test specimens.

3.12.2 Testing

3.12.2.1 Slump Tests

ASTM C143/C143M. Take concrete samples during concrete placement/discharge. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cementitious material ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete.

3.12.2.2 Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3.12.2.3 Compressive Strength Tests

ASTM C39/C39M. Make six 6 inch by 12 inch or 4 inch by 8 inch test cylinders for each set of tests in accordance with ASTM C31/C31M, ASTM C172/C172M and applicable requirements of ACI 305R and ACI 306R. Take precautions to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold two cylinder in reserve. Take samples for strength tests of each mix design of

concrete placed each day not less than once a day, nor less than once for each 100 cubic yards of concrete for the first 500 cubic yards, then every 500 cubic yards thereafter, nor less than once for each 5400 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result must be the average of two cylinders from the same concrete sample tested at 28 days. Concrete compressive tests must meet the requirements of this section, the Contract Document, and ACI 301. Retest locations represented by erratic core strengths. Where retest does not meet concrete compressive strength requirements submit a mitigation or remediation plan for review and approval by the contracting officer. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

3.12.2.4 Air Content

ASTM C173/C173M or ASTM C231/C231M for normal weight concrete . Test air-entrained concrete for air content at the same frequency as specified for slump tests.

3.12.2.5 Unit Weight of Structural Concrete

ASTM C567/C567M and ASTM C138/C138M. Determine unit weight of lightweight and normal weight concrete. Perform test for every 20 cubic yards maximum.

3.12.2.6 Strength of Concrete Structure

The strength of the concrete structure will be considered to be deficient if any of the following conditions are identified:

a. Failure to meet compressive strength tests as evaluated.

b. Reinforcement not conforming to requirements specified.

c. Concrete which differs from required dimensions or location in such a manner as to reduce strength.

d. Concrete curing and protection of concrete against extremes of temperature during curing, not conforming to requirements specified.

e. Concrete subjected to damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration.

f. Poor workmanship likely to result in deficient strength.

Where the strength of the concrete structure is considered deficient submit a mitigation or remediation plan for review and approval by the contracting officer.

3.12.2.7 Non-Conforming Materials

Factors that indicate that there are non-conforming materials include (but not limited to) excessive compressive strength, inadequate compressive strength, excessive slump, excessive voids and honeycombing, concrete delivery records that indicate excessive time between mixing and placement, or excessive water was added to the mixture during delivery and placement. Any of these indicators alone are sufficient reason for the Contracting Officer to request additional sampling and testing.

Investigations into non-conforming materials must be conducted at the Contractor's expense. The Contractor must be responsible for the investigation and must make written recommendations to adequately mitigate or remediate the non-conforming material. The Contracting Officer may accept, accept with reduced payment, require mitigation, or require removal and replacement of non-conforming material at no additional cost to the Government.

3.12.2.8 Testing Concrete Structure for Strength

When there is evidence that strength of concrete structure in place does not meet specification requirements or there are non-conforming materials, make cores drilled from hardened concrete for compressive strength determination in accordance with ASTM C42/C42M, and as follows:

a. Take at least three representative cores from each member or area of concrete-in-place that is considered potentially deficient. Location of cores will be determined by the Contracting Officer.

b. Test cores after moisture conditioning in accordance with ASTM C42/C42M if concrete they represent is more than superficially wet under service.

c. Air dry cores, (60 to 80 degrees F with relative humidity less than 60 percent) for 7 days before test and test dry if concrete they represent is dry under service conditions.

d. Strength of cores from each member or area are considered satisfactory if their average is equal to or greater than 85 percent of the 28-day design compressive strength of the class of concrete.

e. Core specimens will be taken and tested by the Government. If the results of core-boring tests indicate that the concrete as placed does not conform to the drawings and specification, the cost of such tests and restoration required must be borne by the Contractor.

Fill core holes solid with patching mortar and finished to match adjacent concrete surfaces.

Correct concrete work that is found inadequate by core tests in a manner approved by the Contracting Officer.

3.13 REPAIR, REHABILITATION AND REMOVAL

Before the Contracting Officer accepts the structure the Contractor must inspect the structure for cracks, damage and substandard concrete placements that may adversely affect the service life of the structure. A report documenting these defects must be prepared which includes recommendations for repair, removal or remediation must be submitted to the Contracting Officer for approval before any corrective work is accomplished.

3.13.1 Crack Repair

Prior to final acceptance, all cracks in excess of 0.02 inches wide must be documented and repaired. The proposed method and materials to repair the cracks must be submitted to the Contracting Officer for approval. The proposal must address the amount of movement expected in the crack due to temperature changes and loading.

3.13.2 Repair of Weak Surfaces

Weak surfaces are defined as mortar-rich, rain-damaged, uncured, or containing exposed voids or deleterious materials. Concrete surfaces with weak surfaces less than 1/4 inch thick must be diamond ground to remove the weak surface. Surfaces containing weak surfaces greater than 1/4 inch thick must be removed and replaced or mitigated in a manner acceptable to the Contracting Officer.

3.13.3 Failure of Quality Assurance Test Results

Proposed mitigation efforts by the Contractor must be approved by the Contracting Officer prior to proceeding.

-- End of Section --

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SECTION 04 20 00

UNIT MASONRY
11/15

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 216.1	(2014) Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies
ACI SP-66	(2004) ACI Detailing Manual

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M	(2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A1064/A1064M	(2017) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A167	(2011) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A615/A615M	(2020) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A641/A641M	(2019) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A951/A951M	(2011) Standard Specification for Steel Wire for Masonry Joint Reinforcement

ASTM A996/A996M	(2016) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ASTM C1019	(2014) Standard Test Method for Sampling and Testing Grout
ASTM C129	(2014a) Standard Specification for Nonloadbearing Concrete Masonry Units
ASTM C1384	(2012a) Standard Specification for Admixtures for Masonry Mortars
ASTM C1611/C1611M	(2014) Standard Test Method for Slump Flow of Self-Consolidating Concrete
ASTM C207	(2018) Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C270	(2019) Standard Specification for Mortar for Unit Masonry
ASTM C476	(2019) Standard Specification for Grout for Masonry
ASTM C494/C494M	(2019) Standard Specification for Chemical Admixtures for Concrete
ASTM C55	(2017) Standard Specification for Concrete Building Brick
ASTM C641	(2009) Staining Materials in Lightweight Concrete Aggregates
ASTM C67	(2017) Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
ASTM C780	(2016) Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C90	(2016) Standard Specification for Loadbearing Concrete Masonry Units
ASTM D2000	(2018) Standard Classification System for Rubber Products in Automotive Applications
ASTM D2287	(2019) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
ASTM E514/E514M	(2014a) Standard Test Method for Water Penetration and Leakage Through Masonry

THE MASONRY SOCIETY (TMS)

TMS MSJC	(2011) Masonry Standard Joint Committee's (MSJC) Book - Building Code Requirements

and Specification for Masonry Structures, Containing TMS 402/ACI 530/ASCE 5, TMS 602/ACI 530.1/ASCE 6, and Companion Commentaries

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Cut CMU Drawings; G
Reinforcement Detail Drawings; G

SD-03 Product Data

Hot Weather Procedures; G
Cold Weather Procedures; G
Cement;
Cementitious Materials;

SD-05 Design Data

Masonry Compressive Strength;
Bracing Calculations;

SD-06 Test Reports

Efflorescence Test
Fire-Rated Concrete Masonry Units
Field Testing of Mortar
Field Testing of Grout
Prism Tests
Single-Wythe Masonry Wall Water Penetration Test

SD-07 Certificates

Special Masonry Inspector Qualifications
Clay or Shale Brick
Concrete Masonry Units (CMU)
Cementitious Materials
Admixtures for Masonry Mortar
Admixtures for Grout
Anchors, Ties, and Bar Positioners
Joint Reinforcement

SD-08 Manufacturer's Instructions

Admixtures for Masonry Mortar
Admixtures for Grout

1.3 QUALITY ASSURANCE

1.3.1 Masonry Mock-Up Panels

1.3.1.1 Mock-Up Panel Location

After material samples are approved and prior to starting masonry work, construct a mock-up panel for each type and color of masonry required. At least 48 hours prior to constructing the panel or panels, submit written notification to the Contracting Officer. Do not build-in mock-up panels as part of the structure; locate mock-up panels where directed. Construct portable mock-up panels or locate in an area where they will not be disrupted during construction.

1.3.1.2 Mock-Up Panel Configuration

Construct mock-up panels L-shaped or otherwise configured to represent all of the wall elements. Construct panels of the size necessary to demonstrate the acceptable level of workmanship for each type of masonry represented on the project. Provide a straight panel or a leg of an L-shaped panel of minimum size 4 feet long by 4 feet high.

1.3.1.3 Mock-Up Panel Composition

Show full color range, texture, and bond pattern of the masonry work. Demonstrate mortar joint tooling; grouting of reinforced vertical cores, collar joints, bond beams, and lintels; positioning, securing, and lapping of reinforcing steel; positioning and lapping of joint reinforcement (including prefabricated corners); and cleaning of masonry work during the construction of the panels. Also include installation or application procedures for anchors, wall ties, CMU control joints, brick expansion joints, insulation, flashing, brick soldier, row lock courses and weeps. Include a a masonry bonded corner . When the panel represents reinforced masonry, include a 2 by 2 foot opening placed at least 2 feet above the panel base and 2 feet away from all free edges, corners, and control joints. Provide required reinforcing around this opening as well as at wall corners and control joints.

1.3.1.4 Mock-Up Panel Construction Method

Where anchored veneer walls or cavity walls are required, demonstrate and receive approval for the method of construction; i.e., either bring up the two wythes together or separately, with the insulation and appropriate ties placed within the specified tolerances across the cavity. Demonstrate provisions to preclude mortar or grout droppings in the cavity and to provide a clear open air space of the dimensions shown on the drawings. Where masonry is to be grouted, demonstrate and receive approval on the method that will be used to bring up the masonry wythes; support the reinforcing bars; and grout cells, bond beams, lintels, and collar joints using the requirements specified herein. When water-repellent is specified to be applied to the masonry, apply the approved product to the mock-up panel. Construct panels on a properly designed concrete foundation.

1.3.1.5 Mock-Up Panel Purpose

The completed panels is used as the standard of workmanship for the type of masonry represented. Do not commence masonry work until the mock-up panel for that type of masonry construction has been completed and approved. Protect panels from the weather and construction operations until the

masonry work has been completed and approved. Perform cleaning procedures on the mockup and obtain approval of the Contracting Officer prior to cleaning the building. After completion of the work, completely remove the mock-up panels, including all foundation concrete, from the construction site.

1.3.2 Special Masonry Inspector Qualifications

Refer to Section 01 45 35 SPECIAL INSPECTIONS for qualifications and responsibilities of the masonry special inspector.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver, store, handle, and protect material to avoid chipping, breakage, and contact with soil or contaminating material. Store and prepare materials in already disturbed areas to minimize project site disturbance and size of project site.

1.4.1 Masonry Units

Cover and protect masonry units from precipitation. Conform to handling and storage requirements of TMS MSJC.

a. Mark prefabricated lintels on top sides to show either the lintel schedule number or the number and size of top and bottom bars.

1.4.2 Reinforcement, Anchors, and Ties

Store steel reinforcing bars, coated anchors, ties, and joint reinforcement above the ground. Maintain steel reinforcing bars and uncoated ties free of loose mill scale and loose rust.

1.4.3 Cementitious Materials, Sand and Aggregates

Deliver cementitious and other packaged materials in unopened containers, plainly marked and labeled with manufacturers' names and brands. Store cementitious material in dry, weathertight enclosures or completely cover. Handle cementitious materials in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Store sand and aggregates in a manner to prevent contamination and segregation.

1.5 PROJECT/SITE CONDITIONS

Conform to TMS MSJC for hot and cold weather masonry erection.

1.5.1 Hot Weather Procedures

When ambient air temperature exceeds 100 degrees F, or exceeds 90 degrees F and the wind velocity is greater than 8 mph, comply with TMS MSJC Article 1.8 D for: preparation prior to conducting masonry work; construction while masonry work is in progress; and protection for newly completed masonry.

1.5.2 Cold Weather Procedures

When ambient temperature is below 40 degrees F, comply with TMS MSJC Article 1.8 C for: preparation prior to conducting masonry work; construction while masonry work is in progress; and protection for newly completed masonry.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

2.1.1 Design - Specified Compressive Strength of Masonry

2.1.2 Performance - Verify Masonry Compressive Strength

Verify specified compressive strength of masonry using the "Unit Strength Method" of TMS MSJC. Submit calculations and certifications of unit and mortar strength.

2.2 MANUFACTURED UNITS

2.2.1 General Requirements

Do not change the source of materials, which will affect the appearance of the finished work, after the work has started except with Contracting Officer's approval. Submit test reports from an approved independent laboratory. Certify test reports on a previously tested material as the same materials as that proposed for use in this project. Submit certificates of compliance stating that the materials meet the specified requirements.

2.2.2 Clay or Shale Brick

2.2.2.1 General

2.2.2.1.1 Sample Submittal

Submit brick samples as specified, showing the color range and texture of clay or shale brick. Limit units used on the project to those that conform to the approved sample. Submit sample of colored mortar with applicable masonry unit and color samples of three stretcher units and one unit for each type of special shape.

2.2.2.1.2 Uniformity

Manufacture bricks at one time and from the same run. Deliver clay or shale brick units factory-blended to provide a uniform appearance and color range in the completed wall.

2.2.2.2 Solid Clay or Shale Brick

Provide brick with specified sizes.

a. Modular size, 3-5/8 inches thick, 8 inches high, and 16 inches long.

2.2.3 Concrete Units

2.2.3.1 Aggregates

Test lightweight aggregates, and blends of lightweight and heavier aggregates in proportions used in producing the units, for stain-producing iron compounds in accordance with ASTM C641,visual classification method. Do not incorporate aggregates for which the iron stain deposited on the filter paper exceeds the "light stain" classification.

Use industrial waste by-products (air-cooled slag, cinders, or bottom ash),

ground waste glass and concrete, granulated slag, and expanded slag in aggregates.

2.2.3.2 Concrete Masonry Units (CMU)

2.2.3.2.1 Cement

Use only cement that has a low alkali content and is of one brand.

2.2.3.2.2 Size

Provide units with specified dimension of 7-5/8 inches wide, 7-5/8 inches high, and 15-5/8 inches long.

2.2.3.2.3 Weather Exposure

Provide concrete masonry units with water-repellant admixture added during manufacture where units will be exposed to weather..

2.2.3.2.4 Unit Types

a. Hollow Load-Bearing Units: ASTM C90, lightweight or normal weight. Provide load-bearing units for exterior walls, foundation walls, load-bearing walls, and shear walls.

b. Hollow Non-Load-Bearing Units: ASTM C129, lightweight or normal weight. Load-bearing units may be provided in lieu of non-load-bearing units.

2.2.3.2.5 Jamb Units

Provide jamb units of the shapes and sizes to conform with wall units. Solid units may be incorporated in the masonry work where necessary to fill out at corners, gable slopes, and elsewhere as approved.

Provide sash jamb units with a 3/4 by 3/4 inch groove near the center at end of each unit.

2.2.3.3 Fire-Rated Concrete Masonry Units

For indicated fire-rated construction, provide concrete masonry units of minimum equivalent thickness for the fire rating indicated and the corresponding type of aggregates indicated in TABLE I. Units containing more than one of the aggregates listed in TABLE I will be rated by linear interpolation based on the percent by dry-rodded volume of each aggregate used in manufacturing the units.

TABLE I
FIRE-RATED CONCRETE MASONRY UNITS

Aggregate Type	Minimum Equivalent Thickness for Fire-Resistance Rating, inch						
	1/2 hour	3/4 hour	1 hour	1-1/2 hour	2 hours	3 hours	4 hours
Calcareous or siliceous gravel (other than limestone)	2.0	2.4	2.8	3.6	4.2	5.3	6.2

TABLE I
FIRE-RATED CONCRETE MASONRY UNITS

Aggregate Type	Minimum Equivalent Thickness for Fire-Resistance Rating, inch						
Limestone, cinders, or air-cooled slag	1.9	2.3	2.7	3.4	4.0	5.0	5.9
Expanded clay, expanded shale, or expanded slate	1.8	2.2	2.6	3.3	3.6	4.4	5.1
Expanded slag or pumice	1.5	1.9	2.1	2.7	3.2	4.0	4.7

Determine equivalent thickness in accordance with ACI 216.1. Where walls are to receive plaster or be faced with brick, or otherwise form an assembly; include the thickness of plaster or brick or other material in the assembly in determining the equivalent thickness. Submit calculation results.

2.2.3.4 Concrete Brick

2.2.3.4.1 Concrete Veneer Units

Provide fluted face, split face, smooth face, and ground face where indicated on the drawings, concrete veneer units conforming to ASTM C55.

2.2.4 Precast Concrete Units

2.2.4.1 General

a. Provide precast concrete trim, lintels, copings, splashblocks and sills that are factory-made units in a plant regularly engaged in producing precast concrete units. Unless otherwise indicated, provide precast concrete with minimum 4,000 psi compressive strength, conforming to Section 03 30 00 CAST-IN-PLACE CONCRETE using 1/2 inch to No. 4 nominal-size coarse aggregate, and with reinforcement required for handling of the units. Maintain minimum clearance of 3/4 inch between reinforcement and faces of units.

b. Unless precast-concrete items have been subjected during manufacture to saturated-steam pressure of at least 120 psi for at least 5 hours, either damp-cure for 24 hours or steam-cure and then age under cover for 28 days or longer. In precast concrete members weighing over 80 pounds provide built-in loops of galvanized wire or other approved provisions for lifting and anchoring.

c. Fabricate units with beds and joints at right angles to the face, with sharp true arises and with drip grooves on the underside where units overhang walls. Form exposed-to-view surfaces free of surface voids, spalls, cracks, and chipped or broken edges and with uniform appearance and color. Unless otherwise specified, provide units with a smooth dense finish.

d. Prior to installation, wet and inspect each unit for crazing. Items showing evidence of dusting, spalling, crazing, or having surfaces treated with a protective coating will be rejected.

e. Submit specified factory certificates.

2.3 EQUIPMENT

2.3.1 Vibrators

Maintain at least one spare vibrator on site at all times.

2.3.2 Grout Pumps

Pumping through aluminum tubes is not permitted.

2.4 MATERIALS

2.4.1 Mortar Materials

2.4.1.1 Cementitious Materials

Provide cementitious materials that conform to those permitted by ASTM C270.

2.4.1.2 Hydrated Lime and Alternates

Provide lime that conforms to one of the materials permitted by ASTM C207 for use in combination with portland cement, hydraulic cement, and blended hydraulic cement. Do not use lime in combination with masonry cement or mortar cement.

2.4.1.3 Admixtures for Masonry Mortar

In cold weather, use a non-chloride based accelerating admixture that conforms to ASTM C1384, unless Type III portland cement is used in the mortar.

In showers and kitchens, use mortar that contains a water-repellent admixture that conforms to ASTM C1384. Provide a water-repellent admixture, conforming to ASTM C1384 and of the same brand and manufacturer as the block's integral water-repellent, in the mortar used to place concrete masonry units that have an integral water-repellent admixture.

2.4.1.4 Aggregate and Water

Provide aggregate (sand) and water that conform to materials permitted by ASTM C270.

2.4.2 Grout and Ready-Mix Grout Materials

2.4.2.1 Cementitious Materials for Grout

Provide cementitious materials that conform to those permitted by ASTM C476.

2.4.2.2 Admixtures for Grout

Water-reducing admixtures that conform to ASTM C494/C494M Type F or G and viscosity-modifying admixtures that conform to ASTM C494/C494M Type S are permitted for use in grout. Other admixtures require approval by the Contracting Officer.

In cold weather, a non-chloride based accelerating admixture may be used

subject to approval by the Contracting Officer; use accelerating admixture that is non-corrosive and conforms to ASTM C494/C494M, Type C.

2.4.2.3 Aggregate and Water

Provide fine and coarse aggregates and water that conform to materials permitted by ASTM C476.

2.5 MORTAR AND GROUT MIXES

2.5.1 Mortar Mix

a. Provide mortar Type N unless specified otherwise herein. Do not use masonry cement in the mortar.

b. Provide mortar that conforms to ASTM C270. Use Type M or S mortar for foundation walls.

c. Provide Type N or S mortar for non-load-bearing, non-shear-wall interior masonry.

d. For field-batched mortar, measure component materials by volume. Use measuring boxes for materials that do not come in packages, such as sand, for consistent batching. Mix cementitious materials and aggregates between 3 and 5 minutes in a mechanical batch mixer with a sufficient amount of water to produce a workable consistency. Do not hand mix mortar unless approved by the Contracting Officer. Maintain workability of mortar by remixing or retempering. Discard mortar that has begun to stiffen or is not used within 2-1/2 hours after initial mixing.

e. For preblended mortar, follow manufacturer's mixing instructions.

2.5.2 Grout and Ready Mix Grout Mix

Use grout that conforms to ASTM C476, fine. Use conventional grout with a slump between 8 and 11 inches. Use self-consolidating grout with slump flow of 24 to 30 inches and a visual stability index (VSI) not greater than 1. Provide minimum grout strength of 3000 psi in 28 days, as tested in accordance with ASTM C1019. Do not change proportions and do not use materials with different physical or chemical characteristics in grout for the work unless additional evidence is furnished that grout meets the specified requirements. Use ready-mixed grout that conforms to ASTM C476.

2.6 ACCESSORIES

2.6.1 Grout Barriers

Grout barriers for vertical cores that consist of fine mesh wire, fiberglass, or expanded metal.

2.6.2 Anchors, Ties, and Bar Positioners

2.6.2.1 General

a. Fabricate anchors and ties without drips or crimps. Size anchors and ties to provide a minimum of 5/8 inch mortar cover from each face of masonry.

b. Fabricate steel wire anchors and ties shall from wire conforming to ASTM A1064/A1064M and hot-dip galvanize in accordance with ASTM A153/A153M.

c. Fabricate joint reinforcement in conformance with ASTM A951/A951M. Hot dip galvanize joint reinforcement in exterior walls and in interior walls exposed to moist environment in conformance with ASTM A153/A153M. Galvanize joint reinforcement in other interior walls in conformance with ASTM A641/A641M; coordinate with paragraph JOINT REINFORCEMENT below.

d. Fabricate sheet metal anchors and ties in conformance with ASTM A1008/A1008M. Hot dip galvanize sheet metal anchors and ties in exterior walls and in interior walls exposed to moist environment in compliance with ASTM A153/A153M Class B. Galvanize sheet metal anchors and ties in other interior walls in compliance with ASTM A653/A653M, Coating Designation G60.

e. Submit two anchors, ties.

2.6.2.2 Dovetail Anchors

Provide dovetail anchors of 3/16 inch diameter steel wire, triangular shaped, and attached to a 12 gauge or heavier steel dovetail section. Use these anchors to connect the exterior masonry wythe as it passes over the face of concrete columns, beams, or walls. Fill cells immediately above and below these anchors unless solid units are used. Furnish dovetail slots, which are specified to be installed by others, in accordance with Section 03 30 00 CAST-IN-PLACE CONCRETE.

2.6.2.3 Adjustable Anchors

2.6.2.3.1 Anchorage to Structural Steel

Provide hot-dip galvanized adjustable anchors for connecting masonry walls to the structural steel frame as detailed on the drawings. Provide zinc-rich paint for touching up paint after welding galvanized anchors to structural steel.

2.6.2.3.2 Anchorage of Veneer to Light Gauge Steel or Concrete Backing

Use one of the following types of adjustable anchors to connect veneer to light gauge steel or concrete backing:

a. sheet metal at least 7/8 inch wide, 0.06 inch thick, and with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch or bent, notched or punched to provide equivalent performance;

b. wire anchors of minimum size W1.7 with ends bent to form a minimum 2 inches extension and without drips;

c. or wire pintle anchors used in conjunction with joint reinforcement.

Do not exceed 1/16 inch clearance between connecting parts of the tie. Assemble adjustable anchors to prevent disengagement. Provide pintle anchors with one or more pintle legs of wire size W2.8 and an offset not exceeding 1-1/4 inch.

2.6.2.4 Bar Positioners

Factory-fabricate bar positioners, used to prevent displacement of reinforcing bars during the course of construction, from 9 gauge steel wire or equivalent, and hot-dip galvanized.

2.6.3 Joint Reinforcement

Factory fabricate joint reinforcement in conformance with ASTM A951/A951M, welded construction. Provide ladder type joint reinforcement, having one longitudinal wire in the mortar bed of each face shell for hollow units and one wire for solid units and with all wires a minimum of 9 gauge. Size joint reinforcement to provide a minimum of 5/8 inch cover from each face. Space crosswires not more than 16 inches. Provide joint reinforcement for straight runs in flat sections not less than 10 feet long. Provide joint reinforcement with factory formed corners and intersections. If approved for use, joint reinforcement may be furnished with adjustable wall tie features. Submit one piece of each type used, including corner and wall intersection pieces, showing at least two cross wires.

2.6.4 Reinforcing Steel Bars

Reinforcing steel bars and rods shall conform to ASTM A615/A615M or ASTM A996/A996M, Grade 60.

2.6.5 Concrete Masonry Control Joint Keys

Provide control joint keys of a factory fabricated solid section of natural or synthetic rubber (or combination thereof) conforming to ASTM D2000 M2AA-805 with a minimum durometer hardness of 80 or polyvinyl chloride conforming to ASTM D2287 Type PVC 654-4 with a minimum durometer hardness of 85. Form the control joint key with a solid shear section not less than 5/8 inch thick and 3/8 inch thick flanges, with a tolerance of plus or minus 1/16 inch, to fit neatly, but without forcing, in masonry unit jamb sash grooves.

2.6.6 Clay Masonry Expansion-Joint Materials

Provide backer rod and sealant, adequate to accommodate joint compression and extension equal to 50 percent of the width of the joint. Provide the backer rod of compressible rod stock of closed cell polyethylene foam, polyurethane foam, butyl rubber foam, or other flexible, nonabsorptive material as recommended by the sealant manufacturer. Provide sealant in conformance with Section 07 92 00 JOINT SEALANTS with a maximum volatile organic compound (VOC) content of 600 grams/liter.

Submit one piece of each type of material used.

2.6.7 Through Wall Flashing and Weeps

2.6.7.1 General

Provide stainless steel sheet, self-adhesive rubberized sheet, or reinforced membrane sheet flashing except that flashing indicated to terminate in reglets shall be metal or coated-metal flashing and except that the material shall be one which is not adversely affected by dampproofing material.

2.6.7.2 Coated-Copper Flashing

Provide 7 ounce, electrolytic copper sheet, uniformly coated on both sides with acidproof, alkaliproof, asphalt impregnated kraft paper or polyethylene sheets.

2.6.7.3 Stainless Steel Flashing

Provide stainless steel, ASTM A167, Type 304 or 316, 0.015 inch thick, No. 2D finish. Where indicated, provide with factory-fabricated deformations that mechanically bond flashing against horizontal movement in all directions, where deformations consist of dimples, diagonal corrugations, or a combination of dimples and transverse corrugations.

2.6.7.4 Rubberized Flashing

Provide self-adhesive rubberized asphalt sheet flashing consisting of 32-mil thick pliable and highly adhesive rubberized asphalt compound bonded completely and integrally to 8-mil thick, high density, cross-laminated polyethylene film to produce an overall thickness of 40 mils. Provide rubberized, asphalt-based mastic and surface conditioner that are each approved by flashing manufacturer for use with flashing material.

2.6.7.5 Metal Drip Edge

Provide stainless steel drip edge, 15-mil thick, hemmed edges, with down-turned drip at the outside edge and upturned dam at the inside edge for use with membrane flashings.

2.6.8 RIGID BOARD-TYPE INSULATION

Provide rigid board-type insulation as specified in Section 07 21 13 MINERAL FIBER BLANKET INSULATION.

PART 3 EXECUTION

3.1 EXAMINATION

Prior to start of work, verify the applicable conditions as set forth in TMS MSJC, inspection.

3.2 PREPARATION

3.2.1 Stains

Protect exposed surfaces from mortar and other stains. When mortar joints are tooled, remove mortar from exposed surfaces with fiber brushes and wooden paddles. Protect base of walls from splash stains by covering adjacent ground with sand, sawdust, or polyethylene.

3.2.2 Loads

Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed. Provide temporary bracing as required.

3.2.3 Concrete Surfaces

Where masonry is to be placed, clean concrete of laitance, dust, dirt, oil,

organic matter, or other foreign materials and slightly roughen to provide a surface texture with a depth of at least 1/8 inch. Sandblast, if necessary, to remove laitance from pores and to expose the aggregate.

3.2.4 Shelf Angles

Adjust shelf angles as required to keep the masonry level and at the proper elevation.

3.2.5 Bracing

Provide bracing and scaffolding necessary for masonry work. Design bracing to resist wind pressure as required by OSHA and local codes and submit bracing calculations, sealed by a registered professional engineer. Do not remove bracing in less than 10 days.

3.3 ERECTION

3.3.1 General

a. Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Lay masonry units in running and the indicated bond pattern. Lay facing courses level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances is plus or minus 1/2 inch. Adjust each unit to its final position while mortar is still soft and has plastic consistency.

b. Remove and clean units that have been disturbed after the mortar has stiffened, and relay with fresh mortar. Keep air spaces, cavities, chases, expansion joints, and spaces to be grouted free from mortar and other debris. Select units to be used in exposed masonry surfaces from those having the least amount of chipped edges or other imperfections detracting from the appearance of the finished work.

c. When necessary to temporarily discontinue the work, step (rack) back the masonry for joining when work resumes. Toothing may be used only when specifically approved by the Contracting Officer. Before resuming work, remove loose mortar and thoroughly clean the exposed joint. Cover the top of walls subjected to rain or snow with nonstaining waterproof covering or membrane when work is not in process. Extend the covering a minimum of 610 mm 2 feet down on each side of the wall and hold securely in place.

d. Ensure that units being laid and surfaces to receive units are free of water film and frost. Lay solid units in a nonfurrowed full bed of mortar. Bevel mortar for veneer wythes and slope down toward the cavity side. Shove units into place so that the vertical joints are tight. Completely fill vertical joints between solid units with mortar, except where indicated at control, expansion, and isolation joints. Place hollow units so that mortar extends to the depth of the face shell at heads and beds, unless otherwise indicated. Mortar will be permitted to protrude up to 1/2 inch into the space or cells to be grouted. Provide means to prevent mortar from dropping into the space below or clean grout spaces prior to grouting.

e. In multi-wythe construction with collar joints no more than 3/4 inch wide, bring up the inner wythe not more than 16 inches ahead of the outer wythe. Fill collar joints with mortar during the laying of the

facing wythe, and filling shall not lag the laying of the facing wythe by back-buttering each unit as it is laid.

3.3.1.1 Jointing

Tool mortar joints when the mortar is thumbprint hard. Tool horizontal joints after tooling vertical joints. Brush mortar joints to remove loose and excess mortar.

3.3.1.1.1 Tooled Joints

Tool mortar joints in exposed exterior and interior masonry surfaces concave, using a jointer that is slightly larger than the joint width so that complete contact is made along the edges of the unit. Perform tooling so that the mortar is compressed and the joint surface is sealed. Use a jointer of sufficient length to obtain a straight and true mortar joint.

3.3.1.1.2 Flush Joints

Flush cut mortar joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas. Finish flush cut joints by cutting off the mortar flush with the face of the wall. Point joints in unparged masonry walls below grade tight. For architectural units, such as fluted units, completely fill both the head and bed joints and flush cut.

3.3.1.1.3 Door and Window Frame Joints

On the exposed interior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch. On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of 3/8 inch.

3.3.1.1.4 Joint Widths

a. Construct brick masonry with mortar joint widths equal to the difference between the specified and nominal dimensions of the unit, within tolerances permitted by TMS MSJC.

b. Provide 3/8 inch wide mortar joints in concrete masonry, except for prefaced concrete masonry units.

c. Provide 3/8 inch wide mortar joints on unfaced side of prefaced concrete masonry units and not less than 3/16 inch nor more than 1/4 inch wide on prefaced side.

d. Maintain mortar joint widths within tolerances permitted by TMS MSJC

3.3.1.2 Cutting and Fitting

Use full units of the proper size wherever possible, in lieu of cut units. Locate cut units where they would have the least impact on the architectural aesthetic goals of the facility. Perform cutting and fitting, including that required to accommodate the work of others, by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut. Before being placed in the work, dry wet-cut units to the same surface-dry appearance as uncut units being laid in the wall. Provide cut edges that are clean, true and sharp.

a. Carefully make openings in the masonry so that wall plates, cover

plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints. Provide reinforced masonry lintels above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

b. Do not reduce masonry units in size by more than one-third in height and one-half in length. Do not locate cut products at ends of walls, corners, and other openings.

3.3.1.3 Unfinished Work

Rack back unfinished work for joining with new work. Toothing may be resorted to only when specifically approved by the Contracting Officer. Remove loose mortar and thoroughly clean the exposed joints before laying new work.

3.3.1.4 Clay Masonry Expansion Joints

Provide clay masonry expansion joints as indicated. Construct by leaving a gap. Ensure that no mortar or other noncompressible materials are within the joint. Install backer rod and sealant in accordance with Section 07 92 00 JOINT SEALANTS.

3.3.1.5 Control Joints

Provide control joints in concrete masonry as indicated. Construct by using sash jamb units with control joint key or using open end stretcher units placed with the closed end at the joint in accordance with the details shown on the Drawings. Form a continuous vertical joint at control joint locations, including through bond beams, by utilizing half blocks in alternating courses on each side of the joint. Interrupt the control joint key in courses containing continuous bond beam reinforcement. Do not interrupt the horizontal reinforcement and grout at the control joint.

Where mortar was placed in the joint, rake both faces of the control joints to a depth of 3/4 inch. Install backer rod and sealant on both faces in accordance with Section 07 92 00 JOINT SEALANTS.

3.3.2 Clay or Shale Brick Masonry

3.3.2.1 Brick Placement

Blend all brick at the jobsite from several cubes to produce a uniform appearance when installed. An observable "banding" or "layering" of colors or textures caused by improperly mixed brick is unacceptable. Lay brick facing with the better face exposed. Lay brick in running bond with each course bonded at corners, unless otherwise indicated. Lay molded brick with the frog side down. Do not lay brick that is cored, recessed, or has other deformations in a manner that allows those deformations to be exposed to view; lay 100 percent solid units in these areas. Completely fill head and bed joints of solid units with mortar. Lay hollow units with mortar joints as specified for concrete masonry units.

Place exterior face of salvaged bricks towards the exterior.

3.3.2.2 Wetting of Units

Wetting of clay, shale brick, or hollow brick units having an initial rate

of absorption of more than 1 gram per minute per square inch of bed surface shall be in conformance with ASTM C67. Ensure that each unit is nearly saturated when wetted but surface dry when laid.

Test clay or shale brick daily on the job, prior to laying, as follows: Using a wax pencil, draw a circle the size of a quarter on five randomly selected bricks. Apply 20 drops of water with a medicine dropper to the surface within the circle on each brick. If the average time that the water is completely absorbed in the five bricks is less than 1-1/2 minutes, wet bricks represented by the five bricks tested.

3.3.2.3 Brick Sills

Lay brick on edge, slope not less than 3/4 inch downward to the outside, and project not less than 1/2 inch beyond the face of the wall to form a wash and drip. Fill all joints solidly with mortar and tool.

3.3.3 Anchored Veneer Construction

a. Construct exterior masonry wythes to the thickness indicated on the drawings. Provide a minimum 2 inch air space behind the masonry veneer. Provide means to ensure that the cavity space and flashings are kept clean of mortar droppings and other loose debris. Maintain chases and raked-out joints free from mortar and debris.

b. Place masonry in running bond pattern.

c. For veneer over stud framing, do not install veneer until the exterior sheathing, moisture barrier, veneer anchors and flashing have been installed on the backing. Take extreme care to avoid damage to the moisture barrier and flashing during construction of the masonry veneer. Repair or replace portions of the moisture barrier and flashing that are damaged prior to completion of the veneer. Provide a continuous cavity as indicated.

d. For veneer with a masonry backup wythe, lay up both the inner and the outer wythes together except when adjustable joint reinforcement assemblies are approved for use. When both wythes are not brought up together, install through-wall flashings with the exterior wythe, securing the top edge of the flashing with a termination bar and sealant, or protect flashings that are installed with the interior wythe from damage until they are fully enclosed in the wall.

e. Provide anchors (ties) to connect the veneer to its backing in sufficient quantity to comply with the following requirements: maximum vertical spacing of 6 inches, and maximum horizontal spacing of 24 inches. Provide additional anchors around openings larger than 16 inch in either direction. Space anchors around perimeter of opening at a maximum of 24 inches on center. Place anchors within 12 inches of openings. Anchors with drips are not permitted.

f. With solid units, embed anchors in mortar joint and extend into the veneer a minimum of 1-1/2 inch, with at least 5/8 inch mortar cover to the outside face.

g. With hollow units, embed anchors in mortar or grout and extend into the veneer a minimum of 1-1/2 inch, with at least 5/8 inch mortar or grout cover to outside face.

3.3.4 Reinforced, Single Wythe Concrete Masonry Units Walls

3.3.4.1 Concrete Masonry Unit Placement

a. Fully bed units used to form piers, pilasters, columns, starting courses on footings, solid foundation walls, lintels, and beams, and where cells are to be filled with grout in mortar under both face shells and webs. Provide mortar beds under both face shells for other units. Mortar head joints for a distance in from the face of the unit not less than the thickness of the face shell.

b. Solidly grout foundation walls below grade.

c. Stiffen double walls at wall-mounted plumbing fixtures by use of strap anchors, two above each fixture and two below each fixture, located to avoid pipe runs, and extending from center to center of each wall within the double wall. Adequately reinforce walls and partitions for support of wall-hung plumbing fixtures when chair carriers are not specified.

d. Submit drawings showing elevations of walls exposed to view and indicating the location of all cut CMU products.

3.3.4.2 Preparation for Reinforcement

Lay units in such a manner as to preserve the unobstructed vertical continuity of cores to be grouted. Remove mortar protrusions extending 1/2 inch or more into cells before placing grout. Position reinforcing bars accurately as indicated before placing grout. Where vertical reinforcement occurs, fill cores solid with grout in accordance with paragraph PLACING GROUT in this Section.

3.3.5 ANCHORAGE

3.3.5.1 Anchorage to Concrete

Anchorage of masonry to the face of concrete columns, beams, or walls shall be with dovetail anchors spaced not over 16 inches on centers vertically and 24 inches on center horizontally.

3.3.5.2 Anchorage to Structural Steel

Masonry shall be anchored to vertical structural steel framing with adjustable steel wire anchors spaced not over 16 inches on centers vertically, and if applicable, not over 24 inches on centers horizontally.

3.3.5.3 Anchorage at Intersecting Walls

Provide wire mesh anchors at maximum 16 inches spacing at intersections of interior non-bearing masonry walls.

Anchor structural masonry walls with reinforced bond beams and horizontal joint reinforcement as indicated in the contract drawings, unless the drawings indicate a movement joint at the intersection.

3.3.6 Lintels

3.3.6.1 Masonry Lintels

Construct masonry lintels with lintel units filled solid with grout in all courses and reinforced with a minimum of two No. 5 bars in the bottom course unless otherwise indicated. Extend lintel reinforcement beyond each side of masonry opening 40 bar diameters or 24 inches, whichever is greater. Support reinforcing bars in place prior to grouting and locate 1/2 inch above the bottom inside surface of the lintel unit.

3.3.6.2 Precast Concrete and Steel Lintels

Provide precast concrete and steel lintels as shown on the Drawings. Set lintels in a full bed of mortar with faces plumb and true. Provide steel and precast lintels with a minimum bearing length of 8 inches unless otherwise indicated. In partially grouted masonry, provide fully grouted units under the full lintel bearing length, unless otherwise indicated.

3.4 INSTALLATION

3.4.1 Bar Reinforcement Installation

3.4.1.1 Preparation

Submit detail drawings showing bar splice locations. Identify bent bars on a bending diagram and reference and locate such bars on the drawings. Show wall dimensions, bar clearances, and wall openings. Utilize bending details that conform to the requirements of ACI SP-66. No approval will be given to the shop drawings until the Contractor certifies that all openings, including those for mechanical and electrical service, are shown. If, during construction, additional masonry openings are required, resubmit the approved shop drawings with the additional openings shown along with the proposed changes. Clearly highlight location of these additional openings. Provide wall elevation drawings with minimum scale of 1/4 inch per foot. Submit drawings including plans, elevations, and details of wall reinforcement; details of reinforcing bars at corners and wall intersections; offsets; tops, bottoms, and ends of walls; control and expansion joints; lintels; and wall openings.

Clean reinforcement of loose, flaky rust, scale, grease, mortar, grout, and other coatings that might destroy or reduce its bond prior to placing grout. Do not use bars with kinks or bends not shown on the approved shop drawings. Place reinforcement prior to grouting. Unless otherwise indicated, extend vertical wall reinforcement to within 2 inches of tops of walls.

3.4.1.2 Positioning Bars

a. Accurately place vertical bars within the cells at the positions indicated on the drawings. A minimum clearance of 1/2 inch shall be maintained between the bars and masonry units. Provide minimum clearance between parallel bars of 1/2 inch between the bars and masonry units for coarse grout and a minimum clearance of 1/4 inch between the bars and masonry units for fine grout. Provide minimum clearance between parallel bars of 1 inch or one diameter of the reinforcement, whichever is greater. Vertical reinforcement may be held in place using bar positioners located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the

reinforcement or by other means to prevent displacement beyond permitted tolerances. As masonry work progresses, secure vertical reinforcement to prevent displacement beyond allowable tolerances.

b. Wire column and pilaster lateral ties in position around the vertical reinforcing bars. Place lateral ties in contact with the vertical reinforcement and do not place in horizontal mortar bed joints.

c. Position horizontal reinforcing bars as indicated. Stagger splices in adjacent horizontal bars, unless otherwise indicated.

d. Form splices by lapping bars as indicated. Do not cut, bend or eliminate reinforcing bars. Foundation dowel bars may be field-bent when permitted by TMS MSJC.

3.4.1.3 Splices of Bar Reinforcement

Lap splice reinforcing bars as indicated. When used, provide welded or mechanical connections that develop at least 125 percent of the specified yield strength of the reinforcement.

3.4.2 Placing Grout

3.4.2.1 General

Fill cells containing reinforcing bars with grout. Solidly grout hollow masonry units in walls or partitions supporting plumbing, heating, or other mechanical fixtures, voids at door and window jambs, and other indicated spaces. Solidly grout cells under lintel bearings on each side of openings for full height of openings. Solidly grout walls below grade, lintels, and bond beams. Units other than open end units may require grouting each course to preclude voids in the units.

Discard site-mixed grout that is not placed within 1-1/2 hours after water is first added to the batch or when the specified slump is not met without adding water after initial mixing. Discard ready-mixed grout that does not meet the specified slump without adding water other than water that was added at the time of initial discharge. Allow sufficient time between grout lifts to preclude displacement or cracking of face shells of masonry units. Provide a grout shear key between lifts when grouting is delayed and the lower lift loses plasticity. If blowouts, flowouts, misalignment, or cracking of face shells should occur during construction, tear down the wall and rebuild.

3.4.2.2 Horizontal Grout Barriers

Embed horizontal grout barriers in mortar below cells of hollow units receiving grout.

3.4.2.3 Grout Holes and Cleanouts

3.4.2.3.1 Grout Holes

Provide grouting holes in slabs, spandrel beams, and other in-place overhead construction. Locate holes over vertical reinforcing bars or as required to facilitate grout fill in bond beams. Provide additional openings spaced not more than 16 inches on centers where grouting of hollow unit masonry is indicated. Fom such openings not less than 4 inches in diameter or 3 by 4 inches in horizontal dimensions. Upon completion of

grouting operations, plug and finish grouting holes to match surrounding surfaces.

3.4.2.3.2 Cleanouts for Hollow Unit Masonry Construction

For hollow masonry units. provide cleanout holes at the bottom of every grout pour in cores containing vertical reinforcement when the height of the grout pour exceeds 5 feet 4 inches. Where all cells are to be grouted, construct cleanout courses using bond beam units in an inverted position to permit cleaning of all cells. Provide cleanout holes at a maximum spacing of 32 inches where all cells are to be filled with grout.

Establish a new series of cleanouts if grouting operations are stopped for more than 4 hours. Provide cleanouts not less than 3 by 3 inch by cutting openings in one face shell. Manufacturer's standard cutout units may be used at the Contractor's option. Do not cleanout holes until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, close cleanout holes in an approved manner to match surrounding masonry.

3.4.2.3.3 Cleanouts for Multi-Wythe Composite Masonry Construction

Provide cleanouts for construction of walls that incorporate a grout filled cavity between solid masonry wythes, provide cleanouts at the bottom of every pour by omitting every other masonry unit from one wythe. Establish a new series of cleanouts if grouting operations are stopped for more than 4 hours. Do not plug cleanout holes until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, close cleanout holes in an approved manner to match surrounding masonry.

3.4.2.4 Grout Placement

A grout pour is the total height of masonry to be grouted prior to erection of additional masonry. A grout lift is an increment of grout placement within a grout pour. A grout pour is filled by one or more lifts of grout.

a. Lay masonry to the top of a pour permitted by TMS MSJC Table 7, based on the size of the grout space and the type of grout. Prior to grouting, remove masonry protrusions that extend 1/2 inch or more into cells or spaces to be grouted. Provide grout holes and cleanouts in accordance with paragraph GROUT HOLES AND CLEANOUTS above when the grout pour height exceeds 5 feet 4 inches. Hold reinforcement, bolts, and embedded connections rigidly in position before grouting is started. Do not prewet concrete masonry units.

b. Place grout using a hand bucket, concrete hopper, or grout pump to fill the grout space without segregation of aggregate. Operate grout pumps to produce a continuous stream of grout without air pockets, segregation, or contamination.

c. If the masonry has cured at least 4 hours, grout slump is maintained between 10 to 11 inches, and no intermediate reinforced bond beams are placed between the top and bottom of the pour height, place conventional grout in lifts not exceeding 12 feet 8 inches. For the same curing and slump conditions but with intermediate bond beams, limit conventional grout lift to the bottom of the lowest bond beam that is more than 5 feet 4 inches above the bottom of the lift, but do not exceed 12 feet 8 inches. If masonry has not cured at least 4 hours

or grout slump is not maintained between 10 to 11 inches, place conventional grout in lifts not exceeding 5 feet 4 inches.

d. Consolidate conventional grout lift and reconsolidate after initial settlement before placing next lift. For grout pours that are 12 inches or less in height, consolidate and reconsolidate grout by mechanical vibration or puddling. For grout pours that are greater than 12 inches in height, consolidate and reconsolidate grout by mechanical vibration. Apply vibrators at uniformly spaced points not further apart than the visible effectiveness of the machine. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation. If previous lift is not permitted to set, dip vibrator into previous lift. Do not insert vibrators into lower lifts that are in a semi-solidified state. If lower lift sets prior to placement of subsequent lift, form a grout key by terminating grout a minimum of 1-1/2 inch below a mortar joint. Vibrate each vertical cell containing reinforcement in partially grouted masonry. Do not form grout keys within beams.

e. If the masonry has cured 4 hours, place self-consolidating grout (SCG) in lifts not exceeding the pour height. If masonry has not cured for at least 4 hours, place SCG in lifts not exceeding 5 feet 4 inches. Do not mechanically consolidate self-consolidating grout. Place self-consolidating grout in accordance with manufacturer's recommendations.

f. Upon completion of each day's grouting, remove waste materials and debris from the equipment, and dispose of outside the masonry.

3.4.3 Joint Reinforcement Installation

Install joint reinforcement at 16 inches on center unless otherwise indicated. Lap joint reinforcement not less than 6 inches. Install prefabricated sections at corners and wall intersections. Place the longitudinal wires of joint reinforcement in mortar beds to provide not less than 5/8 inch cover to either face of the unit.

3.4.4 Bond Beams

Reinforce and grout bond beams as indicated and as described in paragraphs above. Install grout barriers under bond beam units to retain the grout as required, unless wall is fully grouted or solid bottom units are used. For high lift grouting in partially grouted masonry, provide grout retaining material on the top of bond beams to prevent upward flow of grout. Ensure that reinforcement is continuous, including around corners, except through control joints or expansion joints, unless otherwise indicated.

3.4.5 Flashing and Weeps

Install through-wall flashing at obstructions in the cavity and where indicated on Drawings. Ensure continuity of the flashing at laps and inside and outside corners by splicing in a manner approved by the flashing manufacturer. Ensure that the top edge of the flashing is sealed by attaching a termination bar and applying compatible sealant at the top edge of the termination bar lapping a minimum of 6 inches under the weather resistive barrier. Terminate the horizontal leg of the flashing terminating the fabric flashing 1/2 inch short of the outside face of masonry and adhering the flashing to a sheet metal drip edge. Provide sealant below the drip edge of through-wall flashing.

Wherever through-wall flashing occurs, provide weep holes to drain flashing to exterior at acceptable locations as indicated. Provide weeps of open head joints. Locate weeps not more than 24 inches on centers in mortar joints of the exterior wythe directly on the horizontal leg of through-wall flashing over foundations, bond beams, and any other horizontal interruptions of the cavity. Place weep holes perfectly horizontal or slightly canted downward to encourage water drainage outward and not inward. Other methods may be used for providing weeps when spacing is reduced to 16 inches on center and approved by the Contracting Officer. Maintain weeps free of mortar and other obstructions.

3.5 APPLICATION

3.5.1 Insulation

Insulate cavity walls (multi-wythe noncomposite masonry walls), where shown, by installing board-type insulation on the cavity side of the inner wythe. Apply board type insulation directly to the masonry or thru-wall flashing with adhesive. Neatly fit insulation between obstructions without impaling insulation on ties or anchors. Apply insulation in parallel courses with vertical joints breaking midway over the course below and in moderate contact with adjoining units without forcing. Cut to fit neatly against adjoining surfaces. Tape or seal the joints between the boards.

3.5.2 Interface with Other Products

3.5.2.1 Built-In Items

Fill spaces around built-in items with mortar. Point openings around flush-mount electrical outlet boxes in wet locations with mortar. Embed anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in as the masonry work progresses. Fully embed anchors, ties and joint reinforcement in the mortar. Fill cells receiving anchor bolts and cells of the first course below bearing plates with grout, unless otherwise indicated.

3.5.2.2 Door and Window Frame Joints

On the exposed interior and exterior sides of exterior frames, rake joints between frames and abutting masonry walls to a depth of 3/8 inch.

3.5.2.3 Bearing Plates

Set bearing plates for beams, joists, joist girders and similar structural members to the proper line and elevation with damp-pack bedding mortar, except where non-shrink grout is indicated. Provide bedding mortar and non-shrink grout s specified in Section 03 30 00 CAST-IN-PLACE CONCRETE.

3.5.3 Tolerances

Lay masonry plumb, true to line, with courses level within the tolerances of TMS MSJC, Article 3.3 F.

3.6 FIELD QUALITY CONTROL

3.6.1 Tests

3.6.1.1 Field Testing of Mortar

Prepare and test mortar samples for mortar aggregate ratio in accordance with ASTM C780 Appendix A4. Prepare and test mortar compressive strength specimens in accordance with ASTM C780 Appendix A6.

3.6.1.2 Field Testing of Grout

a. Perform grout testing at the following frequency: 1 time per day. For each required grout property to be evaluated, provide a minimum of three specimens.

b. Sample and test conventional and self-conslidating grout for compressive strength and temperature in accordance with ASTM C1019.

c. Evaluate slump in conventional grout in accordance with ASTM C1019.

d. Evaluate slump flow and visual stability index of self-consolidating grout in accordance with ASTM C1611/C1611M.

3.6.1.3 Single-Wythe Masonry Wall Water Penetration Test

Prior to start of field construction of the single-wythe concrete masonry wall, perform masonry wall water penetration test on mock-up wall assemblies consisting of the identical design, materials, mix, and construction methods as the actual wall construction and in accordance with ASTM E514/E514M. Prepare a minimum of three specimens and cure for minimum 28 days prior to testing. Construct panels by the same methods, processes, and applications to be used on the project's construction site. Spray test for 6 hours on each specimen. If water is visible on back of test panels during the test and areas of dampness on the backside of the test panels do not exceed 25 percent of the wall area, the panels will be considered to have passed. Dampness is defined as any area of surface darkening or discoloration due to moisture penetration or accumulation below the observed surface.

Construct additional test panels for each failed test performed until three test panels pass the test. Factors that can affect test performance include materials, mixing, and quality of application and workmanship. Materials, mixing, and methods adjustments may be necessary in order to provide construction that passes the water penetration test. Document and record the test specimen construction materials and application and provide written test report in accordance with ASTM E514/E514M, supplemented by a detailed discussion of the specifics of test panel construction, application methods and processes used, quality of construction, and any variances or deviations that may have occurred between test panels during test panel construction. For failed test panels, identify in the supplemental report the variances, deficiencies or flaws that contributed to test panel failure and itemize the precautions to be taken in field construction of the masonry wall to prevent similar deficiencies and assure the wall construction replicates test panel conditions that pass the water penetration test. Submit the complete, certified test report, including supplemental report, to the Contracting Officer prior to start of single-wythe concrete masonry wall construction. Significant changes to materials, proportions, or construction techniques from those used in the

passing water penetration test are grounds for performing new tests, at the discretion of the Contracting Officer.

3.7 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, completely remove mortar and grout daubs and splashings from masonry-unit surfaces that will be exposed or painted. Before completion of the work, rake out defects in joints of masonry to be exposed or painted, fill with mortar, and tool to match existing joints. Immediately after grout work is completed, remove scum and stains that have percolated through the masonry work using a low pressure stream of water and a stiff bristled brush. Do not clean masonry surfaces, other than removing excess surface mortar, until mortar in joints has hardened. Leave masonry surfaces clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Do not use metal tools and metal brushes for cleaning.

3.7.1 Dry-Brushing Concrete Masonry

Dry brush exposed concrete masonry surfaces at the end of each day's work and after any required pointing, using stiff-fiber bristled brushes.

3.7.2 Clay Brick Surfaces

Clean exposed clay brick masonry surfaces to obtain surfaces free of stain, dirt, mortar and grout daubs, efflorescence, and discoloration or scum from cleaning operations. Perform cleaning in accordance with the approved cleaning procedure demonstrated on the mockup.

After cleaning, examine the sample panel of similar material for discoloration or stain as a result of cleaning. If the sample panel is discolored or stained, change the method of cleaning to ensure that the masonry surfaces in the structure will not be adversely affected. Water-soak exposed masonry surfaces and then clean with a proprietary masonry cleaning agent specifically recommended for the color and texture by the clay brick manufacturer and manufacturer of the cleaning product. Apply the solution with stiff fiber brushes, followed immediately by thorough rinsing with clean water. Use proprietary cleaning agents in conformance with the cleaning product manufacturer's printed recommendations. Remove efflorescence in conformance with the brick manufacturer's recommendations.

3.8 PROTECTION

Protect facing materials against staining. Cover top of walls with nonstaining waterproof covering or membrane to protect from moisture intrusion when work is not in progress. Continue covering the top of the unfinished walls until the wall is waterproofed with a complete roof or parapet system. Extend covering a minimum of 2 feet down on each side of the wall and hold securely in place. Before starting or resuming work, clean top surface of masonry in place of loose mortar and foreign material.

-- End of Section --

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SECTION 05 12 00

STRUCTURAL STEEL
08/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 207	(2016; R 2017) Certification Standard for Steel Fabrication and Erection, and Manufacturing of Metal Components
AISC 303	(2016) Code of Standard Practice for Steel Buildings and Bridges
AISC 325	(2017) Steel Construction Manual
AISC 326	(2009) Detailing for Steel Construction
AISC 360	(2016) Specification for Structural Steel Buildings
AISC 420	(2010) Certification Standard for Shop Application of Complex Protective Coating Systems
AISC DESIGN GUIDE 10	(1997) Erection Bracing of Low-Rise Structural Steel Buildings

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ANSI/ASNT CP-189	(2016) ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel (ANSI/ASNT CP-105-2006)

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(2012) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel
AWS QC1	(2016) Specification for AWS Certification of Welding Inspectors

ASME INTERNATIONAL (ASME)

ASME B46.1	(2009) Surface Texture, Surface Roughness, Waviness and Lay

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A143/A143M	(2007; R 2014) Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
ASTM A29/A29M	(2016) Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
ASTM A307	(2014; E 2017) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A500/A500M	(2018) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A563	(2015) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A563M	(2007; R 2013) Standard Specification for Carbon and Alloy Steel Nuts (Metric)
ASTM A6/A6M	(2017a) Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A780/A780M	(2009; R 2015) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A992/A992M	(2011; R 2015) Standard Specification for Structural Steel Shapes
ASTM B695	(2004; R 2016) Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
ASTM C1107/C1107M	(2017) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C827/C827M	(2016) Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
ASTM F1136/F1136M	(2011) Standard Specification for Zinc/Aluminum Corrosion Protective Coatings for Fasteners

ASTM F1554	(2018) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F2329/F2329M	(2015) Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
ASTM F2833	(2011; R 2017) Standard Specification for Corrosion Protective Fastener Coatings with Zinc Rich Base Coat and Aluminum Organic/Inorganic Type
ASTM F3125/F3125M	(2015a) Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions
ASTM F436/F436M	(2016) Standard Specification for Hardened Steel Washers Inch and Metric Dimensions
ASTM F844	(2007a; R 2013) Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM F959/F959M	(2017a) Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners, Inch and Metric Series

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC PA 1	(2016) Shop, Field, and Maintenance Coating of Metals
SSPC Paint 20	(2002; E 2004) Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic)
SSPC Paint 29	(2002; E 2004) Zinc Dust Sacrificial Primer, Performance-Based
SSPC SP 3	(1982; E 2004) Power Tool Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2019) Structural Engineering
UFC 3-310-04	(2013; with Change 1, 2016) Seismic Design of Buildings

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR Part 1926, Subpart R	Steel Erection

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Erection Drawings; G

SD-02 Shop Drawings

Fabrication Drawings Including Details of Connections; G

SD-03 Product Data

Shop Primer

Welding Electrodes and Rods

Direct Tension Indicator Washers

Non-Shrink Grout

Tension Control Bolts

Recycled Content for Structural Steel; S

Recycled Content for Structural Steel Tubing; S

SD-05 Design DataDesign Calculations for Steel Connections; G
SD-06 Test Reports

Class B Coating

Bolts, Nuts, and Washers

Weld Inspection Reports

Direct Tension Indicator Washer Inspection Reports

Bolt Testing Reports

SD-07 Certificates

Steel

Bolts, Nuts, and Washers

AISC Structural Steel Fabricator Quality Certification

Welding Procedures and Qualifications

Welding Electrodes and Rods

Certified Welding Inspector

NDT Technician

Welding Procedure Specifications (WPS)

1.3 AISC QUALITY CERTIFICATION

Work must be fabricated by an AISC Certified Structural Steel Fabricator, in accordance with AISC 207, Category BU. Submit AISC Structural Steel Fabricator quality certification.

1.4 QUALITY ASSURANCE

1.4.1 Preconstruction Submittals

1.4.1.1 Erection Drawings

Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing. The erection drawings must conform to AISC 303.

1.4.2 Fabrication Drawing Requirements

Submit fabrication drawings for approval prior to fabrication. Prepare in accordance with AISC 303, AISC 326 and AISC 325. Fabrication drawings must not be reproductions of contract drawings. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Use AWS A2.4 standard welding symbols. Clearly highlight any deviations from the details shown on the contract drawings highlighted on the fabrication drawings. Explain the reasons for any deviations from the contract drawings.

1.4.3 Delegated Connection Design

Design structural steel connections where reactions are indicated in the contract documents per AISC 303, Option 3, using the connection loads indicated. Submit design calculations for steel connections signed and sealed by a registered professional engineer.

1.4.4 Certifications

1.4.4.1 Welding Procedures and Qualifications

Prior to welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. If the qualification date of the welder or welding operator is more than 6 months old, the welding operator's qualification certificate must be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months.

Conform to all requirements specified in AWS D1.1/D1.1M.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide the structural steel system, including shop primer and galvanizing, complete and ready for use. Provide structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing in accordance with AISC 303, AISC 360, UFC 3-301-01 and UFC 3-310-04 except as modified in this contract.

2.2 STEEL

2.2.1 Structural Steel

Wide flange and WT shapes, ASTM A992/A992M. Angles, Channels and Plates, ASTM A36/A36M. Provide structural steel containing a minimum of 80 percent recycled content. Submit data identifying percentage of recycled content for structural steel.

2.2.2 Structural Steel Tubing

ASTM A500/A500M, Grade B. Provide structural steel tubing containing a minimum of 25 percent recycled content. Submit data identifying percentage of recycled content for structural steel tubing.

2.3 BOLTS, NUTS, AND WASHERS

Submit the certified manufacturer's mill reports which clearly show the applicable ASTM mechanical and chemical requirements together with the actual test results for the supplied fasteners.

2.3.1 Common Grade Bolts

2.3.1.1 Bolts

ASTM A307, Grade A, plain finish hot dipped zinc coating. The bolt heads and the nuts of the supplied fasteners must be marked with the manufacturer's identification mark, the strength grade and type specified by ASTM specifications.

2.3.1.2 Nuts

ASTM A563, Grade A, heavy hex style.

2.3.1.3 Washers

ASTM F844.

2.3.2 High-Strength Bolts

High strength bolts and nuts must be shipped together in the same shipping container. Fasteners indicated to be galvanized shall be tested by the supplier to show that the galvanized nut with the supplied lubricant provided may be rotated from the snug tight condition well in excess of the rotation required for pretentioned installation without stripping. The supplier shall supply nuts that have been lubricated and tested with the supplied bolts.

2.3.2.1 Bolts

ASTM F3125/F3125M, Grade A325M A325 , Type 1 Heavy Hex Head Style, plain finish in conditioned spaces and hot dipped zinc coating in all unconditioned spaces, including porches and soffits.

2.3.2.2 Nuts

ASTM A563, Grade and Style as specified in the applicable ASTM bolt standard.

2.3.2.3 Direct Tension Indicator Washers

ASTM F959/F959M. Provide ASTM B695, Class 55, Type 1 galvanizing. Submit product data for direct tension indicator washers.

2.3.2.4 Washers

ASTM F436/F436M, plain carbon steel.

2.3.3 Tension Control Bolts

ASTM F3125/F3125M, Grade F1852 or F2280, Type 1, twistoff style assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon steel nuts, and hardened carbon steel washers. Assembly finish must be plain in conditioned spaces and mechanically deposited zinc coating in all unconditioned spaces, included porches and soffits. Submit product data for tension control bolts.

2.3.4 Foundation Anchorage

2.3.4.1 Anchor Rods

ASTM F1554 Gr 36 , Class 1A. Hot Dip Galvanized.

2.3.4.2 Anchor Nuts

ASTM A563, Grade A, hex style, Hot Dip Galvanized.

2.3.4.3 Anchor Washers

ASTM F844.

2.3.4.4 Anchor Plate Washers

ASTM A36/A36M, Hot Dip Galvanized.

2.4 STRUCTURAL STEEL ACCESSORIES

2.4.1 Welding Electrodes and Rods

AWS D1.1/D1.1M. Submit product data for welding electrodes and rods.

2.4.2 Non-Shrink Grout

ASTM C1107/C1107M, with no ASTM C827/C827M shrinkage. Submit product data for non-shrink grout.

2.4.3 Welded Shear Stud Connectors

ASTM A29/A29M, Grades 1010 through 1020. AWS D1.1/D1.1M, Table 7.1, Type B.

2.5 GALVANIZING

ASTM F2329/F2329M, ASTM F1136/F1136M, ASTM F2833 or ASTM B695 for threaded parts or ASTM A123/A123M for structural steel members, as applicable, unless specified otherwise galvanize after fabrication where practicable.

2.6 FABRICATION

Fabrication must be in accordance with the applicable provisions of AISC 325. Fabrication and assembly must be done in the shop to the greatest extent possible. Punch, subpunch and ream, or drill bolt holes perpendicular to the surface of the member.

Compression joints depending on contact bearing must have a surface roughness not in excess of 500 micro inch as determined by ASME B46.1, and ends must be square within the tolerances for milled ends specified in ASTM A6/A6M.

Shop splices of members between field splices will be permitted only where indicated on the Contract Drawings. Splices not indicated require the approval of the Contracting Officer.

Do not splice truss top and bottom chords except as approved by the Contracting Officer. Provide chord splices at panel joints at approximately the third point of the span. The center of gravity lines of truss members must intersect at panel points unless otherwise approved by the Contracting Officer. When the center of gravity lines do not intersect at a panel point, make provisions for the stresses due to eccentricity. Camber of trusses must be 1/8 inch in 10 feet unless otherwise indicated.

2.6.1 Markings

Prior to erection, identify members by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections must be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations. Affix embossed tags to hot-dipped galvanized members.

2.6.2 Shop Primer

SSPC Paint 20 or SSPC Paint 29, (zinc rich primer). Shop prime structural steel, except as modified herein, in accordance with SSPC PA 1. Do not prime steel surfaces embedded in concrete, galvanized surfaces, surfaces to receive sprayed-on fireproofing, surfaces designed as part of a composite steel concrete section, or surfaces within 0.5 inch of the toe of the welds prior to welding (except surfaces on which metal decking and shear studs are to be welded). If flash rusting occurs, re-clean the surface prior to application of primer. Apply primer in accordance with endorsement "SPE-P1" of AISC 420 or approved equal NACE or SSPC certificationto a minimum dry film thickness of 2.0 mil. Submit shop primer product data.

Prime slip critical surfaces with a Class B coating in accordance with AISC 325. Submit test report for Class B coating.

Prior to assembly, prime surfaces which will be concealed or inaccessible after assembly. Do not apply primer in foggy or rainy weather; when the ambient temperature is below 45 degrees F or over 95 degrees F; or when the primer may be exposed to temperatures below 40 degrees F within 48 hours after application, unless approved otherwise by the Contracting Officer. Repair damaged primed surfaces with an additional coat of primer.

2.6.2.1 Cleaning

SSPC SP 6/NACE No.3, except steel exposed in spaces above ceilings, attic spaces, furred spaces, and chases that will be hidden to view in finished construction may be cleaned to SSPC SP 3 when recommended by the shop primer manufacturer. Maintain steel surfaces free from rust, dirt, oil, grease, and other contaminants through final assembly.

2.6.3 Fireproofing Coated Surfaces

Clean and prepare surfaces to receive sprayed-on fireproofing coatings in accordance with the manufacturer's recommendations, and as specified in Section 07 81 00 SPRAY-APPLIED FIREPROOFING.

2.7 DRAINAGE HOLES

Drill adequate drainage holes to eliminate water traps. Hole diameter must be 1/2 inch and location indicated on the detail drawings. Hole size and locations must not affect the structural integrity.

PART 3 EXECUTION

3.1 ERECTION

a. Erection of structural steel, except as indicated in item b. below, must be in accordance with the applicable provisions of AISC 325, AISC 303 and 29 CFR Part 1926, Subpart R.

b. For low-rise structural steel buildings (60 feet tall or less and a maximum of 2 stories), erect the structure in accordance with AISC DESIGN GUIDE 10.

After final positioning of steel members, provide full bearing under base plates and bearing plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer's instructions.

3.1.1 STORAGE

Store the material out of contact with the ground in such manner and location as to minimize deterioration.

3.2 CONNECTIONS

Except as modified in this section, design connections indicated in accordance with AISC 360. Build connections into existing work. Do not tighten anchor bolts set in concrete with impact torque wrenches. Holes must not be cut or enlarged by burning. Bolts, nuts, and washers must be clean of dirt and rust, and lubricated immediately prior to installation.

3.2.1 Common Grade Bolts

Tighten ASTM A307 bolts to a "snug tight" fit. "Snug tight" is the

tightness that exists when plies in a joint are in firm contact. If firm contact of joint plies cannot be obtained with a few impacts of an impact wrench, or the full effort of a man using a spud wrench, contact the Contracting Officer for further instructions.

3.2.2 High-Strength Bolts

Provide direct tension indicator washers in all ASTM F3125/F3125M, Grade A325 and Grade A490 bolted connections. Bolts must be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, fully tension bolts, progressing from the most rigid part of a connection to the free edges.

Fastener components shall be protected from dirt and moisture in closed containers at the site of the installation. Fastener components that are not incorporated into the work shall be returned to protected storage at the end of the work shift.

3.2.2.1 Installation of Direct Tension Indicator Washers (DTIW)

Where possible, install the DTIW under the bolt head and tighten the nut. If the DTIW is installed adjacent to the turned element, provide a flat washer between the DTIW and nut when the nut is turned for tightening, and between the DTIW and bolt head when the bolt head is turned for tightening. In addition to the LIW, provide flat washers under both the bolt head and nut when ASTM F3125/F3125M, Grade A490 bolts are used.

3.2.3 Tension Control Bolts

Bolts must be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, fully tension bolts, progressing from the most rigid part of a connection to the free edges.

3.3 GAS CUTTING

Use of gas-cutting torch in the field for correcting fabrication errors is not permitted on any major member in the structural framing. Use of a gas cutting torch will be permitted on minor members not under stress only after approval has been obtained from the Contracting Officer.

3.4 WELDING

Welding must be in accordance with AWS D1.1/D1.1M Provide AWS D1.1/D1.1M qualified welders, welding operators, and tackers.

Develop and submit the Welding Procedure Specifications (WPS) for all welding, including welding done using prequalified procedures. Submit for approval all WPS, whether prequalified or qualified by testing.

3.4.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips

Remove only from finished areas.

3.5 SHOP PRIMER REPAIR

Repair shop primer in accordance with the paint manufacturer's recommendation for surfaces damaged by handling, transporting, cutting, welding, or bolting.

3.5.1 Field Priming

Field prime steel exposed to the weather, or located in building areas without HVAC for control of relative humidity. After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat must be cleaned and primed with paint of the same quality as that used for the shop coat.

3.6 GALVANIZING REPAIR

Repair damage to galvanized coatings using ASTM A780/A780M zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces to which repair paint has been applied.

3.7 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing. Notify the Contracting Officer in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of the inspection.

3.7.1 Welds

3.7.1.1 Visual Inspection

AWS D1.1/D1.1M. Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections. A Certified Welding Inspector must perform visual inspection on 100 percent of all welds. Document this inspection in the Visual Weld Inspection Log. Submit certificates indicating that certified welding inspectors meet the requirements of AWS QC1.

3.7.1.2 Nondestructive Testing

Nondestructive testing must be in accordance with AWS D1.1/D1.1M. Ultrasonic testing must be performed in accordance with Table 6.2 of AWS D1.1/D1.1M. Test locations must be selected by the Contracting Officer. All personnel performing NDT must be certified in accordance with ANSI/ASNT CP-189 in the method of testing being performed. Submit certificates showing compliance with ANSI/ASNT CP-189 for all NDT technician s. If more than 20 percent of welds made by a welder contain defects identified by testing, then all groove welds made by that welder must be tested by ultrasonic testing, and all fillet welds made by that welder must be inspected by magnetic particle testing (MT) or dye penetrant testing (PT) as approved by the Contracting Officer. When groove welds made by an individual welder are required to be tested, magnetic particle or dye penetrant testing may be used only in areas inaccessible to ultrasonic testing. Retest all repaired areas. Submit weld inspection reports.

Testing frequency: Provide the following types and number of tests:

Test Type	Number of Tests
Ultrasonic	20 percent of CJP Welds
Magnetic Particle	20 percent of PJP

Test Type	Number of Tests
Dye Penetrant	20 percent of PJP

3.7.2 Direct Tension Indicator Washers

3.7.2.1 Direct Tension Indicator Washer Compression

Test direct tension indicator washers in place to verify that they have been compressed sufficiently to provide the 0.015 inch gap, as required by ASTM F959/F959M. Submit direct tension indicator washer inspection reports.

3.7.3 High-Strength Bolts

3.7.3.1 Testing Bolt, Nut, and Washer Assemblies

Test a minimum of 3 bolt, nut, and washer assemblies from each mill certificate batch in a tension measuring device at the job site prior to the beginning of bolting start-up. Demonstrate that the bolts and nuts, when used together, can develop tension not less than the provisions specified in AISC 360, depending on bolt size and grade. The bolt tension must be developed by tightening the nut. A representative of the manufacturer or supplier must be present to ensure that the fasteners are properly used, and to demonstrate that the fastener assemblies supplied satisfy the specified requirements. Submit bolt testing reports.

3.7.3.2 Inspection

Inspection procedures must be in accordance with AISC 360. Confirm and report to the Contracting Officer that the materials meet the project specification and that they are properly stored. Confirm that the faying surfaces have been properly prepared before the connections are assembled. Observe the specified job site testing and calibration, and confirm that the procedure to be used provides the required tension. Monitor the work to ensure the testing procedures are routinely followed on joints that are specified to be fully tensioned.

3.7.3.3 Testing

The Government has the option to perform nondestructive tests on 5 percent of the installed bolts to verify compliance with pre-load bolt tension requirements. Provide the required access for the Government to perform the tests. The nondestructive testing will be done in-place using an ultrasonic measuring device or any other device capable of determining in-place pre-load bolt tension. The test locations must be selected by the Contracting Officer. If more than 10 percent of the bolts tested contain defects identified by testing, then all bolts used from the batch from which the tested bolts were taken, must be tested at the Contractor's expense. Retest new bolts after installation at the Contractor's expense.

3.7.4 Testing for Embrittlement

ASTM A143/A143M for steel products hot-dip galvanized after fabrication. Submit embrittlement test reports.

3.7.5 Inspection and Testing of Steel Stud Welding

Perform verification inspection and testing of steel stud welding conforming to the requirements of AWS D1.1/D1.1M, Stud Welding Clause. The Contracting Officer will serve as the verification inspector. Bend test studs that do not show a full 360 degree weld flash or have been repaired by welding as required by AWS D1.1/D1.1M, Stud Welding Clause. Studs that crack under testing in the weld, base metal or shank will be rejected and replaced by the Contractor at no additional cost.

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SECTION 05 30 00

STEEL DECKS
05/15

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI D100	(1991; R 2008) Cold-Formed Steel Design Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel
AWS D1.3/D1.3M	(2018) Structural Welding Code - Sheet Steel

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M	(2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A780/A780M	(2009; R 2015) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A792/A792M	(2010) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM D1056	(2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D1149	(2007; R 2012) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber
ASTM D746	(2014) Standard Test Method for

	Brittleness Temperature of Plastics and Elastomers by Impact
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/
FM DS 1-28R	(1998) Data Sheet: Roof Systems

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 20	(2002; E 2004) Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic)

STEEL DECK INSTITUTE (SDI)

ANSI/SDI C	(2017) Standard for Composite Steel Floor Deck - Slabs
ANSI/SDI NC	(2017) Standard for Non-Composite Steel Floor Deck
ANSI/SDI QA/QC	(2017) Standard for Quality Control and Quality Assurance for Installation of Steel Deck
SDI DDM04	(2015; Errata 1-3 2016; Add 1 2015; Add 2 20162006) Diaphragm Design Manual; 4th Edition
SDI DDP	(1987; R 2000) Deck Damage and Penetrations
SDI MOC3	(2016) Manual of Construction with Steel Deck (3rd Edition)

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2019) Structural Engineering

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926	Safety and Health Regulations for Construction

UNDERWRITERS LABORATORIES (UL)

UL 580	(2006; Reprint Nov 2018) UL Standard for Safety Tests for Uplift Resistance of Roof Assemblies
UL Fire Resistance	(2014) Fire Resistance Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor QC approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication Drawings; G

SD-03 Product Data

Accessories

Deck Units

Galvanizing Repair Paint

Mechanical Fasteners

Touch-Up Paint

Welding Equipment

Welding Rods and Accessories

Recycled Content of Steel Products; S

SD-05 Design Data

Deck Units; G

SD-07 Certificates

Powder-Actuated Tool Operator

Welder Qualifications

Welding Procedures

Fire Safety

Wind Storm Resistance

Manufacturer's Certificate

Stud Manufacture's Certification

Stud Manufacture's Test Reports

1.3 QUALITY ASSURANCE

1.3.1 Deck Units

Furnish deck units and accessory products from a manufacturer regularly engaged in manufacture of steel decking. Provide manufacturer's certificate

s attesting that the decking material meets the specified requirements.

1.3.2 Certification of Powder-Actuated Tool Operator

Provide manufacturer's certificate attesting that the operators are authorized to use the low velocity powder-actuated tool.

1.3.3 Qualifications for Welding Work

Follow Welding Procedures of AWS D1.3/D1.3M for sheet steel and AWS D1.1/D1.1M for stud welding.
Submit qualified Welder Qualifications in accordance with AWS D1.3/D1.3M for sheet steel and AWS D1.1/D1.1M for stud welding, or under an equivalent approved qualification test. Perform tests on test pieces in positions and with clearances equivalent to those actually encountered. If a test weld fails to meet requirements, perform an immediate retest of two test welds until each test weld passes. Failure in the immediate retest will require the welder be retested after further practice or training, performing a complete set of test welds.

Submit manufacturer's catalog data for Welding Equipment and Welding Rods and Accessories.

1.3.4 Regulatory Requirements

1.3.4.1 Fire Safety

Test roof deck as a part of a roof deck construction assembly of the type used for this project, listing as fire classified in the UL Fire Resistance, or listing as Class I construction in the FM APP GUIDE, and so labeled.

1.3.4.2 Wind Storm Resistance

Provide roof construction assembly capable of withstanding a nominal uplift pressure meeting those shown on the contract drawings when tested in accordance with the uplift pressure test described in the FM DS 1-28R or as described in UL 580 and in general compliance with UFC 3-301-01.

1.3.5 Fabrication Drawings

Show type and location of units, location and sequence of connections, bearing on supports, methods of anchoring, attachment of accessories, adjusting plate details, cant strips, ridge and valley plates, metal closure strips, size and location of holes to be cut and reinforcement to be provided, the manufacturer's erection instructions and other pertinent details.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver deck units to the site in a dry and undamaged condition. Store and handle steel deck in a manner to protect it from corrosion, deformation, and other types of damage. Do not use decking for storage or as working platform until units have been fastened into position. Exercise care not to damage material or overload decking during construction. The maximum uniform distributed storage load must not exceed the design live load. Stack decking on platforms or pallets and cover with weathertight ventilated covering. Elevate one end during storage to provide drainage. Maintain deck finish at all times to prevent formation of rust. Repair deck finish using touch-up paint. Replace damaged material.

1.5 DESIGN REQUIREMENTS FOR ROOF DECKS

1.5.1 Properties of Sections

Properties of metal roof deck sections must comply with engineering design width as limited by the provisions of AISI D100.

1.5.2 Allowable Loads

Indicate total uniform dead and live load for detailing purposes.

PART 2 PRODUCTS

2.1 DECK UNITS

Submit manufacturer's design calculations, or applicable published literature for the structural properties of the proposed deck units.

Provide products with an average recycled content of steel products so postconsumer recycled content plus one half of preconsumer recycled content not less than 25 percent.

2.1.1 Roof Deck

Conform to ASTM A792/A792M or ASTM A1008/A1008M for deck used in conjunction with insulation and built-up roofing. Fabricate roof deck units of the steel design thickness required by the design drawings and galvanized. Zinc-coat in conformance with ASTM A653/A653M, G90 coating class.

2.1.2 Composite Deck

Where indicated in the contract drawings, Conform to ASTM A653/A653M or ASTM A1008/A1008M for composite deck assembly. Fabricate deck used as the tension reinforcing in composite deck with integrally embossed or raised pattern ribs. The steel design thickness required by the design drawings. Zinc-coat in conformance with ASTM A653/A653M, G90 coating class.

2.1.3 Length of Deck Units

Provide deck units of sufficient length to span three or more spacings where possible.

2.1.4 Touch-Up Paint

Provide a high zinc-dust content paint for regalvanizing welds in galvanized steel conforming to ASTM A780/A780M.

Provide touch-up paint for zinc-coated units of an approved galvanizing repair paint with a high-zinc dust content. Touch-up welds with paint conforming to SSPC Paint 20 in accordance with ASTM A780/A780M. Maintain finish of deck units and accessories by using touch-up paint whenever necessary to prevent the formation of rust.

2.2 ACCESSORIES

Provide accessories of same material as deck, unless specified otherwise. Provide manufacturer's standard type accessories, as specified.

2.2.1 Adjusting Plates

Provide adjusting plates, or segments of deck units, of same thickness and configuration as deck units in locations too narrow to accommodate full size units. Provide factory cut plates of predetermined size where possible.

2.2.2 End Closures

Fabricated of sheet metal by the deck manufacturer. Provide end closures minimum 0.0295 inch thick to close open ends at exposed edges of floors, and openings through deck.

2.2.3 Flexible Closure Strips for Roof Decks

Provide strips made of vulcanized, closed-cell, synthetic rubber material specified and premolded to the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

Conforming to ASTM D1056, Grade 2A1, with the following additional properties:

Brittleness temperature of minus 40 degrees F when tested in accordance with ASTM D746.

Flammability resistance with a flame spread rating of less than 25 when tested in accordance with ASTM E84.

Resistance to ozone must be "no cracks" after exposure of a sample kept under a surface tensile strain of 25 percent to an ozone concentration of 100 parts per million of air by volume in air for 100 hours at 104 degrees F and tested in accordance with ASTM D1149.

Provide a elastomeric type adhesive as recommended by the manufacturer of the flexible closure strips.

2.2.4 Closure Plates for Composite Deck

Support and retain concrete at each floor level. Provide edge closures at all edges of the slab of sufficient strength and stiffness to support the wet concrete. Provide metal closures for all openings in composite steel deck 1/4 inch and over.

2.2.5 Sheet Metal Collar

Where deck is cut for passage of pipes, ducts, columns, etc., and deck is to remain exposed, provide a neatly cut sheet metal collar to cover edges of deck. Do not cut deck until after installation of supplemental supports.

2.2.6 Cover Plates

Sheet metal to close panel edge and end conditions, and where panels change direction or butt. Polyethylene-coated, self-adhesive, 2 inch wide joint tape may be provided in lieu of cover plates on flat-surfaced decking butt joints.

Fabricate cover plates for abutting floor deck units from the specified structural-quality steel sheets not less than nominal 18 gagethick before

galvanizing. Provide 6 inch wide cover plates and form to match the contour of the floor deck units.

2.2.7 Column Closures

Sheet metal, minimum 0.0358 inch thick or metal rib lath.

2.2.8 Access Hole Covers

Sheet metal, minimum 0.0474 inch thick.

2.2.9 Hanger

Provide clips or loops for utility systems and suspended ceilings of one or more of the following types:

a. Lip tabs or integral tabs where noncellular decking or flat plate of cellular section is 0.0474 inch thick or more, and a structural concrete fill is used over deck.

b. Slots or holes punched in decking for installation of pigtails.

c. Tabs driven from top side of decking and arranged so as not to pierce electrical cells.

d. Decking manufacturer's standard as approved by the Contracting Officer.

2.2.10 Shear Connectors

Provide shear connectors in accordance with AWS D1.1/D1.1M headed stud Type B. Submit stud manufacture's certification that the studs delivered conform to the material requirements. Submit stud manufacture's test reports for the last completed in-plant quality control mechanical tests.

2.2.11 Cant Strips for Roof Decks

Fabricate cant strips from the specified commercial-quality steel sheets not less than nominal 0.0358 inch thick before galvanizing. Bend strips to form a 45-degree cant not less than 5 inch wide, with top and bottom flanges a minimum 3 inch wide. Length of strips 10 feet.

2.2.12 Ridge and Valley Plates for Roof Decks

Fabricate plates from the specified structural-quality steel sheets, not less than nominal 0.043 inch thick before galvanizing. Provide plates of minimum 6 inch wide and bent to provide tight fitting closures at ridges and valleys. Provide a minimum length of ridge and valley plates of 10 feet.

2.2.13 Metal Closure Strips for Roof Decks

Fabricate strips from the specified commercial-quality steel sheets not less than nominal 0.043 inch thick before galvanizing. Provide strips from the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

2.2.14 Steel Angles for Roof Decks

Provide steel edge angles conforming to ASTM A36/A36M at all roof and floor deck edges.

2.2.15 Mechanical Fasteners

Provide mechanical fasteners as indicated.

2.2.16 Miscellaneous Accessories

Furnish the manufacturer's standard accessories to complete the deck installation. Furnish metal accessories of the same material as the deck and with the minimum design thickness as follows: saddles, 0.0474 inch welding washers, 0.0598 inch other metal accessories, 0.0358 inch unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

Prior to installation of decking units and accessories, examine worksite to verify that as-built structure will permit installation of decking system without modification.

3.2 INSTALLATION

Install steel deck units in accordance with 29 CFR 1926, Subpart R – Steel Erection, ANSI/SDI QA/QC, SDI DDM04 and approved shop drawings. Place units on structural supports, properly adjusted, leveled, and aligned at right angles to supports before permanently securing in place. Damaged deck and accessories including material which is permanently stained or contaminated, deformed, or with burned holes shall not be installed. Extend deck units over three or more supports unless absolutely impractical. Report inaccuracies in alignment or leveling to the Contracting Officer and make necessary corrections before permanently anchoring deck units. Locate deck ends over supports only. Butted deck ends. Do not use unanchored deck units as a work or storage platform. Do not fill unanchored deck with concrete. Permanently anchor units placed by the end of each working day. Do not support suspended ceilings, light fixtures, ducts, utilities, or other loads by steel deck unless indicated. Distribute loads by appropriate means to prevent damage.

3.2.1 Attachment

Immediately after placement and alignment, and after correcting inaccuracies, permanently fasten steel deck units to structural supports and to adjacent deck units by welding with normal 3/4 inch diameter puddle welds, or fastened with screws as indicated on the design drawings and in accordance with manufacturer's recommended procedure. Clamp or weight deck units to provide firm contact between deck units and structural supports while performing welding or fastening. Anchoring the deck to structural supports with powder-actuated fasteners or pneumatically driven fasteners is prohibited.

3.2.1.1 Welding

Perform welding in accordance with AWS D1.3/D1.3M using methods and electrodes recommended by the manufacturers of the base metal alloys being used. Ensure only operators previously qualified by tests prescribed in AWS D1.3/D1.3M make welds. Immediately recertify, or replace qualified welders, that are producing unsatisfactory welding. Do not use welding washers at the connections of the deck to supports. Do not use welding washers at sidelaps. Holes and similar defects will not be acceptable.

Attach all partial or segments of deck units to structural supports in accordance with Section 2.5 of SDI DDM04. Attach shear connectors as shown and welded as per AWS D1.1/D1.1M through the steel deck to the steel member. Immediately clean welds by chipping and wire brushing. Heavily coat welds, cut edges and damaged portions of shop primed finish with the manufacturer's standard touch-up paint.

3.2.1.2 Mechanical Fastening

Anchor deck to structural supports and adjoining units with mechanical fasteners where indicated. Drive screws to properly clamp desk to supporting steel.

3.2.1.3 Sidelap Fastening

Lock sidelaps between adjacent floor deck units together by welding or screws as indicated.

3.2.2 Openings

Cut or drill all holes and openings required and be coordinated with the drawings, specifications, and other trades. Frame and reinforce openings through the deck in conformance with SDI DDP. Reinforce holes and openings 6 to 12 inch across by 0.0474 inch thick steel sheet at least 12 inch wider and longer than the opening and be fastened to the steel deck at each corner of the sheet and at a maximum of 6 inch on center. Reinforce holes and openings larger than 12 inch by steel channels or angles installed perpendicular to the steel joists and supported by the adjacent steel joists. Install steel channels or angles perpendicular to the deck ribs and fasten to the channels or angles perpendicular to the steel joists.

3.2.3 Deck Damage

SDI MOC3, for repair of deck damage.

3.2.4 Touch-Up Paint

3.2.4.1 Roof Deck

After roof decking installation, wire brush, clean, and touchup paint the scarred areas on top and bottom surfaces of metal roof decking. The scarred areas include welds, weld scars, bruises, and rust spots. Touchup galvanized surfaces with galvanizing repair paint. Touchup painted surfaces with repair paint of painted surfaces.

3.2.4.2 Floor Deck

For floor decking installation, wire brush, clean, and touchup paint the scarred areas on the top and bottom surfaces of the metal floor decking and on the surface of supporting steel members. Include welds, weld scars, bruises, and rust spots for scarred areas. Touched up the galvanized surfaces with galvanizing repair paint. Touch up the painted surfaces with paint for the repair of painted surfaces.

3.2.5 Accessory Installation

3.2.5.1 Adjusting Plates

Provide in locations too narrow to accommodate full-size deck units and

install as shown on shop drawings.

3.2.5.2 End Closures

Provide end closure to close open ends of cells at columns, walls, and openings in deck.

3.2.5.3 Column Closures

Provide for spaces between floor decking and columns which penetrate the deck. Field cut closure plate to fit column in the field and tack weld to decking and columns.

3.2.5.4 Access Hole Covers

Provide access whole covers to seal holes cut in decking to facilitate welding of the deck to structural supports.

3.2.5.5 Hangers

Provide as indicated to support utility system and suspended ceilings. Space devices so as to provide one device per 6.25 square feet.

3.2.6 Concrete Work

Prior to placement of concrete, inspect installed decking to ensure that there has been no permanent deflection or other damage to decking. Replace decking which has been damaged or permanently deflected as approved by the Contracting Officer. Place concrete on metal deck in accordance with Construction Practice of ANSI/SDI C or ANSI/SDI NC.

3.2.7 Preparation of Fire-Proofed Surfaces

Provide deck surfaces, both composite and noncomposite, which are to receive sprayed-on fireproofing, galvanized and free of all grease, mill oil, paraffin, dirt, salt, and other contaminants which impair adhesion of the fireproofing. Complete any required cleaning prior to steel deck installation using a cleaning method that is compatible with the sprayed-on fireproofing.

3.3 CANT STRIPS FOR ROOF DECKS

Provide strips to be fusion welded to surface of roof decking, secured to wood nailers by galvanized screws or to steel framing by galvanized self-tapping screws or welds. Do not exceed spacing of welds and fasteners of 12 inch. Lap end joints a minimum 3 inch and secure with galvanized sheet metal screws spaced a maximum 4 inch on center.

3.4 RIDGE AND VALLEY PLATES FOR ROOF DECKS

Provide plates to be fusion welded to top surface of roof decking. Lap end joints a minimum 3 inch. For valley plates, provide endlaps to be in the direction of water flow.

3.5 CLOSURE STRIPS FOR ROOF DECKS

Provide closure strips at open, uncovered ends and edges of the roof decking and in voids between roof decking and top of walls and partitions where indicated. Install closure strips in position in a manner to provide

a weathertight installation.

3.6 ROOF INSULATION SUPPORT FOR ROOF DECKS

Provide metal closure strips for support of roof insulation where rib openings in top surface of metal roof decking occur adjacent to edges and openings. Weld metal closure strips in position.

3.7 CLEANING AND PROTECTION FOR ROOF DECKS

Upon completion of the deck, sweep surfaces clean and prepare for installation of the roofing.

3.8 FIELD QUALITY CONTROL

3.8.1 Headed Stud Inspection

In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.

b. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.8.2 Deck Weld Inspection

Visual inspect welds in accordance with AWS D1.3/D1.3M.

3.8.3 Decks Not Receiving Concrete

Inspect the decking top surface for distortion after installation. For roof decks not receiving concrete, verify distortion by placing a straight edge across three adjacent top flanges. The maximum allowable gap between the straight edge and the top flanges should not exceed manufacturing and construction tolerances of supporting members. When gap is more than the allowable, provide corrective measures or replacement. Reinspect decking after performing corrective measures or replacement.

-- End of Section --

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SECTION 05 40 00

COLD-FORMED METAL FRAMING
05/15

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 318	(2014; Errata 1-2 2014) Building Code Requirements for Structural Concrete and Commentary

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI S100	(2012) North American Specification for the Design of Cold-Formed Steel Structural Members
AISI S110	(2007; Suppl 1; Reaffirmed 2012) Standard for Seismic Design of Cold-Formed Steel Structural Systems - Special Bolted Moment Frames
AISI S200	(2007) North American Standard for Cold-Formed Steel Framing - General Provision
AISI S201	(2007) North American Standard for Cold-Formed Steel Framing - Product Data
AISI S202	(2011) Code of Standard Practice for Cold-formed Steel Structural Framing
AISI S211	(2007) North American Standard for Cold-Formed Steel Framing - Wall Stud Design
AISI S212	(2007) North American Standard for Cold-Formed Steel Framing - Header Design
AISI S213	(2007; Suppl 1 2009) North American Standard for Cold-Formed Steel Framing - Lateral Design
AISI S214	(2012) North American Standard for Cold-Formed Steel Framing – Truss Design

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel

AWS D1.3/D1.3M	(2018) Structural Welding Code - Sheet Steel

ASTM INTERNATIONAL (ASTM)

ASTM A1003/A1003M	(2015) Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2014; E 2017) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C1007	(2011a) Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories
ASTM C1513	(2018) Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections
ASTM C955	(2011c) Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
ASTM E119	(2019) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E329	(2020) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
ASTM E488/E488M	(2010) Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements
ASTM F1554	(2018) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F1941	(2010) Standard Specification for Electrodeposited Coatings on Threaded

	Fasteners (Unified Inch Screw Threads (UN/UNR))
ASTM F2329	(2013) Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2019) Structural Engineering

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor QC approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Framing Components; G
Cold Formed Trusses; G

SD-03 Product Data

Steel Studs, Joists, Tracks, Bracing, Bridging and Accessories

SD-05 Design Data

Metal Framing Calculations, including Wind loads as indicated in the contract drawings; G
Cold Formed Truss Calculations and their connections; G

SD-07 Certificates

Exterior Cold-Formed Metal Framing

Welds

SD-11 Closeout Submittals

Recycled Content of Steel Products; S

1.3 DELIVERY, STORAGE, AND HANDLING

Steel framing and related accessories shall be stored and handled in accordance with the AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing".

1.4 MAXIMUM DEFLECTION

Deflections of structural members shall not exceed the more restrictive of the limitations of ICC IBC, UFC 3-301-01.

1.5 QUALITY ASSURANCE

a. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a registered professional engineer.

b. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E329 for testing indicated.

c. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

d. Welding Qualifications: Qualify procedures and personnel according to the following:

(1) AWS D1.1/D1.1M, "Structural Welding Code - Steel".

(2) AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel".

e. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E119 by, and displaying a classification label from, a testing and inspecting agency acceptable to authorities having jurisdiction.

f. AISI Specifications and Standards: Comply with:

(1) AISI S100, "North American Specification for the Design of Cold-Formed Steel Structural Members".

(2) AISI S110, "Standard for Seismic Design of Cold-Formed Steel Structural Systems - Special Bolted Moment Frames".

(3) AISI S200, "North American Standard for Cold-Formed Steel Framing - General Provision".

(4) AISI S201, "North American Standard for Cold-Formed Steel Framing - Product Data".

(5) AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing".

(6) AISI S211, "North American Standard for Cold-Formed Steel Framing - Wall Stud Design".

(7) AISI S212, "North American Standard for Cold-Formed Steel Framing - Header Design".

(8) AISI S213, "North American Standard for Cold-Formed Steel Framing - Lateral Design".

(9) AISI S214, "North American Standard for Cold-Formed Steel Framing - Truss Design".

1.5.1 Drawing Requirements

Submit framing components to show sizes, thicknesses, layout, material designations, methods of installation, and accessories including the following:

a. Cross sections, plans, and/or elevationsshowing component types and locations for each framing application; including shop coatings and material thicknesses for each framing component.

b. Connection details showing fastener type, quantity, location, and other information to assure proper installation.

c. Drawings depicting panel configuration, dimensions, components, locations, and construction sequence if the Contractor elects to install prefabricated/prefinished frames. Sign and seal fabrication drawings by a registered professional engineer.

1.5.2 Design Data Required

Submit metal framing calculations and Cold Formed Truss Calculations and their connections with design criteria and structural loading, including but not limited to Wind, to verify sizes, thickness, and spacing of members and connections signed and sealed by a registered professional engineer. Show methods and practices used in installation.

PART 2 PRODUCTS

2.1 STEEL STUDS, JOISTS, TRACKS, BRACING, BRIDGING AND ACCESSORIES

Framing components shall comply with ASTM C955 and the following.

a. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one half of preconsumer recycled content not less than 25 percent.

b. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

(1) Grade: As required by structural performance.

(2) Coating: G60 (Z180).

c. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

(1) Minimum Base-Metal Thickness: 0.0428 inch.

(2) Minimum Flange Width: 1-5/8 inches.

d. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

(1) Minimum Base-Metal Thickness: 0.0428 inch.

(2) Flange Width: 1-1/4 inches minimum.

2.1.1 Studs and Joists of 54 mils (0.054 Inch) and Heavier

Galvanized steel, ASTM A653/A653M and ASTM A1003/A1003M, SS Grade 50, G60 .

2.1.2 Studs and Joists of 43 mils (0.043 Inch) and Lighter

Studs and Joists of 43 mils (0.043 Inch) and Lighter, Track, and Accessories (All thicknesses): Galvanized steel, ASTM A653/A653M and ASTM A1003/A1003M, SS, Grade 33 33,000 psi G60.

2.1.3 Sizes, Thickness, Section Modulus, and Other Structural Properties

Size and thickness as required.

2.2 MARKINGS

Studs and track shall have product markings stamped on the web of the section. The markings shall be repeated throughout the length of the member at a maximum spacing of 4 feet on center and shall be legible and easily read. The product marking shall include the following:

a. An ICC number.

b. Manufacturer's identification.

c. Minimum delivered uncoated steel thickness.

d. Protective coating designator.

e. Minimum yield strength.

2.3 CONNECTIONS

2.3.1 Steel-To-Concrete Connections

a. Anchor Rods: ASTM F1554, Grade 36; galvanized per ASTM A153/A153M.

b. Post-Installed Concrete Anchors: Adhesive or expansion anchors fabricated from corrosion-resistant materials with allowable load capacities in accordance with ICC-ES AC193 and ACI 318 greater than or equal to the design load as determined by testing per ASTM E488/E488M conducted by a qualified testing agency.

c. Power-Actuated Fasteners: Fabricated from corrosion-resistant materials with allowable load capacities in accordance with ICC-ES AC 70 greater than or equal to the design load as determined by testing per ASTM E1190 conducted by a qualified testing agency

2.3.2 Steel-To-Steel Connections

a. Screws: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping steel screws of the type and size indicated. Provide low-profile head beneath sheathing and manufacturer's standard elsewhere. Electroplated to a minimum of 5 micron zinc coating per ASTM F1941 or hot-dipped galvanized per ASTM A123/A123M or ASTM A153/A153M.

b. Bolts: ASTM A307 coated by hot-dip process per ASTM F2329 or zinc-coated by mechanical-deposition process per ASTM B695, Class 55.

c. Welding Electrodes: Comply with AWS standards.

2.4 PLASTIC GROMMETS

Supply plastic grommets for stud webs as recommended by stud manufacturer, to protect electrical wires and plumbing piping. Prevent metal-to-metal contact between wiring/piping and studs.

2.5 SEALER GASKET

Closed-cell neoprene foam, 1/4-inch thick, selected from manufacturer's standard widths to match width of bottom track on concrete slab or foundation.

PART 3 EXECUTION

3.1 TRUSS FABRICATION

a. Fabricate cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

b. Truss must be fabricated off site by a Truss Manufacturer qualified by the Truss Plate Institute (TPI) steel truss plant quality assurance program certification

c. Fabricate trusses using jigs or templates.

d. Splices can only occur at joints.

e. Cut truss members by sawing or shearing: do not torch cut.

f. Fasten cold-formed steel truss members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator.

g. Fasten other materials to cold-formed steel trusses by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

h. Reinforce, stiffen, and brace trusses to withstand handling, delivery, and erection stresses. Lift fabricated trusses to prevent damage or permanent distortion.

3.2 FASTENING

Fasten framing members together by welding or by using self-drilling, self-tapping screws. Electrodes and screw connections shall be as required and indicated in the design calculations.

3.2.1 Welds

All welding shall be performed in accordance with AWS D1.3/D1.3M, as modified by AISI S100. All welders, welding operations, and welding procedures shall be qualified according to AWS D1.3/D1.3M. Submit certified copies of welder qualifications test records showing qualification in accordance with AWS D1.3/D1.3M. All welds shall be

cleaned and coated with rust inhibitive galvanizing paint. Do not field weld materials lighter than 43 mils.

3.2.2 Screws

Screws shall be of the self-drilling self-tapping type, size, and location as required. Screw penetration through joined materials shall not be less than three exposed threads. Minimum spacings and edge distances for screws shall be as specified in AISI S100. Screws covered by sheathing materials shall have low profile heads.

3.2.3 Anchors

Anchors shall be of the type, size, and location as required.

3.2.4 Powder-Actuated Fasteners

Powder-actuated fasteners shall be of the type, size, and location as required.

3.3 INSTALLATION

Install cold-formed framing in accordance with ASTM C1007 and AISI S200.

Install cold-formed steel framing according to AISI S202 and to manufacturer's written instructions unless more stringent requirements are indicated.

3.3.1 Tracks

Provide accurately aligned runners at top and bottom of studs. Install sealer gasket under bottom of track on concrete slab or foundation. Anchor tracks as indicated in design calculations. Butt weld joints in tracks or splice with stud inserts. Fasteners shall be at least 3 inches from the edge of concrete slabs.

3.3.2 Studs

Cut studs square and set with firm bearing against webs of top and bottom tracks. Position studs vertically in tracks and space as indicated in design. Do not splice studs. Provide at least two studs at jambs of doors and other openings 2 feet wide or larger. Provide jack studs over openings, as necessary, to maintain indicated stud spacing. Provide tripled studs at corners, positioned to receive interior and exterior finishes. Fasten studs to top and bottom tracks by welding or screwing both flanges to the tracks. Framed wall openings shall include headers and supporting components as shown on the drawings. Headers shall be installed in all openings that are larger than the stud spacing in a wall. In curtain wall construction, provide for vertical movement where studs connect to the structural frame. Provide horizontal bracing in accordance with the design calculations and AISI S100. Bracing shall be not less than the following:

LOAD	HEIGHT	BRACING
Wind load only	Up to 10 feet	One row at mid-height

LOAD	HEIGHT	BRACING
	Over 10 feet	Rows 5'-0" o.c. maximum
Axial load	Up to 10 feet	Two rows at 1/3 points
	Over 10 feet	Rows 3'-4" o.c. maximum

3.3.3 Trusses

a. Install, bridge, and brace cold-formed steel trusses according to AISI S200, AISI S214, AISI's "Code of Standard Practice for Cold-Formed Steel Structural Framing," and manufacturer's written instructions unless more stringent requirements are indicated.

b. Install temporary bracing and supports. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

c. Do not alter, cut, or remove framing members or connections of trusses.

3.3.4 Erection Tolerances

a. Framing members which will be covered by finishes such as wallboard, plaster, or ceramic tile set in a mortar setting bed, shall be within the following limits:

(1) Layout of walls and partitions: 1/4 inch from intended position;

(2) Plates and runners: 1/4 inch in 8 feet from a straight line;

(3) Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and

(4) Face of framing members: 1/4 inch in 8 feet from a true plane.

b. 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:

(1) Layout of walls and partitions: 1/4 inch from intended position;

(2) Plates and runners: 1/8 inch in 8 feet from a straight line;

(3) Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and

(4) Face of framing members: 1/8 inch in 8 feet from a true plane.

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SECTION 05 50 13

MISCELLANEOUS METAL FABRICATIONS
05/17

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303	(2016) Code of Standard Practice for Steel Buildings and Bridges

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B18.2.1	(2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(2015) Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
ASME B18.6.2	(1998; R 2010) Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws: Inch Series
ASME B18.6.3	(2013; R 2017) Machine Screws, Tapping Screws, and Machine Drive Screws (Inch Series)
ASME B18.21.1	(2009; R 2016) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)
ASME B18.21.2M	(1999; R 2014) Lock Washers (Metric Series)
ASME B18.22M	(1981; R 2017) Metric Plain Washers

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.3	(2013) Safety Requirements for Powder-Actuated Fastening Systems American National Standard for Construction and Demolition Operations

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A29/A29M	(2016) Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A47/A47M	(1999; R 2018; E 2018) Standard Specification for Ferritic Malleable Iron Castings
ASTM A53/A53M	(2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A108	(2013) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2014; E 2017) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A500/A500M	(2018) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A780/A780M	(2009; R 2015) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A924/A924M	(2020) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B26/B26M	(2014; E 2015) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B108/B108M	(2019) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM C1513	(2018) Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections
ASTM D1187/D1187M	(1997; E 2011; R 2011) Asphalt-Base Emulsions for Use as Protective Coatings for Metal
ASTM F1554	(2018) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

MASTER PAINTERS INSTITUTE (MPI)

MPI 79	(2012) Primer, Alkyd, Anti-Corrosive for Metal

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 3	(1982; E 2004) Power Tool Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Bollards/Pipe Guards; G

Roof Hatches, Installation Drawings; G

SD-03 Product Data

Corner Guards

Wheel Guards

Roof Hatches; G

Each Downspout Terminations Type; G

Recycled Content; S

SD-07 Certificates

Certificates of Compliance; G

Certified Mill Test Reports for Chemistry and Mechanical Properties; G

1.3 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1/D1.1M. Use procedures, materials, and equipment of the type required for the work.

1.4 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

1.5 MISCELLANEOUS REQUIREMENTS

1.5.1 Fabrication Drawings

Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified in AISC 303.

1.5.2 Installation Drawings

Submit templates, erection, and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation in relation to the building construction.

PART 2 PRODUCTS

2.1 RECYCLED CONTENT

Provide products with recycled content.

2.2 MATERIALS

Provide exposed fastenings of compatible materials (avoid contact of dissimilar metals). Coordinate color and finish with the material to which fastenings are applied.

2.2.1 Structural Carbon Steel

Provide in accordance with ASTM A36/A36M.

2.2.2 Structural Tubing

Provide in accordance with ASTM A500/A500M.

2.2.3 Steel Pipe

Provide in accordance with ASTM A53/A53M, Type E or S, Grade B.

2.2.4 Fittings for Steel Pipe

Provide standard malleable iron fittings in accordance with ASTM A47/A47M.

2.2.5 Anchor Bolts

Provide in accordance with ASTM F1554. Where exposed, provide anchor bolts of the same material, color, and finish as the metal to which they are applied.

2.2.5.1 Lag Screws and Bolts

Provide in accordance with ASME B18.2.1, type and grade best suited for the purpose.

2.2.5.2 Toggle Bolts

Provide in accordance with ASME B18.2.1.

2.2.5.3 Bolts, Nuts, Studs and Rivets

Provide in accordance with ASME B18.2.2 or ASTM A307.

2.2.5.4 Powder Actuated Fasteners

Follow safety provisions in accordance with ASSP A10.3.

2.2.5.5 Screws

Provide in accordance with ASME B18.2.1, ASME B18.6.2, ASME B18.6.3 and ASTM C1513.

2.2.5.6 Washers

Provide plain washers in accordance with ASME B18.22M, ASME B18.21.1. Provide beveled washers for American Standard beams and channels, square or rectangular, tapered in thickness, and smooth. Provide lock washers in accordance with ASME B18.21.2M, ASME B18.21.1.

2.2.5.7 Welded Headed Shear Studs

Provide in accordance with ASTM A108 or ASTM A29/A29M-12.

2.2.6 Aluminum Alloy Products

Provide in accordance with ASTM B209M, ASTM B209 for sheet plate, ASTM B221M, ASTM B221M, ASTM B221 for extrusions and ASTM B26/B26M or ASTM B108/B108M for castings. Provide aluminum extrusions at least 1/8 inch thick and aluminum plate or sheet at least 0.050 inch thick.

2.3 FABRICATION FINISHES

2.3.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication

where practicable. Provide galvanizing in accordance with ASTM A123/A123M, ASTM A153/A153M, ASTM A653/A653M or ASTM A924/A924M, Z275 G90.

2.3.2 Galvanize

Anchor bolts, grating fasteners, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

2.3.3 Repair of Zinc-Coated Surfaces

Repair damaged surfaces with galvanizing repair method and paint in accordance with ASTM A780/A780M or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved by Contracting Officer. Clean areas to be repaired and remove slag from welds. Heat, with a torch, surfaces to which stick or paste material will be applied. Heat to a temperature sufficient to melt the metals in the stick or paste. Spread molten material uniformly over surfaces to be coated and wipe off excess material.

2.3.4 Shop Cleaning and Painting

2.3.4.1 Surface Preparation

Blast clean surfaces in accordance with SSPC SP 6/NACE No.3. Surfaces that will be exposed in spaces above ceiling or in attic spaces, crawl spaces, furred spaces, and chases may be cleaned in accordance with SSPC SP 3 in lieu of being blast cleaned. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean. Steel to be embedded in concrete must be free of dirt and grease prior to embed. Do not paint or galvanize bearing surfaces, including contact surfaces within slip critical joints. Shop coat these surfaces with rust prevention.

2.3.4.2 Pretreatment, Priming and Painting

Apply pre-treatment, primer, and paint in accordance with manufacturer's printed instructions.

2.3.5 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.3.6 Aluminum Surfaces

2.3.6.1 Surface Condition

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

2.3.6.2 Aluminum Finishes

Unexposed sheet, plate and extrusions may have mill finish as fabricated. Sandblast castings' finish, medium, AA DAF45. Unless otherwise specified, provide all other aluminum items with a standard mill finish. Provide a coating thickness not less than that specified for protective and decorative type finishes for items used in interior locations or architectural Class I type finish for items used in exterior locations. Provide in accordance with AA DAF45. Provide a polished satin finish on

items to be anodized.

2.4 BOLLARDS/PIPE GUARDS

Provide 6" inch galvanized standard weight steel pipe in accordance with ASTM A53/A53M. Anchor posts in concrete as indicated and fill solidly with concrete with minimum compressive strength of 2500 psi.

2.5 DOWNSPOUT TERMINATIONS

Provide 4x3 inch aluminum downspout tile adapter with manufacturer's standard powder coated finish. Units shall have all seams welded.

Provide polished bronze cast downspout nozzle and flange.

2.6 MISCELLANEOUS PLATES AND SHAPES

Provide items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings and frames. Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions as indicated and as required to support wall loads over openings. Provide with connections and fasteners. Construct to have at least 8 in bearing on masonry at each end.

Provide angles and plates in accordance with ASTM A36/A36M, for embedment as indicated. Galvanize embedded items exposed to the elements in accordance with ASTM A123/A123M.

2.7 SECURITY GRILLES

Fabricate of channel frames with not less than two masonry anchors at each jamb and 1/2 inch hardened steel bars spaced not over 4 inches both ways and welded to frame. Provide 18 by 16 mesh screen and two layers of 1/4 inch hardware cloth clamped to frame.

2.8 ROOF HATCHES (SCUTTLES)

Provide aluminum sheets not less than 14 gauge with 3 inch beaded flange, welded and ground at corners. Provide a minimum clear opening of 30 by 36 inches. Insulate cover and curb with one inch thick rigid fiberboard insulation, covered and protected by aluminum sheet of not less than 26 gage. Provide with 12 inches high curb, formed with 3 inch mounting flanges with holes for securing to the roof deck.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated in accordance with manufacturer's instructions. Verify all field dimensions prior to fabrication. Include materials and parts necessary to complete each assembly, whether indicated or not. Miss-alignment and miss-sizing of holes for fasteners is cause for rejection. Conceal fastenings where practicable. Joints exposed to weather must be watertight.

3.2 WORKMANSHIP

Provide miscellaneous metalwork that is true and accurate in shape, size, and profile. Make angles and lines continuous and straight. Make curves

consistent, smooth and unfaceted. Provide continuous welding along the entire area of contact except where tack welding is permitted. Do not tack weld exposed connections. Unless otherwise indicated and approved, provide a smooth finish on exposed surfaces. Provide countersuck rivets where exposed. Provide coped and mitered corner joints aligned flush and without gaps.

3.3 BUILT-IN WORK

Where necessary and not otherwise indicated, form built-in metal work for anchorage with concrete or masonry. Provide built-in metal work in ample time for securing in place as the work progresses.

3.4 WELDING

Perform welding, welding inspection, and corrective welding in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation. Provide welded headed shear studs in accordance with AWS D1.1/D1.1M, Clause 7, except as otherwise specified. Provide in accordance with the safety requirements of EM 385-1-1.

3.5 DISSIMILAR METALS

Where dissimilar metals are in contact, protect surfaces with a coating in accordance with MPI 79 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, plaster, mortar, masonry, wood, or absorptive materials subject to wetting, protect in accordance with ASTM D1187/D1187M, asphalt-base emulsion. Clean surfaces with metal shavings from installation at the end of each work day.

3.6 ROOF HATCH (SCUTTLES)

Construction and accessories as follows:

a. Provide insulated cover and curb with mounting flanges for securing to roof deck. Provide curbs with integral metal cap flashing of the same gage and metal as the curb, fully welded and ground at corners for weather tightness.

b. Provide hatches completely assembled, with pintle hinges, compression spring operators enclosed in telescopic tubes, positive snap latches with turn handles on inside and outside, and neoprene draft seals. Provide fasteners for padlocking from the inside. Provide covers with automatic hold-open arms complete with grip handle to permit one hand release. Cover action must be smooth through its entire range of motion with an operating pressure of approximately 30 pounds.

3.7 INSTALLATION MISCELLANEOUS PLATES AND SHAPES

Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions as indicated and as required to support wall loads over openings. Provide with connections and fasteners. Construct to have at least 8 inches bearing on masonry at each end.

-- End of Section --

SECTION 05 51 33

METAL LADDERS
02/16

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN LADDER INSTITUTE (ALI)

ALI A14.3	(2008; R 2018) Ladders - Fixed - Safety Requirements

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A47/A47M	(1999; R 2018; E 2018) Standard Specification for Ferritic Malleable Iron Castings
ASTM A53/A53M	(2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A500/A500M	(2018) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM A780/A780M	(2009; R 2015) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A924/A924M	(2020) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B26/B26M	(2014; E 2015) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B108/B108M	(2019) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM D1187/D1187M	(1997; E 2011; R 2011) Asphalt-Base Emulsions for Use as Protective Coatings for Metal

MASTER PAINTERS INSTITUTE (MPI)

MPI 79	(2012) Primer, Alkyd, Anti-Corrosive for Metal

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 3	(1982; E 2004) Power Tool Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.23	(Nov 2016) Ladders
29 CFR 1910.28	(Nov 2016)Duty to Have Fall Protection and Falling Object Protection

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Ladders, Installation Drawings

SD-03 Product Data

Ladders

Ladder Safety Devices (Climbing Ladder Fall Arrest Systems)

SD-07 Certificates

Fabricator Certification for Ladder Assembly

1.3 CERTIFICATES

Provide fabricator certification for ladder assembly stating that the ladder and associated components have been fabricated according to the requirements of 29 CFR 1910.23.

Provide fabricator certification for ships ladder assembly stating that the ships ladder and associated components have been fabricated according to the requirements of 29 CFR 1910.23.

1.4 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1/D1.1M. Use procedures, materials, and equipment of the type required for the work.

1.5 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Structural Carbon Steel

ASTM A36/A36M.

2.1.2 Structural Tubing

ASTM A500/A500M.

2.1.3 Steel Pipe

ASTM A53/A53M, Type E or S, Grade B.

2.1.4 Fittings for Steel Pipe

Standard malleable iron fittings ASTM A47/A47M.

2.1.5 Aluminum Alloy Products

Conform to ASTM B209 for sheet plate, ASTM B221 for extrusions and ASTM B26/B26M or ASTM B108/B108M for castings, as applicable. Provide aluminum extrusions at least 1/8 inch thick and aluminum plate or sheet at least 0.050 inch thick.

2.2 FABRICATION FINISHES

2.2.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing: ASTM A123/A123M, ASTM A153/A153M, ASTM A653/A653M or ASTM A924/A924M, G90, as applicable.

2.2.2 Galvanize

Anchor bolts, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

2.2.3 Repair of Zinc-Coated Surfaces

Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A780/A780M or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved by Contracting Officer. Clean areas to be repaired and remove slag from welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread molten material uniformly over surfaces to be coated and wipe off excess material.

2.2.4 Shop Cleaning and Painting

2.2.4.1 Surface Preparation

Blast clean surfaces in accordance with SSPC SP 6/NACE No.3. Surfaces that will be exposed in spaces above ceiling or in attic spaces, crawl spaces, furred spaces, and chases may be cleaned in accordance with SSPC SP 3 in lieu of being blast cleaned. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean.

2.2.4.2 Pretreatment, Priming and Painting

Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions.

2.2.5 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.2.6 Aluminum Surfaces

2.2.6.1 Surface Condition

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

2.2.6.2 Aluminum Finishes

Unexposed plate and extrusions may have mill finish as fabricated. Sandblast castings' finish, medium, AA DAF45. Unless otherwise specified, provide all other aluminum items with standard mill finish. Provide a coating thickness not less than that specified for protective and

decorative type finishes for items used in interior locations or architectural Class I type finish for items used in exterior locations in AA DAF45.

2.3 LADDERS

Fabricate vertical ladders conforming to 29 CFR 1910.23 and Section 5 of ALI A14.3. Ladders shall be capable of supporting their maximum intended load. Use 2 1/2 by 3/8 inch steel flats for stringers and 3/4 inch diameter steel rods for rungs. Ladder rungs, step and cleats must be spaced not less than 10 inches and not more than 16 inches wide (measured before installation of ladder safety system), spaced no more than 14 inches apart, plug welded or shouldered and headed into stringers. Install ladders so that the maximum perpendicular distance from the centerline of the steps or rungs, or grab bars, or both, to the nearest permanent object in the back of the ladder or to the finished wall surface will not be less than 7 inches, except for the elevator pit ladders, which have a minimum perpendicular distance of 4.5 inches. Provide heavy clip angles riveted or bolted to the stringer and drilled for not less than two 1/2 inch diameter expansion bolts as indicated. Provide intermediate clip angles not over 48 inches on centers. The top rung of the ladder must be level with the top of the access level, parapet or landing served by the ladder except for hatches or wells. Extend the side rails of through or side step ladders 42 inches above the access level. Provide ladder access protective swing gates at the top of access/egress level. The drawings must indicate ladder locations and details of critical dimensions and materials.

2.3.1 Phasing out of Ladder Cages and Wells (29 CFR 1910.28, Nov 2016)

Conform to 29 CFR 1910.28 (Nov 2016).

Each ladder installed before 19 November, 2018 shall be equipped with a personal fall arrest system, ladder safety device (climbing Ladder Fall Arrest System), cage, or well.

Each newly installed ladder over 20 feet in length shall only be equipped with a personal fall arrest system or climbing ladder fall arrest system (ladder safety device), cages and wells are prohibited. When a fixed ladder, cage, or well, or any portion of a section thereof, is replaced, a personal fall arrest system or climbing ladder fall arrest system (ladder safety device) is installed in at least that section of the fixed ladder, cage, or well where the replacement is located. On and after November 18, 2036, all fixed ladders shall only be equipped with a personal fall arrest system or a ladder safety device (climbing ladder Fall Arrest System).

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated, according to manufacturer's instructions. Verify all measurements and take all field measurements necessary before fabrication. Provide Exposed fastenings of compatible materials, generally matching in color and finish, and harmonize with the material to which fastenings are applied. Include materials and parts necessary to complete each item, even though such work is not definitely shown or specified. Poor matching of holes for fasteners will be cause for rejection. Conceal fastenings where practicable. Thickness of metal and details of assembly and supports must provide strength and stiffness. Formed joints exposed to the weather to exclude water. Items listed below

require additional procedures.

3.2 WORKMANSHIP

Metalwork must be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching must produce clean true lines and surfaces. Continuously weld along the entire area of contact. Do not tack weld exposed connections of work in place. Grid smooth exposed welds. Provide smooth finish on exposed surfaces of work in place, unless otherwise approved. Where tight fits are required, mill joints. Cope or miter corner joints, well formed, and in true alignment. Install in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening metal items securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion anchors, and powder-actuated fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine bolts, carriage bolts and powder-actuated threaded studs for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

3.4 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

3.5 FINISHES

3.5.1 Dissimilar Materials

Where dissimilar metals are in contact, protect surfaces with a coat conforming to MPI 79 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, plaster, mortar, masonry, wood, or absorptive materials subject to wetting, protect with ASTM D1187/D1187M, asphalt-base emulsion.

3.5.2 Field Preparation

Remove rust preventive coating just prior to field erection, using a remover approved by the rust preventive manufacturer. Surfaces, when assembled, must be free of rust, grease, dirt and other foreign matter.

3.5.3 Environmental Conditions

Do not clean or paint surface when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer.

3.6 LADDERS

Secure to the adjacent construction with the clip angles attached to the

stringer. Secure to masonry or concrete with not less than two 1/2 inch diameter expansion bolts. Install intermediate clip angles not over 48 inches on center. Install brackets as required for securing of ladders welded or bolted to structural steel or built into the masonry or concrete. Ends of ladders must not rest upon finished roof.

-- End of Section --

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SECTION 06 10 00

ROUGH CARPENTRY
08/16

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN FOREST FOUNDATION (AFF)

ATFS STANDARDS	(2015) American Tree Farm System Standards of Sustainability 2015-2020

AMERICAN LUMBER STANDARDS COMMITTEE (ALSC)

ALSC PS 20	(2015) American Softwood Lumber Standard

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B18.2.1	(2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(2015) Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
ASME B18.5.2.1M	(2006; R 2011) Metric Round Head Short Square Neck Bolts
ASME B18.5.2.2M	(1982; R 2010) Metric Round Head Square Neck Bolts
ASME B18.6.1	(2016) Wood Screws (Inch Series)

AMERICAN WOOD COUNCIL (AWC)

AWC NDS	(2015) National Design Specification (NDS) for Wood Construction
AWC WFCM	(2012) Wood Frame Construction Manual for One- and Two-Family Dwellings

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA BOOK	(2015) AWPA Book of Standards
AWPA M2	(2019) Standard for the Inspection of Preservative Treated Wood Products for Industrial Use
AWPA M6	(2013) Brands Used on Preservative Treated Materials

AWPA P5	(2015) Standard for Waterborne Preservatives
AWPA P18	(2014) Nonpressure Preservatives
AWPA P49	(2015) Standard for Fire Retardant FR-1
AWPA T1	(2019) Use Category System: Processing and Treatment Standard
AWPA U1	(2019) Use Category System: User Specification for Treated Wood

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA E445	(2002) Performance Standards and Qualification Policy for Structural-Use Panels (APA PRP-108)
APA F405	(19) Product Guide: Performance Rated Panels
APA L870	(2010) Voluntary Product Standard, PS 1-09, Structural Plywood
APA S350	(2014) PS 2-10, Performance Standard for Wood-Based Structural-Use Panels

ASTM INTERNATIONAL (ASTM)

ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2014; E 2017) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM D2898	(2010; R 2017) Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
ASTM F547	(2017) Standard Terminology of Nails for Use with Wood and Wood-Base Materials
ASTM F1667	(2018a) Standard Specification for Driven Fasteners: Nails, Spikes, and Staples

CALIFORNIA AIR RESOURCES BOARD (CARB)

CARB 93120	(2007) Airborne Toxic Control Measure (ATCM) to Reduce Formaldehyde Emissions from Composite Wood Products

CSA GROUP (CSA)

CSA Z809-08	(R2013) Sustainable Forest Management

FM GLOBAL (FM)

FM 4435	(2013) Roof Perimeter Flashing

FOREST STEWARDSHIP COUNCIL (FSC)

FSC STD 01 001	(2015) Principles and Criteria for Forest Stewardship

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)

NHLA Rules	(2015) Rules for the Measurement & Inspection of Hardwood & Cypress

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)

NELMA Grading Rules	(2013) Standard Grading Rules for Northeastern Lumber

PROGRAMME FOR ENDORSEMENT OF FOREST CERTIFICATION (PEFC)

PEFC ST 2002:2013	(2015) PEFC International Standard Chain of Custody of Forest Based Products Requirements

REDWOOD INSPECTION SERVICE (RIS) OF THE CALIFORNIA REDWOOD ASSOCIATION (CRA)

RIS Grade Use	(1998) Redwood Lumber Grades and Uses

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)

SCMA Spec	(1986; Supple. No. 1, Aug 1993) Standard Specifications for Grades of Southern Cypress

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB 1003	(2014) Standard Grading Rules for Southern Pine Lumber

SUSTAINABLE FOREST INITIATIVE (SFI)

SFI 2015-2019	(2015) Standards, Rules for Label Use, Procedures and Guidance

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-1923	(Rev A; Notice 3) Shield, Expansion (Lag, Machine and Externally Threaded Wedge Bolt

	Anchors)
CID A-A-1924	(Rev A; Notice 3) Shield, Expansion (Self Drilling Tubular Expansion Shell Bolt Anchors
CID A-A-1925	(Rev A; Notice 3) Shield Expansion (Nail Anchors)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 770	Formaldehyde Standards for Composite Wood Products

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB 17	(2015) Standard Grading Rules

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA G-5	(2017) Western Lumber Grading Rules

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Nailers and Nailing Strips; G

Drawings of field erection details, including materials and methods of fastening nailers in conformance with Factory Mutual wind uplift rated systems specified in other Sections of these specifications.

SD-03 Product Data

Fire-retardant Treatment

Adhesives

SD-06 Test Reports

Preservative-treated Lumber and Plywood

SD-07 Certificates

Certificates of Grade

Certified Sustainably Harvested Virgin Lumber; S

Certified Sustainably Harvested Structural-use and OSB Panels for

Other Uses; S

Certified Sustainably Harvested Plywood Underlayment; S

Preservative Treatment

Indoor Air Quality for Particleboard Underlayment; S

Indoor Air Quality for Fiberboard Underlayment; S

Indoor Air Quality for Strawboard Panels; S

Indoor Air Quality for Fiberboard Wall Sheathing; S

Indoor Air Quality for Aerosol Adhesives; S

Indoor Air Quality for Non-aerosol Adhesives; S

SD-10 Operation and Maintenance Data

Plastic

When not labeled, identify types in Operation and Maintenance Manual.

Take-back Program

Include contact information, summary of procedures, and the limitations and conditions applicable to the project. Indicate manufacturer's commitment to reclaim materials for recycling or reuse.

1.3 DELIVERY AND STORAGE

Deliver materials to the site in an undamaged condition. Store, protect, handle, and install prefabricated structural elements in accordance with manufacturer's instructions and as specified. Store materials off the ground to provide proper ventilation, with drainage to avoid standing water, and protection against ground moisture and dampness. Store materials with a moisture barrier at both the ground level and as a cover forming a well ventilated enclosure. Store wood I-beams and glue-laminated beams and joists on edge. Adhere to requirements for stacking, lifting, bracing, cutting, notching, and special fastening requirements. Do not use materials that have visible moisture or biological growth. Remove defective and damaged materials and provide new materials. Store separated reusable wood waste convenient to cutting station and area of work.

1.4 GRADING AND MARKING

1.4.1 Lumber

Mark each piece of framing and board lumber or each bundle of small pieces of lumber with the grade mark of a recognized association or independent inspection agency. Such association or agency must be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Surfaces that are to be exposed to view must not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.

1.4.2 Plywood

Mark each sheet with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark must identify the plywood by species group or span rating, exposure durability classification, grade, and compliance with APA L870. Surfaces that are to be exposed to view must not bear grademarks or other types of identifying marks.

1.4.3 Preservative-Treated Lumber and Plywood

The Contractor is responsible for the quality of treated wood products. Each treated piece must be inspected in accordance with AWPA M2 and permanently marked or branded, by the producer, in accordance with AWPA M6. The Contractor must provide Contracting Officer's Representative (COR) with the inspection report of an approved independent inspection agency that offered products comply with applicable AWPA Standards. The appropriate Quality Mark on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.

1.4.4 Fire-Retardant Treated Lumber

Mark each piece in accordance with AWPA M6, except pieces that are to be natural or transparent finished. In addition, exterior fire-retardant lumber must be distinguished by a permanent penetrating blue stain. Labels of a nationally recognized independent testing agency will be accepted as evidence of conformance to the fire-retardant requirements of AWPA M6.

1.4.5 Hardboard, Gypsum Board, and Fiberboard

Mark each sheet or bundle to identify the standard under which the material is produced and the producer.

1.5 SIZES AND SURFACING

ALSC PS 20 for dressed sizes of yard and structural lumber. Lumber must be surfaced four sides. Size references, unless otherwise specified, are nominal sizes, and actual sizes must be within manufacturing tolerances allowed by the standard under which the product is produced. Other measurements are IP or SI standard.

1.6 MOISTURE CONTENT

Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products must be as follows at the time of delivery to the job site:

a. Framing lumber and board, 19 percent maximum

b. Timbers 5 inches and thicker, 25 percent maximum

c. Materials other than lumber; moisture content must be in accordance with standard under which the product is produced

1.7 PRESERVATIVE TREATMENT

Treat wood products with waterborne wood preservatives conforming to AWPA P5. Pressure treatment of wood products must conform to the requirements of

AWPA BOOK Use Category System Standards U1 and T1. Pressure-treated wood products must not contain arsenic, chromium, or other agents classified as carcinogenic, probably carcinogenic, or possibly carcinogenic to humans (compounds in Groups 1, 2A, or 2B) by the International Agency for Research on Cancer (IARC), Lyon, France. Pressure-treated wood products must not exceed the limits of the U.S. EPA's Toxic Characteristic Leaching Procedure (TCLP), and must not be classified as hazardous waste. Submit certification from treating plant stating chemicals and process used and net amount of preservatives retained are in conformance with specified standards. In accordance with AWPA U1 provide non-copper preservative treatment such as EL2, PTI or SBX,DOT for products in direct contact with sheet metal.

a. 0.25 pcf intended for above ground use.

b. 0.40 pcf intended for ground contact and fresh water use. 0.60 pcf intended for Ammoniacal Copper Quaternary Compound (ACQ)-treated foundations. 0.80 to 1.00 pcf intended for ACQ-treated pilings. All wood must be air or kiln dried after treatment. Specific treatments must be verified by the report of an approved independent inspection agency, or the AWPA Quality Mark on each piece. Minimize cutting and avoid breathing sawdust. Brush coat areas that are cut or drilled after treatment with either the same preservative used in the treatment or with a 2 percent copper naphthenate solution. All lumber and woodwork must be preservative treated. The following items must be preservative treated:

(1) Wood framing, woodwork, and plywood up to and including the subflooring at the first-floor level of structures having crawl spaces when the bottoms of such items are 24 inches or less from the earth underneath.

(2) Wood members that are in contact with water.

(3) Wood sills, soles, plates, furring, and sleepers that are less than 24 inches from the ground, furring and nailers that are set into or in contact with concrete or masonry.

(4) Nailers, edge strips, crickets, curbs, and cants for roof decks.

1.7.1 Existing Structures

Use borate, permathrin, or a sodium silicate wood mineralization process to treat wood. Use borate for interior applications only.

1.7.2 New Construction

Use a boron-based preservative conforming to AWPA P18, sodium silicate wood mineralization process, or Ammoniacal Copper Quaternary Compound to treat wood. Use boron-based preservatives for above-ground applications only.

1.8 FIRE-RETARDANT TREATMENT

Fire-retardant treated wood must be pressure treated with fire retardants conforming to AWPA P49. Fire retardant treatment of wood products must conform to the requirements of AWPA U1, Commodity Specification H and AWPA T1, Section H. Treatment and performance inspection must be by an independent and qualified testing agency that establishes performance ratings. Each piece or bundle of treated material must bear identification

of the testing agency to indicate performance in accordance with such rating. Treated materials to be exposed to rain wetting must be subjected to an accelerated weathering technique in accordance with ASTM D2898 prior to being tested. Such items which will not be inside a building, and such items which will be exposed to heat or high humidity, must receive exterior fire-retardant treatment. Fire-retardant-treated wood products must be free of halogens, sulfates, ammonium phosphate, and formaldehyde. Items to be treated include the following:

a. Telecom backboards.

1.9 QUALITY ASSURANCE

1.9.1 Drawing Requirements

For fabricated structural members, trusses, qlu-lam members, indicate materials, details of construction, methods of fastening, and erection details. Include reference to design criteria used and manufacturers design calculations. Submit drawings for all proposed modifications of structural members. Do not proceed with modifications until the submittal has been approved.

1.9.2 Data Required

Submit calculations and drawings for all proposed modifications of structural members. Do not proceed with modifications until the submittal has been approved.

1.9.3 Humidity Requirements

Sequence work to minimize use of temporary HVAC to dry out building and control humidity.

1.10 ENVIRONMENTAL REQUIREMENTS

During and immediately after installation of treated wood, engineered wood products, and laminated wood products at interior spaces, provide temporary ventilation.

1.11 CERTIFICATIONS

1.11.1 Certified Wood Grades

Provide certificates of grade from the grading agency on graded but unmarked lumber or plywood attesting that materials meet the grade requirements specified herein.

1.11.2 Certified Sustainably Harvested Wood

Provide wood certified as sustainably harvested by FSC STD 01 001, ATFS STANDARDS, CSA Z809-08, SFI 2015-2019, or other third party program certified by PEFC ST 2002:2013. Provide a letter of Certification of Sustainably Harvested Wood signed by the wood supplier. Identify certifying organization and their third party program name and indicate compliance with chain-of-custody program requirements. Submit sustainable wood certification data; identify each certified product on a line item basis. Submit copies of invoices bearing certification numbers.

1.11.3 Indoor Air Quality Certifications

Submit required indoor air quality certifications in one submittal package.

1.11.3.1 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

1.11.3.2 Composite Wood, Wood Structural Panel and Agrifiber Products

For purposes of this specification, composite wood and agrifiber products include particleboard, medium density fiberboard (MDF), strawboard, panel substrates, and door cores. Provide products certified to meet requirements of both 40 CFR 770 and CARB 93120. Provide current product certification documentation from certification body.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Virgin Lumber

Lumber fabricated from old growth timber is not permitted. Avoid companies who buy, sell, or use old growth timber in their operations, when possible. Provide certified sustainably harvested virgin lumber.

2.2 LUMBER

2.2.1 Framing Lumber

Framing lumber such as nailing strips, and nailers must be one of the species listed in the table below. Minimum grade of species must be as listed.

Table of Grades for Framing and Board Lumber			
Grading Rules	Species	Framing	Board Lumber
WWPA G-5 standard grading rules	Aspen, Douglas Fir-Larch, Douglas Fir South, Engelmann Spruce-Lodgepole Pine, Engelmann Spruce, Hem-Fir, Idaho White Pine, Lodgepole Pine, Mountain Hemlock, Mountain Hemlock-Hem-Fir, Ponderosa Pine-Sugar Pine, Ponderosa Pine-Lodgepole Pine, Subalpine Fir, White Woods, Western Woods, Western Cedars, Western Hemlock	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	All Species: No. 3 Common
WCLIB 17 standard grading rules	Douglas Fir-Larch, Hem-Fir, Mountain Hemlock, Sitka Spruce, Western Cedars, Western Hemlock	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	All Species: Standard

Table of Grades for Framing and Board Lumber			
Grading Rules	Species	Framing	Board Lumber
SPIB 1003 standard grading rules	Southern Pine	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	No. 2 Boards
SCMA Spec standard specifications	Cypress	No. 2 Common	No. 2 Common
NELMA Grading Rules standard grading rules	Balsam Fir, Eastern Hemlock-Tamarack, Eastern Spruce, Eastern White Pine, Northern Pine, Northern Pine-Cedar	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	All Species: No. 3 Common except Standard for Eastern White and Northern Pine
RIS Grade Use standard specifications	Redwood	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 10 feet and shorter)	Construction Heart

Table of Grades for Framing and Board Lumber			
Grading Rules	Species	Framing	Board Lumber
NHLA Rules rules for the measurement and inspection of hardwood and cypress lumber	Cypress	No. 2 Dimension	No. 2 Common

2.3 PLYWOOD, STRUCTURAL-USE, AND ORIENTED STRAND BOARD (OSB) PANELS

APA L870, APA S350, APA E445, and APA F405 respectively.

2.3.1 Subflooring

2.3.1.1 Plywood - Other Uses

Plywood for Telecom backboard 1/2" plywood.

2.4 UNDERLAYMENT

Underlayment must conform to one of the following:

2.4.1 Plywood

Plywood must conform to APA L870, underlayment grade with exterior glue, or C-C (Plugged) exterior grade 11/32 inch thick, 4 feet wide. Provide certified sustainably harvested plywood.

2.5 OTHER MATERIALS

2.5.1 Miscellaneous Wood Members

2.5.1.1 Blocking

Blocking must be standard or number 2 grade.

2.5.2 Adhesives

Comply with applicable regulations regarding toxic and hazardous materials and as specified.

2.6 ROUGH HARDWARE

Unless otherwise indicated or specified, rough hardware must be of the type and size necessary for the project requirements. Sizes, types, and spacing of fastenings of manufactured building materials must be as recommended by the product manufacturer unless otherwise indicated or specified. Rough hardware exposed to the weather or embedded in or in contact with preservative treated wood, exterior masonry, or concrete walls or slabs must be hot-dip zinc-coated in accordance with ASTM A153/A153M. Nails and fastenings for fire-retardant treated lumber and woodwork exposed to the weather must be copper alloy or hot-dipped galvanized fasteners as

recommended by the treated wood manufacturer.

2.6.1 Bolts, Nuts, Studs, and Rivets

ASME B18.2.1, ASME B18.5.2.1M, ASME B18.5.2.2M and ASME B18.2.2.

2.6.2 Anchor Bolts

ASTM A307, size as indicated, complete with nuts and washers.

2.6.3 Expansion Shields

CID A-A-1923, CID A-A-1924, and CID A-A-1925. Except as shown otherwise, maximum size of devices must be 3/8 inch.

2.6.4 Lag Screws and Lag Bolts

ASME B18.2.1.

2.6.5 Wood Screws

ASME B18.6.1.

2.6.6 Nails

ASTM F547, size and type best suited for purpose. For sheathing and subflooring, length of nails must be sufficient to extend 1 inch into supports. In general, 8-penny or larger nails must be used for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber; 16-penny or larger nails must be used for nailing through 2 inch thick lumber. Nails used with treated lumber and sheathing must be hot-dipped galvanized in accordance with ASTM A153/A153M. Nailing must be in accordance with the recommended nailing schedule contained in AWC WFCM. Where detailed nailing requirements are not specified, nail size and spacing must be sufficient to develop an adequate strength for the connection. The connection's strength must be verified against the nail capacity tables in AWC NDS. Reasonable judgment backed by experience must ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector must be used.

2.6.7 Wire Nails

ASTM F1667.

2.6.8 Clip Angles

Steel, 3/16 inch thick, size best suited for intended use; or zinc-coated steel or iron commercial clips designed for connecting wood members.

2.6.9 Door Buck Anchors

Metal anchors, 1/8 by 1-1/4 inch steel, 12 inches long, with ends bent 2 inches. Anchors must be screwed to the backs of bucks and built into masonry or concrete. Locate 8 inches above sills and below heads and not more than 24 inches intermediately between. Anchorage of bucks to steel framing must be as necessary to suit the conditions.

2.6.10 Metal Framing Anchors

Construct anchors to the configuration shown using hot dip zinc-coated steel conforming to ASTM A653/A653M, G90. Except where otherwise shown, Steel must be not lighter than 18 gage. Special nails supplied by the manufacturer must be used for all nailing.

PART 3 EXECUTION

3.1 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Conform to AWC WFCM and install in accordance with the National Association of Home Builders (NAHB) Advanced Framing Techniques: Optimum Value Engineering, unless otherwise indicated or specified. Select lumber sizes to minimize waste. Fit framing lumber and other rough carpentry, set accurately to the required lines and levels, and secure in place in a rigid manner. Space plastic lumber boards as necessary to allow for lengthwise expansion and contraction. Do not splice framing members between bearing points. Set joists, rafters, and purlins with their crown edge up. Frame members for the passage of pipes, conduits, and ducts. Provide adequate support as appropriate to the application, climate, and modulus of elasticity of the product. Do not cut or bore structural members for the passage of ducts or pipes without approval. Reinforce all members damaged by such cutting or boring by means of specially formed and approved sheet metal or bar steel shapes, or remove and provide new, as approved. Provide as necessary for the proper completion of the work all framing members not indicated or specified. Spiking and nailing not indicated or specified otherwise must be in accordance with the Nailing Schedule contained in ICC IBC; perform bolting in an approved manner. Spikes, nails, and bolts must be drawn up tight.

3.1.1 Sills

Set sills level and square and wedge with steel or slate shims; point or grout with non-shrinking cement mortar to provide continuous and solid bearing. Anchor sills to the foundations as indicated. Where sizes and spacing of anchor bolts are not indicated, provide not less than 5/8 inch diameter bolts at all corners and splices and space at a maximum of 6 feet o.c. between corner bolts. Provide at least two bolts for each sill member. Lap and splice sills at corners and bolt through the laps or butt the ends and through-bolt not more than 6 inches from the ends. Provide bolts with plate washers and nuts. Bolts in exterior walls must be zinc-coated.

3.1.1.1 Anchors in Masonry

Except where indicated otherwise, Embed anchor bolts not less than 15 inches in masonry unit walls and provide each with a nut and a 2 inch diameter washer at bottom end. Fully grout bolts with mortar.

3.1.1.2 Anchors in Concrete

Except where indicated otherwise, Embed anchor bolts not less than 8 inches in poured concrete walls and provide each with a nut and a 2 inch diameter washer at bottom end. A bent end may be substituted for the nut and washer; bend must be not less than 90 degrees. Powder-actuated fasteners

spaced 3 feet o.c. may be provided in lieu of bolts for single thickness plates on concrete.

3.2 MISCELLANEOUS

3.2.1 Wood Roof Nailers, Edge Strips, Crickets, Curbs, and Cants

Provide sizes and configurations indicated or specified and anchored securely to continuous construction.

3.2.1.1 Roof Edge Strips and Nailers

Provide at perimeter of roof, around openings through roof, and where roofs abut walls, curbs, and other vertical surfaces. Except where indicated otherwise, nailers must be 6 inches wide and the same thickness as the insulation. Anchor nailers securely to underlying construction. Anchor perimeter nailers in accordance with FM 4435.

3.2.1.2 Crickets, Cants, and Curbs

Provide wood saddles or crickets, cant strips, curbs for scuttles and ventilators, and wood nailers bolted to tops of concrete or masonry curbs and at expansion joints, as indicated, specified, or necessary and of lumber.

3.2.2 Rough Wood Bucks

2 inch nominal thickness. Set wood bucks true and plumb. Anchor bucks to concrete or masonry with steel straps extending into the wall 8 inches minimum. Place anchors near the top and bottom of the buck and space uniformly at 2 foot maximum intervals.

3.2.3 Wood Blocking

Provide proper sizes and shapes at proper locations for the installation and attachment of wood and other finish materials, fixtures, equipment, and items indicated or specified.

3.2.4 Wood Grounds

Provide for fastening wood trim, finish materials, and other items to plastered walls and ceilings. Install grounds in proper alignment and true with an 8 foot straightedge.

3.2.5 Wood Furring

Provide where shown and as necessary for facing materials specified. Except as shown otherwise, furring strips must be nominal one by 3, continuous, and spaced 16 inches o.c. Erect furring vertically or horizontally as necessary. Nail furring strips to masonry. Do not use wood plugs. Provide furring strips around openings, behind bases, and at angles and corners. Furring must be plumb, rigid, and level and must be shimmed as necessary to provide a true, even plane with surfaces suitable to receive the finish required. Form furring for offsets and breaks in walls or ceilings on 1 by 4 wood strips spaced 16 inches o.c.

3.2.6 Wood Bumpers

Dress to the sizes indicated, and bevel edges. Bore, countersink, and bolt bumpers in place.

3.2.7 Temporary Closures

Provide with hinged doors and padlocks and install during construction at exterior doorways and other ground level openings that are not otherwise closed. Cover windows and other unprotected openings with polyethylene or other approved material, stretched on wood frames. Provide dustproof barrier partitions to isolate areas as directed.

3.2.8 Sill Plates

Sill plates must be set level and square and anchor bolted at not more than 6 feet on centers and not more than 12 inches from end of each piece. A minimum of two anchors must be used for each piece.

3.3 ERECTION TOLERANCES

a. Framing members which will be covered by finishes such as wallboard, plaster, or ceramic tile set in a mortar setting bed, must be within the following limits:

(1) Layout of walls and partitions: 1/4 inch from intended position;

(2) Plates and runners: 1/4 inch in 8 feet from a straight line;

(3) Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and

(4) Face of framing members: 1/4 inch in 8 feet from a true plane.

b. Framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive must be within the following limits:

(1) Layout of walls and partitions: 1/4 inch from intended position;

(2) Plates and runners: 1/8 inch in 8 feet from a straight line;

(3) Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and

(4) Face of framing members: 1/8 in 8 feet from a true plane.

3.4 WASTE MANAGEMENT OF WOOD PRODUCTS

In accordance with the Waste Management Plan and as specified. Separate and reuse scrap sheet materials larger than 2 square feet, framing members larger than 16 inches, and multiple offcuts of any size larger than 12 inches. Clearly separate damaged wood and other scrap lumber for acceptable alternative uses on site, including bracing, blocking, cripples, ties, and shims.

Separate composite wood from other wood types and recycle or reuse.

Separate treated, stained, painted, and contaminated wood and place in designated area for hazardous materials. Dispose of according to local regulations. Do not leave any wood, shavings, sawdust, or other wood waste buried in fill or on the ground, unless for planned future use. Prevent sawdust and wood shavings from entering the storm drainage system. Compost

sawdust. Do not burn scrap lumber that has been pressure treated, or lumber that is less than one year old.

-- End of Section --

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SECTION 06 41 16.00 10

PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS AND LOCKERS
08/10

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A161.2	(1998) Decorative Laminate Countertops, Performance Standards for Fabricated High Pressure

ASTM INTERNATIONAL (ASTM)

ASTM D1037	(2012) Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM F547	(2017) Standard Terminology of Nails for Use with Wood and Wood-Base Materials

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.9	(2015) Cabinet Hardware

COMPOSITE PANEL ASSOCIATION (CPA)

CPA A208.1	(2016) Particleboard

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA LD 3	(2005) Standard for High-Pressure Decorative Laminates

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

UL ENVIRONMENT (ULE)

ULE Greenguard	UL Greenguard Certification Program

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

ANSI/WDMA I.S.1A	(2013) Interior Architectural Wood Flush Doors

WOODWORK INSTITUTE (WI)

NAAWS 3.1 (2017; 2018 Errata Edition) North American Architectural Woodwork Standards

1.2 SYSTEM DESCRIPTION

Work in this section includes laminate clad custom casework cabinets, lockers and hardware as shown on the drawings and as described in this specification. This Section includes high-pressure laminate surfacing and cabinet hardware. All exposed and semi-exposed surfaces, whose finish is not otherwise noted on the drawings or finish schedule, shall be sanded smooth and shall receive a clear finish of polyurethane. Wood finish may be shop finished or field applied in accordance with Section 09 90 00 PAINTS AND COATINGS.

1.3 SUSTAINABILITY REPORTING

Materials in this technical specification may contribute towards contract compliance with sustainability requirements.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings
Installation

SD-03 Product Data

Wood Materials
Wood Finishes
Finish Schedule
Certification

SD-04 Samples

Plastic Laminates
Cabinet Hardware

SD-07 Certificates

Quality Assurance
Laminate Clad Casework

SD-11 Closeout Submittals

LEED Documentation

1.5 QUALITY ASSURANCE

1.5.1 General Requirements

Unless otherwise noted on the drawings, all materials, construction

methods, and fabrication shall conform to and comply with the custom grade quality standards as outlined in NAAWS 3.1, Section for laminate clad cabinets. These standards shall apply in lieu of omissions or specific requirements in this specification. Contractors and their personnel engaged in the work shall be able to demonstrate successful experience with work of comparable extent, complexity and quality to that shown and specified. Submit a quality control statement which illustrates compliance with and understanding of NAAWS 3.1 requirements, in general, and the specific NAAWS 3.1 requirements provided in this specification. The quality control statement shall also certify a minimum of ten years Contractor's experience in laminate clad casework fabrication and construction. The quality control statement shall provide a list of a minimum of five successfully completed projects of a similar scope, size, and complexity.

1.5.2 Sustainable Design Certification

Product shall be third party certified in accordance with ULE Greenguard Gold, SCS Scientific Certification Systems Indoor Advantage Gold or equal. Certification shall be performed annually and shall be current.

1.6 DELIVERY, STORAGE, AND HANDLING

Casework may be delivered knockdown or fully assembled. Deliver all units to the site in undamaged condition, stored off the ground in fully enclosed areas, and protected from damage. The storage area shall be well ventilated and not subject to extreme changes in temperature or humidity.

1.7 SEQUENCING AND SCHEDULING

Coordinate work with other trades. Units shall not be installed in any room or space until painting, and ceiling installation are complete within the room where the units are located. Floor cabinets shall be installed before finished flooring materials are installed.

PART 2 PRODUCTS

2.1 WOOD MATERIALS

2.1.1 Lumber

a. All framing lumber shall be kiln-dried Grade III to dimensions as shown on the drawings. Frame front, where indicated on the drawings, shall be nominal 3/4 inch hardwood.

2.1.2 Panel Products

2.1.2.1 Plywood

All plywood panels used for framing purposes shall be veneer core hardwood plywood, NAAWS 3.1 Grade AA. Nominal thickness of plywood panels shall be as indicated in this specification and on the drawings.

2.1.2.2 Particleboard

All particleboard shall be industrial grade, medium density (40 to 50 pounds per cubic foot), 3/4 inch thick. A moisture-resistant particleboard in grade Type 2-M-2 or 2-M-3 shall be used as the substrate for plastic laminate covered components as located on the drawings and

other areas subjected to moisture. Particleboard shall meet the minimum standards listed in ASTM D1037 and CPA A208.1.

2.2 SOLID POLYMER MATERIAL

Solid surfacing casework components shall conform to the requirements of Section 06 61 16 SOLID SURFACING FABRICATIONS.

2.3 HIGH PRESSURE DECORATIVE LAMINATE (HPDL)

All plastic laminates shall meet the requirements of ANSI/NEMA LD 3 and ANSI A161.2 for high-pressure decorative laminates. Design, colors, surface finish and texture, and locations shall be as indicated on Section 09 06 00 SCHEDULES FOR FINISHES. Submit two samples of each plastic laminate pattern and color. Samples shall be a minimum of 5 by 7 inches in size. Plastic laminate types and nominal minimum thicknesses for casework components shall be as indicated in the following paragraphs.

2.3.1 Horizontal General Purpose Standard (HGS) Grade

Horizontal general purpose standard grade plastic laminate shall be 0.048 inches (plus or minus 0.005 inches) in thickness. This laminate grade is intended for horizontal surfaces where postforming is not required.

2.3.2 Vertical General Purpose Standard (VGS) Grade

Vertical general purpose standard grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in thickness. This laminate grade is intended for exposed exterior vertical surfaces of casework components where postforming is not required.

2.3.3 Horizontal General Purpose Postformable (HGP) Grade

Horizontal general purpose postformable grade plastic laminate shall be 0.042 inches (plus or minus 0.005 inches) in thickness. This laminate grade is intended for horizontal surfaces where post forming is required.

2.3.4 Vertical General Purpose Postformable (VGP) Grade

Vertical general purpose postformable grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in thickness. This laminate grade is intended for exposed exterior vertical surfaces of components where postforming is required for curved surfaces.

2.3.5 Horizontal General Purpose Fire Rated (HGF) Grade

Horizontal general purpose fire rated grade plastic laminate shall be 0.048 inches (plus or minus 0.005 inches) in thickness. Laminate grade shall have a class 1, class A fire rating in accordance with ASTM E84.

2.3.6 Vertical General Purpose Fire Rated (VGF) Grade

Vertical general purpose fire rated grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in thickness. This laminate grade shall have a class 1, class A fire rating in accordance with ASTM E84.

2.3.7 Cabinet Liner Standard (CLS) Grade

Cabinet liner standard grade plastic laminate shall be 0.020 inches in

thickness. This laminate grade is intended for light duty semi-exposed interior surfaces of casework components.

2.3.8 Backing Sheet (BK) Grade

Undecorated backing sheet grade laminate is formulated specifically to be used on the backside of plastic laminated panel substrates to enhance dimensional stability of the substrate. Backing sheet thickness shall be 0.020 inches. Backing sheets shall be provided for all laminated casework components where plastic laminate finish is applied to only one surface of the component substrate.

2.4 EDGE BANDING

Edge banding for casework doors and drawer fronts shall be PVC vinyl and shall be 0.020 inch thick. Material width shall be 15/16 inches. Color and pattern shall match exposed door and drawer front laminate pattern and color.

2.5 VINYL DOOR EDGE

Vinyl edging for locker doors shall be a tee-mould anchor type with a flat edge profile. Finished width shall be as indicated on the drawings. Color shall be as indicated on the drawings Section 09 06 00 SCHEDULES FOR FINISHES.

2.6 CABINET HARDWARE

Submit one sample of each cabinet hardware item specified to include hinges, pulls, drawer glides, grommets, and locker hook and hasp. All hardware shall conform to ANSI/BHMA A156.9, unless otherwise noted, and shall consist of the following components:

2.6.1 Door Hinges

Concealed type, BHMA No. A156.9.B01602 (165 degrees with self closing feature at less than 90 degrees.

2.6.2 Cabinet Pulls

Backmounted wire pull type, BHMA No. A156.9.B32011 (brushed aluminum finish).

2.6.3 Drawer Slide

Side mounted ball bearing type, BHMA No. A156.9.B05091 with full extension and a minimum 75 pound 100 pound load capacity. Slides shall include an integral positive stop to avoid accidental drawer removal.

2.6.4 Adjustable Shelf Support System

Recessed (mortised) metal standards, BHMA No. BO4071, finish: satin stainless steel. Support clips for the standards shall be open type, BHMA No. B04091, finish: satin stainless steel Multiple holes with metal pin supports.

2.7 FASTENERS

Nails, screws, and other suitable fasteners shall be the size and type best suited for the purpose and shall conform to ASTM F547 where applicable.

2.8 ADHESIVES, CAULKS, AND SEALANTS

2.8.1 Adhesives

Adhesives shall be of a formula and type recommended by AWI. Adhesives shall be selected for their ability to provide a durable, permanent bond and shall take into consideration such factors as materials to be bonded, expansion and contraction, bond strength, fire rating, and moisture resistance. Adhesives shall meet local regulations regarding VOC emissions and off-gassing.

2.8.1.1 Wood Joinery

Adhesives used to bond wood members shall be a Type II for interior use polyvinyl acetate resin emulsion. Adhesives shall withstand a bond test as described in ANSI/WDMA I.S.1A.

2.8.1.2 Laminate Adhesive

Adhesive used to join high-pressure decorative laminate to wood shall be a water-based contact adhesive. PVC edgebanding shall be adhered using a polymer-based hot melt glue.

2.8.2 Caulk

Caulk used to fill voids and joints between laminated components and between laminated components and adjacent surfaces shall be clear, 100 percent silicone.

2.8.3 Sealant

Sealant shall be of a type and composition recommended by the substrate manufacturer to provide a moisture barrier at sink cutouts and all other locations where unfinished substrate edges may be subjected to moisture.

2.9 ACCESSORIES

2.9.1 Grommets

Grommets shall be plastic material for cutouts with a diameter of 2 inches. Locations shall be as indicated on the drawings.

2.10 FABRICATION

Verify field measurements as indicated in the shop drawings before fabrication. Fabrication and assembly of components shall be accomplished at the shop site to the maximum extent possible. Construction and fabrication of cabinets and their components shall meet or exceed the requirements for AWI custom grade unless otherwise indicated in this specification. Cabinet style, in accordance with NAAWS 3.1, Section 400-G descriptions, shall be flush overlay.

2.10.1 Base and Wall Cabinet and Locker Case Body

2.10.1.1 Cabinet Components

Frame members shall be glued-together, kiln-dried hardwood lumber. Top corners, bottom corners, and cabinet bottoms shall be braced with either

hardwood blocks or water-resistant glue and nailed in place metal or plastic corner braces. Cabinet components shall be constructed from the following materials and thicknesses:

2.10.1.1.1 Body Members (Ends, Divisions, Bottoms, and Tops)

3/4 inch particleboard panel product

2.10.1.1.2 Face Frames and Rails

3/4 inch panel product

2.10.1.1.3 Shelving

3/4 inch particleboard panel product

2.10.1.1.4 Cabinet Backs

1/4 inch particleboard panel product

2.10.1.1.5 Drawer Sides, Backs, and Subfronts

1/2 inch panel product

2.10.1.1.6 Drawer Bottoms

1/4 inch particleboard panel product

2.10.1.1.7 Door and Drawer Fronts

3/4-inch particleboard panel product

2.10.1.2 Joinery Method for Case Body Members

2.10.1.2.1 Tops, Exposed Ends, and Bottoms

a. Stop dado, glued under pressure, and either nailed, stapled or screwed (fasteners will not be visible on exposed parts).

2.10.1.2.2 Exposed End Corner and Face Frame Attachment

2.10.1.2.2.1 Mitered Joint

lock miter or spline or biscuit, glued under pressure (no visible fasteners)

2.10.1.2.2.2 Non-Mitered Joint (90 degree)

butt joint glued under pressure (no visible fasteners)

2.10.1.2.2.3 Butt Joint

glued and nailed

2.10.1.2.3 Cabinet Backs (Wall Hung Cabinets)

Wall hung cabinet backs must not be relied upon to support the full weight of the cabinet and its anticipated load for hanging/mounting purposes. Method of back joinery and hanging/mounting mechanisms should transfer the load to case body members. Fabrication method shall be:

2.10.1.2.3.1 Side Bound

Side bound, captured in groove or rabbetts; glued and fastened.

2.10.1.2.4 Cabinet Backs (Floor Standing Cabinets)

2.10.1.2.4.1 Side Bound with Rabbetts

Side bound, placed in rabbetts; glued and fastened in rabbetts.

2.10.1.2.5 Wall Anchor Strips

Wall Anchor Strips shall be required for all cabinets with backs less than 1/2 inch thick. Strips shall consist of minimum 1/2 inch thick lumber, minimum 2-1/2 inches width; securely attached to wall side of cabinet back - top and bottom for wall hung cabinets, top only for floor standing cabinets.

2.10.2 Cabinet Floor Base

Floor cabinets shall be mounted on a base constructed of nominal 2 inch thick lumber. Base assembly components shall be treated lumber. Finished height for each cabinet base shall be as indicated on the drawings. Bottom edge of the cabinet door or drawer face shall be flush with top of base.

2.10.3 Cabinet Door and Drawer Fronts

Door and drawer fronts shall be fabricated from 3/4 inch medium density particleboard. All door and drawer front edges shall be surfaced with high pressure plastic laminate , color and pattern as indicated in Section 09 06 00 SCHEDULES FOR FINISHES.

2.10.4 Drawer Assembly

2.10.4.1 Drawer Components

Drawer components shall consist of a removable drawer front, sides, backs, and bottom. Drawer components shall be constructed of the following materials and thicknesses:

2.10.4.1.1 Drawer Sides and Backs For Laminate Finish

1/2 inch thick 7-ply hardwood veneer core substrate

2.10.4.1.2 Drawer Sides and Back For Thermoset Overlay (Melamine) Finish

1/2 inch thick medium density particleboard

2.10.4.1.3 Drawer Bottom

1/4 inch thick veneer core panel product for transparent or plastic laminate finish thermoset decorative overlay melamine panel product

2.10.4.2 Drawer Assembly Joinery Method

a. Multiple dovetail (all corners) or French dovetail front/dadoed back, glued under pressure.

b. Doweled, glued under pressure.

c. Lock shoulder, glued and pin nailed.

d. Bottoms shall be set into sides, front, and back, 1/4 inch deep groove with a minimum 3/8 inch standing shoulder.

2.10.5 Shelving

2.10.5.1 General Requirements

Shelving shall be fabricated from 3/4 inch medium density particleboard. All shelving top and bottom surfaces shall be finished with HPDL plastic laminate. Shelf edges shall be finished in a PVC edgebanding.

2.10.5.2 Shelf Support System

The shelf support system shall be:

2.10.5.2.1 Recessed (Mortised) Metal Shelf Standards

Mortise standards flush with the finishes surface of the cabinet interior side walls, two per side. Pposition and space standards on the side walls to provide a stable shelf surface that eliminates tipping when shelf front is weighted. Install and adjust standards vertically to provide a level, stable shelf surface when clips are in place.

2.10.6 Laminate Application

Laminate application to substrates shall follow the recommended procedures and instructions of the laminate manufacturer and ANSI/NEMA LD 3, using tools and devices specifically designed for laminate fabrication and application. Provide a balanced backer sheet (Grade BK) wherever only one surface of the component substrate requires a plastic laminate finish. Apply required grade of laminate in full uninterrupted sheets consistent with manufactured sizes using one piece for full length only, using adhesives specified herein or as recommended by the manufacturer. Fit corners and joints hairline. All laminate edges shall be machined flush, filed, sanded, or buffed to remove machine marks and eased (sharp corners removed). Clean up at easing shall be such that no overlap of the member eased is visible. Fabrication shall conform to ANSI A161.2. Laminate types and grades for component surfaces shall be as follows unless otherwise indicated on the drawings:

2.10.6.1 Base/Wall Cabinet Case Body

a. Exterior (exposed) surfaces to include exposed and semi-exposed face frame surfaces: HPDL Grade VGS.

b. Interior (semi-exposed) surfaces to include interior back wall, bottom, and side walls: Thermoset Decorative Overlay (melamine).

2.10.6.2 Adjustable Shelving

2.10.6.2.1 Top and Bottom Surfaces

HPDL Grade HGS

2.10.6.2.2 All Edges

PVC edgebanding

2.10.6.3 Fixed Shelving

2.10.6.3.1 Top and Bottom Surfaces

HPDL Grade HGS

2.10.6.3.2 Exposed Edges

PVC edgebanding

2.10.6.4 Door, Drawer Fronts, Access Panels

2.10.6.4.1 Exterior (Exposed) and Interior (Semi-Exposed) Faces

HPDL Grade VGS

2.10.6.4.2 Edges

PVC edgebanding

2.10.6.5 Drawer Assembly

All interior and exterior surfaces: Thermoset Decorative Overlay (melamine).

2.10.6.6 Tolerances

Flushness, flatness, and joint tolerances of laminated surfaces shall meet the NAAWS 3.1 custom grade requirements.

2.10.7 Finishing

2.10.7.1 Filling

No fasteners shall be exposed on laminated surfaces. All nails, screws, and other fasteners in non-laminated cabinet components shall be countersunk and the holes filled with wood filler consistent in color with the wood species.

2.10.7.2 Sanding

All surfaces requiring coatings shall be prepared by sanding with a grit and in a manner that scratches will not show in the final system.

2.10.7.3 Coatings

Types, method of application and location of casework finishes shall be in accordance with the finish schedule, drawings and Section 09 90 00 PAINTS AND COATINGS. All cabinet reveals shall be painted. Submit descriptive data which provides narrative written verification of all types of construction materials and finishes, methods of construction, etc. not clearly illustrated on the submitted shop drawings. Data shall provide written verification of conformance with NAAWS 3.1 for the quality indicated to include materials, tolerances, and types of construction. Both the manufacturer of materials and the fabricator shall submit available literature which describes re-cycled product content, operations

and processes in place that support efficient use of natural resources, energy efficiency, emissions of ozone depleting chemicals, management of water and operational waste, indoor environmental quality, and other production techniques supporting sustainable design and products.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall comply with applicable requirements for NAAWS 3.1 custom quality standards. Countertops and fabricated assemblies shall be installed level, plumb, and true to line, in locations shown on the drawings. Cabinets and other laminate clad casework assemblies shall be attached and anchored securely to the floor and walls with mechanical fasteners that are appropriate for the wall and floor construction.

3.1.1 Anchoring Systems

3.1.1.1 Floor

Base cabinets shall utilize a floor anchoring system. Anchoring and mechanical fasteners shall not be visible from the finished side of the casework assembly. Cabinet assemblies shall be attached to anchored bases without visible fasteners . Where assembly abuts a wall surface, anchoring shall include a minimum 1/2 inch thick lumber or panel product hanging strip, minimum 2-1/2 inch width; securely attached to the top of the wall side of the cabinet back.

3.1.1.2 Wall

Cabinet to be wall mounted shall utilize minimum 1/2 inch thick lumber or panel product hanging strips, minimum 2-1/2 inch width; securely attached to the wall side of the cabinet back, both top and bottom.

3.1.2 Countertops

Countertops shall be installed in locations as indicated on the drawings. Countertops shall be fastened to supporting casework structure with mechanical fasteners, hidden from view. All joints formed by the countertop or countertop splash and adjacent wall surfaces shall be filled with a clear silicone caulk. Loose side splashes shall be adhered to both the countertop surface perimeter and the adjacent wall surface with adhesives appropriate for the type of materials to be adhered. Joints between the countertop surface and splash shall be filled with clear silicone caulk in a smooth consistent concave bead. Bead size shall be the minimum necessary to fill the joint and any surrounding voids or cracks.

3.1.3 Hardware

Casework hardware shall be installed in types and locations as indicated on the drawings. Where fully concealed European-style hinges are specified to be used with particleboard or fiberboard doors, the use of plastic or synthetic insertion dowels shall be used to receive 3/16 inch "Euroscrews". The use of wood screws without insertion dowels is prohibited.

3.1.4 Doors, Drawers and Removable Panels

The fitting of doors, drawers and removable panels shall be accomplished

within target fitting tolerances for gaps and flushness in accordance with NAAWS 3.1 custom grade requirements.

3.1.5 Plumbing Fixtures

Install sinks, sink hardware, and other plumbing fixtures in locations as indicated on the drawings and in accordance with Section 22 00 00 PLUMBING, GENERAL PURPOSE.

-- End of Section --

SECTION 06 61 16

SOLID SURFACING FABRICATIONS
08/10

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D570	(1998; E 2010; R 2010) Standard Test Method for Water Absorption of Plastics
ASTM D638	(2014) Standard Test Method for Tensile Properties of Plastics
ASTM D696	(2016) Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C With a Vitreous Silica Dilatometer
ASTM D2583	(2013a) Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G21	(2015) Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

CSA GROUP (CSA)

CSA B45.5-11/IAPMO Z124	(2011; Update 1 2012) Plastic Plumbing Fixtures - First Edition

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA LD 3	(2005) Standard for High-Pressure Decorative Laminates

NSF INTERNATIONAL (NSF)

NSF/ANSI 51	(2012) Food Equipment Materials

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

TILE COUNCIL OF NORTH AMERICA (TCNA)

TCNA Hdbk	(2017) Handbook for Ceramic, Glass, and Stone Tile Installation

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SYSTEM DESCRIPTION

a. Work under this section includes countertops, backsplashes and side splashes and other items utilizing solid polymer (solid surfacing) fabrication as shown on the drawings and as described in this specification. Do not change source of supply for materials after work has started, if the appearance of finished work would be affected.

b. In most instances, installation of solid polymer fabricated components and assemblies will require strong, correctly located structural support provided by other trades. To provide a stable, sound, secure installation, close coordination is required between the solid polymer fabricator/installer and other trades to ensure that necessary structural wall support, cabinet counter top structural support, proper clearances, and other supporting components are provided for the installation of wall panels, countertops, shelving, and all other solid polymer fabrications to the degree and extent recommended by the solid polymer manufacturer.

c. Appropriate staging areas for solid polymer fabrications. Allow variation in component size and location of openings of plus or minus 1/8 inch.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings; G

Installation; G

SD-03 Product Data

Solid Polymer Material

Qualifications

Fabrications

Indoor air quality for solid surface seam and sealant products; S

SD-04 Samples

Material; G

Counter and Vanity Tops; G

SD-06 Test Reports

Solid Polymer Material

SD-07 Certificates

Fabrications

Qualifications

Indoor Air Quality for solid surface fabrication products; S

SD-10 Operation and Maintenance Data

Clean-up

1.4 CERTIFICATIONS

1.4.1 Indoor Air Quality

Submit required indoor air quality certifications and validations in one submittal package.

1.4.1.1 Indoor Air Quality for Solid Surface Fabricated Products

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification by other third-party program that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

To ensure warranty coverage, solid polymer fabricators must be certified to fabricate by the solid polymer material manufacturer being utilized. Mark all fabrications with the fabricator's certification label affixed in an inconspicuous location. Fabricators must have a minimum of 5 years of experience working with solid polymer materials. Submit solid polymer manufacturer's certification attesting to fabricator qualification approval.

1.6 DELIVERY, STORAGE, AND HANDLING

Do not deliver materials to project site until areas are ready for installation. Deliver components and materials to the site undamaged, in containers clearly marked and labeled with manufacturer's name. Store materials indoors with adequate precautions taken to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation, for duration of project.

1.7 WARRANTY

Provide manufacturer's warranty of ten years against defects in materials, excluding damages caused by physical or chemical abuse or excessive heat. Provide warranty for material and labor for replacement or repair of defective material for a period of ten years after component installation.

PART 2 PRODUCTS

2.1 MATERIAL

Provide solid polymer material that is a homogeneous filled solid polymer; not coated, laminated or of a composite construction; meeting CSA B45.5-11/IAPMO Z124 requirements. Provide materials with the minimum physical and performance properties specified. Superficial damage to a depth of 0.01 inch must be repairable by sanding or polishing. Provide amterial thickness as indicated on the drawings. Provide material not less than 1/4 inch in thickness. Submit a minimum 4 by 4 inch sample of each color and pattern for approval. Provide samples that indicate the full range of color and pattern variation. Retain approved samples as the standard for this work throughout the construction duration. Submit test report results from an independent testing laboratory attesting that the submitted solid polymer material meets or exceeds each of the specified performance requirements. Provide materials that meet the emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type).

Provide quartz solid surfacing material as described in Paragraph 2.1.3.

Provide certification or validation of indoor air quality for solid surface fabrication products.

2.1.1 Cast, 100 Percent Acrylic Polymer Solid Surfacing Material

Provide cast, 100 percent acrylic solid polymer material composed of acrylic polymer, mineral fillers, and pigments and meeting the following minimum performance requirements:

PROPERTY	REQUIREMENT (min. or max.)	TEST PROCEDURE
Tensile Strength	4000 psi (max.)	ASTM D638
Hardness	55-Barcol Impressor (min.)	ASTM D2583
Thermal Expansion	.000023 in/in/F (max.)	ASTM D696

PROPERTY	REQUIREMENT (min. or max.)	TEST PROCEDURE
Boiling Water Surface Resistance	No Change	ANSI/NEMA LD 3-3.05
High Temperature Resistance	No Change	ANSI/NEMA LD 3-3.06
Impact Resistance (Ball drop)		ANSI/NEMA LD 3-303
1/4 inch sheet	36 inches, 1/2 lb ball, no failure	
1/2 inch sheet	140 inches, 1/2 lb ball, no failure	
3/4 inch sheet	200 inches, 1/2 lb ball, no failure	
Mold & Mildew Growth	No growth	ASTM G21
Bacteria Growth	No growth	ASTM G21
Liquid Absorption (Weight in 24 hrs.)	0.1 percent max.	ASTM D570
Flammability		ASTM E84
Flame Spread	25 max.	
Smoke Developed	30 max.	
Sanitation	"Food Contact" approval	NSF/ANSI 51

2.1.2 Acrylic-modified Polymer Solid Surfacing Material

Provide cast, solid polymer material composed of a formulation containing acrylic and polyester polymers, mineral fillers, and pigments. Provide acrylic polymer content not less than 5 percent and not more than 10 percent to meet the following minimum performance requirements:

PROPERTY	REQUIREMENT (min. or max.)	TEST PROCEDURE
Tensile Strength	4100 psi (max.)	ASTM D638
Hardness	50-Barcol Impressor (min.)	ASTM D2583
Thermal Expansion	.000023 in/in/F (max.)	ASTM D696
Boiling Water Surface Resistance	No Change	ANSI/NEMA LD 3-3.05

PROPERTY	REQUIREMENT (min. or max.)	TEST PROCEDURE
High Temperature Resistance	No Change	ANSI/NEMA LD 3-3.06
Impact Resistance (Ball drop)		ANSI/NEMA LD 3-303
1/4 inch sheet	36 inches, 1/2 lb ball, no failure	
1/2 inch sheet	140 inches, 1/2 lb ball, no failure	
3/4 inch sheet	200 inches, 1/2 lb ball, no failure	
Mold & Mildew Growth	No growth	ASTM G21
Bacteria Growth	No growth	ASTM G21
Liquid Absorption (Weight in 24 hrs.)	0.6 percent max.	ASTM D570
Flammability		ASTM E84
Flame Spread	25 max.	
Smoke Developed	100 max.	
Sanitation	"Food Contact" approval	NSF/ANSI 51

2.1.3 Quartz Aggregate (or Engineered Quartz) Solid Surfacing Material

Solid sheets of consisting of quartz aggregates in an acrylic or polyester, or a combination of the two, resin binder (or matrix) that is solid and non-porous with integral color.

Test Item(s)	Test Method(s)	Test Result(s)
Absorption by weight	ASTM C97/C97M-09	0.06%
Density		2370 kg/m3
Abrasion resistance (polished)	ASTM C241/C241M-13	47
Flexural strength	ASTM C880/C880M-09	Dry condition: 34.9 MPa
		Wet condition: 37.5 MPa

Test Item(s)	Test Method(s)	Test Result(s)
Compressive strength	Refer to ASTM C170/C170M-14	Dry condition: 192 MPa
		Wet condition: 185 MPa
Breaking strength	ASTM C648-09	5100 N
Thermal expansion	ASTM C531-00(2012)	30.9 x 10 -6/degrees C
Chemical resistance	ASTM C650-04(2009)	Not affected
Abrasion wear index	ASTM C501-84(2009)	Wear index: 136

2.1.4 Material Patterns and Colors

Provide patterns and colors for all solid polymer components and fabrications indicated on the project color schedule. Pattern and color must be consistent in appearance, throughout the entire depth (thickness) of the solid polymer material.

2.1.5 Surface Finish

Provide exposed finished surfaces and edges with a uniform appearance. Exposed surface finish must be matte; gloss rating of 5-20 semigloss; gloss rating of 25-50 or as indicated on the drawings.

2.2 ACCESSORY PRODUCTS

Provide accessory products, as specified below, manufactured by the solid polymer manufacturer or products approved by the solid polymer manufacturer for use with the solid polymer materials being specified.

2.2.1 Seam Adhesive

Provide a two-part adhesive kit to create permanent, inconspicuous, non-porous, hard seams and joints by chemical bond between solid polymer materials and components to create a monolithic appearance of the fabrication. Adhesive must be approved by the solid polymer manufacturer and color-matched to the surfaces being bonded where solid-colored, solid polymer materials are being bonded together. Provide clear or color matched seam adhesive where particulate patterned, solid polymer materials are being bonded together.

2.2.2 Panel Adhesive

Provide neoprene based panel adhesive meeting TCNA Hdbk, Underwriter's Laboratories (UL) listed. Use this adhesive to bond solid polymer components to adjacent and underlying substrates.

2.2.3 Silicone Sealant

Provide a mildew-resistant, FDA and OSHA Nationally Recognized Testing Laboratory (NRTL) listed silicone sealant or caulk in a clear formulation. The silicone sealant must be approved for use by the solid polymer manufacturer. Use sealant to seal all expansion joints between solid polymer components and all joints between solid polymer components and other adjacent surfaces such as walls, floors, ceiling, and plumbing

fixtures.

2.2.4 Seam and Sealant Emissions

Provide seam and other accessory materials that meet the emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type).

Provide validation of indoor air quality for solid surface seam and sealant products.

2.2.5 Mounting Hardware

Provide mounting hardware, including sink/bowl clips, inserts and fasteners for attachment of undermount sinks and lavatories.

2.3 FABRICATIONS

Provide factory or shop fabricated components to sizes and shapes indicated, to the greatest extent practical, in accordance with approved Shop Drawings and manufacturer's requirements. Provide factory cutouts for sinks, lavatories, and plumbing fixtures where indicated on the drawings. Contours and radii must be routed to template, with edges smooth. Defective and inaccurate work will be rejected. Submit product data indicating product description, fabrication information, and compliance with specified performance requirements for solid polymer, joint adhesive, sealants, and heat reflective tape.

2.3.1 Joints and Seams

Form joints and seams between solid polymer components using manufacturer's approved seam adhesive. Provide inconspicuous joints in appearance and without voids to create a monolithic appearance.

2.3.2 Edge Finishing

Rout and finish component edges to a smooth, uniform appearance and finish. Provide edge shapes and treatments, including any inserts, as detailed on the drawings. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

2.3.3 Counter and Vanity Top Splashes

Fabricate backsplashes and end splashes from solid quartz surfacing material to be 6" in conformance with dimensions and shapes as indicated on the drawings. Provide backsplashes and end splashes for all counter tops and vanity tops. Provide shop fabricated loose, to be field attached backsplashes.

2.3.3.1 End Splashes

Provide quartz end splashes as loose for installation at the jobsite after horizontal surfaces to which they are to be attached have been installed.

2.3.4 Window Stools

Fabricate window stools from 1/2 inch thick solid surfacing, solid polymer material, including dimensions, edge shape, and other details selected from manufacturer's available pre-fabricated standards.

2.3.5 Counter and Vanity Tops

Fabricate all solid surfacing, solid polymer counter top and vanity top components from 1" thick material including details, dimensions, locations, and quantities as indicated on the Drawings. Provide complete counter tops with 6" high loose at all locations. Attach 2 inch wide reinforcing strip of polymer material under each horizontal counter top seam. Submit a minimum 1 foot wide by 6 inch deep, full size sample for each type of counter top shown on the project drawings. The sample must include the edge profile and backsplash as detailed on the project drawings. Provide solid polymer material of a pattern and color as indicated on the drawings. Provide sample that includes at least one seam and retain approved sample as standard for this work.

2.3.5.1 Counter Top With Sink

a. Stainless Steel or Vitreous China Sink. Provide countertops with sinks that include cutouts to template as furnished by the sink manufacturer. Provide manufacturer's standard sink mounting hardware for stainless steel vitreous china installation. Seal seam between sink and counter top shall be sealed with silicone sealant. Install sink, faucet, and plumbing requirements in accordance with Section 22 00 00 PLUMBING,GENERAL PURPOSE.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Components

Do not install items that show visual evidence of biological growth. Install all components and fabricated units plumb, level, and rigid. Make field joints between solid polymer components using solid polymer manufacturer's approved seam adhesives, to provide a monolithic appearance with joints inconspicuous in the finished work. Attach metal or vitreous china sinks and lavatory bowls to counter tops using solid polymer manufacturer's recommended clear silicone sealant and mounting hardware. Install all solid polymer sinks and bowls using a color-matched seam adhesive.

3.1.1.1 Loose Counter Top Splashes

Mount loose splashes in the locations noted on the drawings. Adhere loose splashes to the counter top with a color matched silicone sealant when the solid polymer components are solid colors. Use a clear silicone sealant to provide adhesion of particulate patterned solid polymer splashes to counter tops.

3.1.2 Silicone Sealant

Use a clear, silicone sealant or caulk to seal all expansion joints between solid polymer components and all joints between solid polymer components and other adjacent surfaces such as walls, floors, ceiling, and plumbing fixtures. Sealant bead must be smooth and uniform in appearance and use the minimum size necessary to bridge any gaps between the solid surfacing material and the adjacent surface. Install continuous bead that runs the entire length of the joint being sealed.

3.1.3 Plumbing

Make plumbing connections to sinks and lavatories in accordance with Section 22 00 00 PLUMBING, GENERAL PURPOSE.

3.2 CLEAN-UP

Clean all components after installation and cover to protect against damage during completion of the remaining project items. Components damaged after installation by other trades will be repaired or replaced at the General Contractor's cost. Component supplier will provide a repair/replace cost estimate to the General Contractor who must approve estimate before repairs are made. Submit a minimum of six copies of maintenance data indicating manufacturer's care, repair and cleaning instructions. Provide maintenance video if available.

-- End of Section --

SECTION 07 21 13

BOARD AND BLOCK INSULATION
02/16

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C272/C272M	(2016) Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions
ASTM C578	(2018) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C930	(2019) Standard Classification of Potential Health and Safety Concerns Associated with Thermal Insulation Materials and Accessories
ASTM C1289	(2019) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D1621	(2016) Standard Test Method for Compressive Properties of Rigid Cellular Plastics
ASTM D3833/D3833M	(1996; R 2011) Water Vapor Transmission of Pressure-Sensitive Tapes
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2016) Standard Test Methods for Water Vapor Transmission of Materials

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 31	(2020) Standard for the Installation of Oil-Burning Equipment
NFPA 54	(2021) National Fuel Gas Code
NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4)

National Electrical Code

NFPA 211 (2019) Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.134 Respiratory Protection

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's Standard Details; G

Block or Board Insulation; G

Vapor Retarder; G

Pressure Sensitive Tape; G

Protection Board or Coatings; G

Accessories including sealants; G

Recycled Content for Block or Board Insulation; S

SD-07 Certificates

Block or Board Insulation; G

Vapor Retarder; G

Protection Board or Coating; G

Draft Special Warranties; G

Final Special Warranties; G

SD-08 Manufacturer's Instructions

Block or Board Insulation

Adhesive

1.3 MANUFACTURER'S DETAILS

Submit manufacturer's standard details indicating methods of attachment and spacing, transition and termination details, and installation details. Include verification of existing conditions.

1.4 PRODUCT DATA

Include data for material descriptions, recommendations for product shelf

life, requirements for protection board or coatings, and precautions for flammability and toxicity. Include data to verify compatibility of sealants with insulation.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver materials to the site in original sealed wrapping bearing manufacturer's name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect from damage. Do not allow insulation materials to become wet, soiled, crushed, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storing, and protecting of materials before and during installation.

1.5.2 Storage

Inspect materials delivered to the site for damage and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling. Keep materials wrapped and separated from off-gassing materials (such as drying paints and adhesives). Do not use materials that have visible moisture or biological growth. Comply with manufacturer's recommendations for handling, storage, and protection of materials before and during installation.

1.6 SAFETY PRECAUTIONS

1.6.1 Respirators

Provide installers with dust/mist respirators, training in their use, and protective clothing, all approved by the National Institute for Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA) and in accordance with 29 CFR 1910.134.

1.6.2 Other Safety Considerations

Comply with the safety requirements of ASTM C930.

1.7 SPECIAL WARRANTIES

1.7.1 Guarantee

Guarantee insulation installation against failure due to ultraviolet light exposure for a period of three years from the date of Beneficial Occupancy. Submit draft and final guarantees in accordance with Sections 01 78 00 CLOSEOUT SUBMITTALS and 01 78 23 OPERATION AND MAINTENANCE DATA.

1.7.2 Warranty

Provide manufacturer's material warranty for all system components for a period of three years from the date of Beneficial Occupancy. Submit draft and final warranties in accordance with Sections 01 78 00 CLOSEOUT SUBMITTALS and 01 78 23 OPERATION AND MAINTENANCE DATA.

PART 2 PRODUCTS

2.1 BLOCK OR BOARD INSULATION

Provide thermal insulating materials as recommended by manufacturer for each type of application indicated. Provide insulation with the following physical properties and in accordance with the following standards:

a. Extruded Preformed Cellular Polystyrene: ASTM C578 REV A

e. Faced Rigid Cellular Polyisocyanurate and Polyurethane Insulation: ASTM C1289 REV A

(2) Type II Fibrous felt or glass fiber mat membrane on both major surfaces of the core foam.

2.1.1 Thermal Resistance

2.1.2 Fire Protection Requirements

a. Flame spread index of 75 or less when tested in accordance with ASTM E84.

b. Smoke developed index of 450 or less when tested in accordance with ASTM E84.

c. Provide insulated assemblies in accordance ICC IBC Chapter Fire and Smoke Protection Features.

2.1.3 Other Material Properties

Provide thermal insulating materials with the following properties:

a. Rigid cellular plastics: Compressive Resistance at Yield: Not less than 10 pounds per square inch (psi) when measured according to ASTM D1621.

b. Water Vapor Permeance: Not more than 1.1 Perms or less when measured according to ASTM E96/E96M, desiccant method, in the thickness required to provide the specified thermal resistance, including facings, if any.

e. Water Absorption: Not more than 2 percent by total immersion, by volume, when measured according to ASTM C272/C272M.

2.1.4 Indoor Air Quality

Provide certification of indoor air quality for block or board insulation.

2.1.5 Prohibited Materials

Do not provide materials containing asbestos.

2.2 VAPOR RETARDER AND DAMPPROOFING

2.2.1 Dampproofing for Masonry Cavity Walls

Bituminous material is specified in Section 07 27 26 FLUID APPLIED MEMBRANE AIR BARRIERS.

2.3 PRESSURE SENSITIVE TAPE

As recommended by manufacturer of vapor retarder(s). Match water vapor permeance rating for each vapor retarder specified. Provide tape in accordance with ASTM D3833/D3833M.

2.4 PROTECTION BOARD OR COATING

As recommended by insulation manufacturer.

2.5 ACCESSORIES

2.5.1 Adhesive

As recommended by insulation manufacturer.

2.5.2 Mechanical Fasteners

Corrosion resistant fasteners as recommended by the insulation manufacturer.

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

Prior to installation, ensure all areas that are in contact with the insulation are dry and free of projections that could cause voids, compressed insulation, or punctured vapor retarders. For foundation perimeter or under slab applications, check that subsurface fill is flat, smooth, dry, and well tamped. Do not proceed with installation if moisture or other conditions are present, and notify the Contracting Officer of such conditions. Do not proceed with the work until conditions have been corrected and verified to be dry.

3.2 PREPARATION

3.2.1 Blocking Around Heat Producing Devices

Provide noncombustible blocking at all spaces between heat producing devices and the floors, ceilings and roofs through which they pass. Provide in accordance with ICC IBC Section 2111.12 Fireplace Blocking and with the following clearances:

a. Recessed lighting fixtures, including wiring compartments, ballasts, and other heat producing devices, unless certified for installation surrounded by insulation: 3 inches from outside face of fixtures and devices or as required by NFPA 70 and, if insulation is placed above fixture or device, 24 inches above fixture.

b. Masonry chimneys or masonry enclosing a flue: 2 inches from outside face of masonry. Masonry chimneys for medium and high heat operating appliances: Minimum clearances required by NFPA 211.

c. Vents and vent connectors used for venting products of combustion, flues, and chimneys other than masonry chimneys: Minimum clearances as required by NFPA 211.

d. Gas Fired Appliances: Clearances as required in NFPA 54.

e. Oil Fired Appliances: Clearances as required in NFPA 31.

Blocking is not required if chimneys or flues are certified in writing by the chimney or flue manufacturer for use in contact with specific insulating materials.

3.3 INSTALLATION

3.3.1 Installation and Handling

Provide insulation in accordance with the manufacturer's printed installation instructions. Keep material dry and free of extraneous materials.

3.3.2 Electrical Wiring

Do not install insulation in a manner that would enclose electrical wiring between two layers of insulation.

3.3.3 Continuity of Insulation

Butt tightly against adjoining boards, studs, rafters, joists, sill plates, headers and obstructions. Provide continuity and integrity of insulation at corners, wall to ceiling joint, roof, and floor. Avoid creating thermal bridges and voids. Provide and verify continuity of insulative barrier throughout the building enclosure.

3.3.4 Coordination

Verify final installed insulation thicknesses comply with thicknesses indicated, R-values specified herein, and with the approved insulation submittal(s).

3.4 INSTALLATION ON WALLS

3.4.1 Installation on Masonry Walls

Apply board directly to masonry with adhesive or fasteners as recommended by the insulation manufacturer. Fit between obstructions without impaling board on ties or anchors. Apply in parallel courses with joints breaking midway over course below. Place boards in moderate contact with adjoining insulation without forcing and without gaps. Cut and shape as required to fit around wall penetrations, projections or openings to accommodate conduit or other utilities. Seal around cutouts with sealant. Install insulation in wall cavities so that it leaves at least a nominal 1 inch air space outside of the insulation to allow for cavity drainage.

3.4.2 Mechanical Attachment on Concrete and Masonry Walls

Cut insulation to cover walls. Apply adhesive to wall and set clip or other mechanical fastener in adhesive as recommended by manufacturer. After curing of adhesive, install insulation over fasteners and bend split prongs to provide a flush condition with the insulation. Butt all edges of insulation and seal with tape.

3.4.3 Protection Board or Coating

Install protection board or coating in accordance with manufacturer's printed instructions. Install protection over all exterior exposed insulation and to 1 foot below grade.

3.5 VAPOR RETARDER

Apply vapor retarder continuous across all surfaces. Overlap all joints at least 6 inches and seal with pressure sensitive tape. Seal at sills, header, windows, doors and utility penetrations. Repair punctures or tears with pressure sensitive tape.

3.6 ACCESS PANELS AND DOORS

Attach insulation to all access panels greater than 1 square foot and all access doors in insulated floors and ceilings. Use insulation with same R-Value as that for the floor or ceiling in which each panel occurs.

-- End of Section --

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SECTION 07 21 16

MINERAL FIBER BLANKET INSULATION
11/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C665	(2017) Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM C930	(2019) Standard Classification of Potential Health and Safety Concerns Associated with Thermal Insulation Materials and Accessories
ASTM D3575	(2020) Flexible Cellular Materials Made From Olefin Polymers
ASTM D5359	(2015) Standard Specification for Glass Cullet Recovered from Waste for Use in Manufacture of Glass Fiber
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E136	(2019a) Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

GREEN SEAL (GS)

GS-36	(2013) Adhesives for Commercial Use

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 31	(2020) Standard for the Installation of Oil-Burning Equipment
NFPA 54	(2021) National Fuel Gas Code

NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code
NFPA 211	(2019) Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.134	Respiratory Protection

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Blanket Insulation

Recycled Content for Insulation Materials; S

Sill Sealer Insulation

Vapor Retarder

Accessories

SD-07 Certificates

Indoor Air Quality for Insulation Materials; S

Indoor Air Quality for Adhesives; S

SD-08 Manufacturer's Instructions

Insulation

1.3 CERTIFICATIONS

Submit required indoor air quality certifications and validations in one submittal package.

1.3.1 Insulation Products

Provide product certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification by other third-party programs. Provide current product certification from certification body.

1.3.2 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Deliver materials to site in original sealed wrapping bearing manufacturer's name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect from damage. Do not allow insulation materials to become wet, soiled, crushed, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storing, and protecting of materials before and during installation.

1.4.2 Storage

Inspect materials delivered to the site for damage; unload and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling.

1.5 SAFETY PRECAUTIONS

1.5.1 Respirators

Provide installers with dust/mist respirators, training in their use, and protective clothing, all approved by National Institute for Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA) in accordance with 29 CFR 1910.134.

1.5.2 Other Safety Concerns

Consider other safety concerns and measures as outlined in ASTM C930.

PART 2 PRODUCTS

2.1 BLANKET INSULATION

ASTM C665, Type I, blankets without membrane coverings; Class A, membrane-faced surface with a flame spread of 25 or less, except a flame spread rating of 25 or less and a smoke developed rating of 150 or less when tested in accordance with ASTM E84.

2.1.1 Thermal Resistance Value (R-VALUE)

The R-Value must be as indicated on drawings.

2.1.2 Recycled Materials

Provide insulation materials containing the following minimum percentage of recycled material content by weight:

Fiberglass: 20 percent glass cullet complying with ASTM D5359

Provide data identifying percentage of recycled content for insulation materials.

2.1.3 Prohibited Materials

Do not provide asbestos-containing materials.

2.2 SILL SEALER INSULATION

Provide polyethylene foam sill sealer 3.5 inches in width with the following characteristics:.

Physical Properties	Test Method	Measurement
Nominal Thickness	ASTM D3575	3/16 inch
Compressive Strength	ASTM D3575	1.2 psi
- Vertical Direction	Suffix D	
Tensile Strength	ASTM D3575	32 psi
	Suffix T	

2.3 BLOCKING

Wood, metal, unfaced mineral fiber blankets in accordance with ASTM C665, Type I, or other approved materials. Use only non-combustible materials meeting the requirements of ASTM E136 for blocking around chimneys and heat producing devices.

2.4 VAPOR RETARDER

2.5 ACCESSORIES

2.5.1 Adhesive

As recommended by the insulation manufacturer. Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) that meet either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide aerosol adhesives used on the interior of the building that meet either emissions requirements of CDPH SECTION 01350 (use the office or classroom requirements, regardless of space type) or VOC content requirements of GS-36. Provide certification or validation of indoor air quality for adhesives.

2.5.2 Mechanical Fasteners

Corrosion resistant fasteners as recommended by the insulation manufacturer.

2.5.3 Wire Mesh

Corrosion resistant and as recommended by the insulation manufacturer.

PART 3 EXECUTION

3.1 EXISTING CONDITIONS

Before installing insulation, ensure that areas that will be in contact with the insulation are dry and free of projections which could cause voids, compressed insulation, or punctured vapor retarders. If moisture or other conditions are found that do not allow the workmanlike installation of the insulation, do not proceed but notify Contracting Officer of such conditions.

3.2 PREPARATION

3.2.1 Blocking at Attic Vents and Access Doors

Prior to installation of insulation, install permanent blocking to prevent insulation from slipping over, clogging, or restricting air flow through soffit vents at eaves.

3.2.2 Blocking Around Heat Producing Devices

Install non-combustible blocking around heat producing devices to provide the following clearances:

a. Recessed lighting fixtures, including wiring compartments, ballasts, and other heat producing devices, unless these are certified by the manufacturer for installation surrounded by insulation: 3 inches from outside face of fixtures and devices or as required by NFPA 70 and, if insulation is to be placed above fixture or device, 24 inches above fixture.

b. Masonry chimneys or masonry enclosing a flue: 2 inches from outside face of masonry. Masonry chimneys for medium and high heat operating appliances: Minimum clearances required by NFPA 211.

c. Vents and vent connectors used for venting the products of combustion, flues, and chimneys other than masonry chimneys: Minimum clearances as required by NFPA 211.

d. Gas Fired Appliances: Clearances as required in NFPA 54.

e. Oil Fired Appliances: Clearances as required in NFPA 31.

Blocking around flues and chimneys is not required when insulation blanket, including any attached vapor retarder, passed ASTM E136, in addition to meeting all other requirements stipulated in Part 2. Blocking is also not required if the chimneys are certified by the manufacturer for use in contact with insulating materials.

3.3 INSTALLATION

3.3.1 Insulation

Install and handle insulation in accordance with manufacturer's instructions. Keep material dry and free of extraneous materials. Any materials that show visual evidence of biological growth due to presence of moisture must not be installed on the building project. Ensure personal protective clothing and respiratory equipment is used as required. Observe safe work practices.

3.3.1.1 Electrical wiring

Do not install insulation in a manner that would sandwich electrical wiring between two layers of insulation.

3.3.1.2 Continuity of Insulation

Install blanket insulation to butt tightly against adjoining blankets and to studs, rafters, joists, sill plates, headers and any obstructions. Provide continuity and integrity of insulation at corners, wall to ceiling joints, roof, and floor. Avoid creating thermal bridges.

3.3.1.3 Installation at Bridging and Cross Bracing

Insulate at bridging and cross bracing by splitting blanket vertically at center and packing one half into each opening. Butt insulation at bridging and cross bracing; fill in bridged area with loose or scrap insulation.

3.3.1.4 Insulation without Affixed Vapor Retarder

Provide snug friction fit to hold insulation in place. Stuff pieces of insulation into cracks between trusses, joists, studs and other framing, such as at attic access doors, door and window heads, jambs, and sills, band joists, and headers.

3.3.1.5 Sizing of Blankets

Provide only full width blankets when insulating between trusses, joists, or studs. Size width of blankets for a snug fit where trusses, joists or studs are irregularly spaced.

3.3.1.6 Special Requirements for Ceilings

Place insulation under electrical wiring occurring across joists. Pack insulation into narrowly spaced framing. Do not block flow of air through soffit vents.

3.3.1.7 Installation of Sill Sealer

Size sill sealer insulation and place insulation over top of masonry or concrete perimeter walls or concrete perimeter floor slab on grade. Fasten sill plate over insulation.

-- End of Section --

SECTION 07 22 00

ROOF AND DECK INSULATION
02/16

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C208	(2012; R 2017; E 2017; E 2019) Standard Specification for Cellulosic Fiber Insulating Board
ASTM C552	(2017; E 2018) Standard Specification for Cellular Glass Thermal Insulation
ASTM C578	(2018) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C726	(2017) Standard Specification for Mineral Wool Roof Insulation Board
ASTM C728	(2017a) Standard Specification for Perlite Thermal Insulation Board
ASTM C1177/C1177M	(2017) Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C1289	(2019) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D4263	(1983; R 2018) Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM 4450	(1989) Approval Standard for Class 1 Insulated Steel Deck Roofs
FM 4470	(2010) Single-Ply, Polymer-Modified Bitumen Sheet, Built-up Roof (BUR), and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction
FM APP GUIDE	(updated on-line) Approval Guide

http://www.approvalguide.com/

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

UNDERWRITERS LABORATORIES (UL)

UL 1256	(2002; Reprint Jul 2013) Fire Test of Roof Deck Constructions
UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Insulation Board Layout and Attachment; G

Verification of Existing Conditions; G

SD-03 Product Data

Insulation; G

Cover Board; G

Fasteners; G

Sheathing Paper; G

Moisture Control; G

Asphalt Products; G

Recycled Content For Insulation; S

SD-06 Test Reports

Flame Spread Rating; G

SD-07 Certificates

Installer Qualifications; G

Certificates Of Compliance For Felt Materials; G

Indoor Air Quality For Insulation; S

SD-08 Manufacturer's Instructions

Nails and Fasteners; G

Roof Insulation; G

1.3 SHOP DRAWINGS

Submit insulation board layout and attachment indicating methods of attachment and spacing, transitions, tapered components, thicknesses of materials, and closure and termination conditions. Show locations of ridges, valleys, crickets, interface with, and slope to, roof drains. Base shop drawings on verified field measurements and include verification of existing conditions. Show wood nailers..

1.4 PRODUCT DATA

Include data for material descriptions, recommendations for product shelf life, requirements for cover board or coatings, and precautions for flammability and toxicity. Include data to verify compatibility of sealants with insulation.

1.5 MANUFACTURER'S INSTRUCTIONS

Include field of roof and perimeter attachment requirements.

Provide a complete description of installation sequencing for each phase of the roofing system. Include weatherproofing procedures.

1.6 QUALITY CONTROL

Provide certification of installer qualifications from the insulation manufacturer confirming the specific installer has the required qualifications for installing the specific roof insulation system(s) indicated.

Provide certificates of compliance for felt materials.

1.7 FM APPROVAL REQUIREMENTS

Provide fastening patterns in accordance with FM 1-120 for insulation on steel decks.

1.8 FIRE PERFORMANCE REQUIREMENTS

1.8.1 Insulation in Roof Systems

Comply with the requirements of ICC IBC. Roof insulation to have a flame spread rating of 75 or less when tested in accordance with ASTM E84. Additional documentation of compliance with flame spread rating is not required when insulation of the type used for this project as part of the specific roof assembly is listed and labeled as FM Class 1 approved.

1.8.2 Thermal Barrier Requirements

Separate polystyrene insulation from a steel deck with a thermal barrier of glass mat gypsum roof board or other approved barrier material in accordance with the requirements of the ICC IBCor FM 4450 or FM 4470 or

UL 1256.

1.8.3 Fire Resistance Ratings for Roofs

Provide in accordance with ICC IBC Chapter 7 and Table 721.1(3) Min Fire and Smoke Protection For Floor and Roof Systems.

1.9 CERTIFICATIONS

Provide products certified to meet indoor air quality requirements by UL 2818(Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification by other third-party programs. Provide current product certification documentation from certification body.

1.10 DELIVERY, STORAGE, AND HANDLING

1.10.1 Delivery

Deliver materials to the project site in manufacturer's unopened and undamaged standard commercial containers bearing the following legible information:

a. Name of manufacturer

b. Brand designation

c. Specification number, type, and class, as applicable, where materials are covered by a referenced specification

Deliver materials in sufficient quantity to allow continuity of the work.

1.10.2 Storage and Handling

Store and handle materials in accordance with manufacturer's printed instructions. Protect from damage, exposure to open flame or other ignition sources, wetting, condensation, and moisture absorption. Keep materials wrapped and separated from off-gassing materials (such as drying paints and adhesives). Do not use materials that have visible moisture or biological growth. Store in an enclosed building or trailer that provides a dry, adequately ventilated environment. Store felt rolls on ends. For the 24 hours immediately before application of felts, store felts in an area maintained at a temperature no lower than 50 degrees F above grade and having ventilation on all sides. Replace damaged material with new material.

1.11 ENVIRONMENTAL CONDITIONS

Do not install roof insulation during inclement weather or when air temperature is below 40 degrees F and interior humidity is 45 percent or greater, or when there is visible ice, frost, or moisture on the roof deck.

1.12 PROTECTION

1.12.1 Flame Heated Equipment

1.12.2 Drippage of Bitumen

Seal joints in and at edges of deck as necessary to prevent drippage of asphalt into the building or onto adjacent surfaces.

1.12.3 Completed Work

Cover completed work with cover board for the duration of construction. Avoid traffic on completed work particularly when ambient temperature is above 80 degrees F. Replace crushed or damaged insulation prior to roof surface installation.

PART 2 PRODUCTS

2.1 INSULATION

2.1.1 Insulation Types

Provide one, or an assembly of a maximum of three, of the following roof insulation materials. Provide roof insulation that is compatible with attachment methods for the specified insulation and roof membrane.

a. Expanded Perlite Board: Provide in accordance with ASTM C728. Minimum 3/4 inch thick when both top and bottom surfaces must be in contact with asphalt.

b. Polyisocyanurate Board: Provide in accordance with ASTM C1289 REV A Type II, fibrous felt or glass mat membrane both sides, except minimum compressive strength of 20 pounds per square inch (psi).

c. Composite Boards: Provide in accordance with ASTM C1289 REV A.

d. Cellular Glass Boards: ASTM C552, Type IV.

e. Polystyrene Board: In accordance with ASTM C578 REV A, Type II, IV, or X.

2.1.2 Mineral Fiber Insulation Board

Provide in accordance with ASTM C726.

2.1.3 Recycled Materials

Provide thermal insulation materials containing recycled content. Unless specified otherwise, the minimum required recycled content for listed materials are:

Perlite Composition Board:	75 percent postconsumer paper
Polyisocyanurate/polyurethane:	9 percent recovered material
Wood Fiberboard:	100 percent recovered material
Cellular Glass Insulation:	75 percent recovered content
Structural Fiberboard:	100 percent recovered content
Fiberglass Insulation:	25 percent recovered content
Fiber (felt) or Fiber composite:	75 percent recovered content
Rubber:	90 percent recovered content

Plastic or Plastic/Rubber composite:	90 percent recovered content
Wood/Plastic Composite:	90 percent total recovered content

Provide data identifying percentage of recycled content for insulation.

2.1.4 Indoor Air Quality

Provide certification of indoor air quality for insulation.

2.1.5 Insulation Thickness

As necessary to provide the thermal resistance (R-value) indicated. Base calculation on the R-value for aged insulation. For insulation over steel decks, satisfy both specified R-value and minimum thickness for width of rib opening recommended in insulation manufacturer's published literature.

2.2 COVER BOARD

For use as a thermal barrier (underlayment), fire barrier (overlayment), or cover board for hot-mopped, torched-down, or adhesive-applied roofing membrane over roof insulation.

2.2.1 Glass Mat Gypsum Roof Board

ASTM C1177/C1177M, 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E84, 500 psi, Class A, non-combustible, 1/2 inch thick, 4 by 8 feet board size.

2.2.2 High Density Wood Fiber

Provide high density fiber board, Grade 2 in accordance with ASTM C208 with a transverse load of 12 lbf.

2.3 FASTENERS

Provide flush-driven fasteners through flat round or hexagonal steel or plastic plates. Provide zinc-coated steel plates, flat round not less than 1 3/8 inch diameter, hexagonal not less than 28 gage. Provide high-density plastic plates, molded thermoplastic with smooth top surface, reinforcing ribs and not less than 3 inches in diameter. Fully recess fastener head into plastic plate after it is driven. Form plates to prevent dishing. Do not use bell or cup shaped plates. Provide fasteners in accordance with insulation manufacturer's recommendations for holding power when driven, or a minimum of 40 pounds each in steel deck, whichever is the higher minimum. Provide fasteners for steel or concrete decks in accordance with FM APP GUIDE (http://www.approvalguide.com/) for Class I roof deck construction, and spaced to withstand uplift pressure of 120 pounds per square foot.

2.3.1 Fasteners for Steel Decks

Approved hardened penetrating fasteners or screws in accordance with FM 4450 and listed in FM APP GUIDE for Class I roof deck construction. Quantity and placement to withstand a minimum uplift pressure of 20 psf in accordance with FM APP GUIDE.

2.4 WOOD NAILERS

Pressure-preservative treated as specified in Section 06 10 00 ROUGH CARPENTRY.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

3.1.1 Surface Inspection

Ensure surfaces are clean, smooth, and dry prior to application. Ensure surfaces receiving vapor retarder are free of projections that might puncture the vapor retarder. Check roof deck surfaces, including surfaces sloped to roof drains and outlets, for defects before starting work.

The Contracting Officer will inspect and approve the surfaces immediately before starting installation. Prior to installing insulation, perform the following:

a. Examine steel decks to ensure that panels are properly secured to structural members and to each other and that surfaces of top flanges are flat or slightly convex.

b. Prior to installing any roof system on a concrete deck, moisture test the deck in accordance with ASTM D4263. The deck is acceptable for roof system application when there is no visible moisture on underside of plastic sheet after 24 hours.

3.1.2 Surface Preparation

Correct defects and inaccuracies in roof deck surface to eliminate poor drainage from hollow or low spots, perform the following:

a. Provide wood nailers of the same thickness as the insulation at eaves, edges, curbs, walls, and roof openings for securing of cant strips, gravel stops, gutters, and flashing flanges. On decks with slopes of one in 12 (1 inch per foot) or more, install wood nailers perpendicular to slope for securing insulation and for backnailing of roofing felts. Space nailers in accordance with approved shop drawings.

b. Cover steel decks with a layer of insulation board of sufficient width to span the width of a deck rib opening, and in accordance with fire safety requirements. Secure with piercing or self-drilling, self-tapping fasteners of quantity and placement in accordance with FM APP GUIDE. Locate insulation joints parallel to ribs of deck on solid bearing surfaces only, not over open ribs.

3.2 INSTALLATION OF VAPOR RETARDER

Install vapor retarder in direct contact with insulation. Unless otherwise specified, vapor retarder to consist of two plies of No. 15 asphalt-saturated felt, two plies of asphalt-coated glass felt , or one layer of asphalt-saturated felt base sheet. Lay vapor retarder at right angles to direction of slope. Install first ply of felt or base sheet as specified herein for the specific deck. Apply second ply of 2-ply vapor retarder system using asphalt at rate of 20 to 35 lbs per 100 square feet, applied within plus or minus 25 degrees F of EVT. Do not heat asphalt above asphalt's FBT or 525 degrees F, whichever is less. Use thermometers

to check temperatures during heating and application. Completely seal side and end laps. Asphalt must be visible beyond all edges of each ply as it is being installed. Lay plies free of wrinkles, buckles, creases or fishmouths. Do not walk on mopped surfaces while asphalt is sticky. Press out air bubbles to obtain complete adhesion between surfaces. At walls, eaves, rakes, and other vertical surfaces, extend vapor retarder organic felts or separate plies 9 inches, with not less than 9 inches on the substrate, and the extended portion turned back and mopped in over the top of the insulation. At roof penetrations other than walls, eaves and rakes, and vertical surfaces, extend vapor retarder or separate plies 9 inches to form a lap folded back over the edge of the insulation. Provide asphalt roof cement under the vapor retarder for at least 9 inches from walls, eaves, rakes and other penetrations.

3.2.1 Vapor Retarder on Steel Decks

Even mop the mechanically secured insulation surface with asphalt before installing vapor retarder. For a two-ply vapor retarder, install each sheet lapping 19 inches over the preceding sheet. Lap ends not less than 4 inches. Stagger the laps a minimum of 12 inches. Cement felts together with solid mopping of asphalt. Apply asphalt moppings at rate of 20 to 35 lbs per 100 square feet. For a vapor retarder consisting of one layer of asphalt base sheet, lap each sheet 4 inches over preceding sheet. Lap ends not less than 4 inches, and stagger laps a minimum of 12 inches. Cement base sheets together with solid mopping of asphalt.

3.3 INSULATION INSTALLATION

Apply insulation in two layers with staggered joints when total required thickness of insulation exceeds 1/2 inch. When using multiple layers of insulation, provide joints of each succeeding layer that are parallel and offset in both directions with respect to the layer below. Keep insulation 1/2 inch clear of vertical surfaces penetrating and projecting from roof surface. Verify required slopes to each roof drain.

3.3.1 Installation Using Asphalt on Steel Decks

Secure first layer of insulation and thermal barrier to deck with piercing or self-drilling, self-tapping fasteners. Engage fasteners by driving them through insulation into top flange of steel deck. Use driving method prescribed by fastener manufacturer. Locate insulation joints parallel to ribs of deck on solid bearing surfaces only, not over open ribs. Secure succeeding layers with solid asphalt moppings. Where insulation is applied over steel deck, locate long edge joints so that they bear continuously on the steel deck. Insulation that can be readily lifted after installation is not considered adequately secured. Apply insulation only in quantities that can be entirely waterproofed the same day. Phased construction is not permitted. Apply impermeable faced insulation without damage to the facing.

3.3.2 Installation of Protection for Asphalt Work

Before starting asphalt work, protect surrounding areas and surfaces from spillage and migration of asphalt onto other work. Provide non-combustible protective coverings at surfaces adjacent to hoists and kettles. Lap protective coverings at least 6 inches, secure against wind, and vent to prevent collection of moisture on covered surfaces. Keep protective coverings in place for the duration of asphalt work.

3.3.3 Installation Using Only Mechanical Fasteners

Secure total thickness of insulation with penetrating type fasteners.

3.3.4 Special Precautions for Installation of Foam Insulation

3.3.4.1 Polystyrene Insulation

a. Over the top surface of non-composite polystyrene board, install 1/2 inch thick high density wood fiberboard, 3/4 inch thick expanded perlite board, glass mat gypsum roof board, or other overlayment approved by roofing sheet manufacturer. Tightly butt and stagger joints of field applied overlayment board at least 6 inches with respect to the polystyrene board below. Apply 6 inch wide glass fiber roofing tape centered over joints and edges of overlayment board.

b. Where composite boards consisting of polystyrene insulation are provided, apply 6 inch wide glass fiber roofing tape centered over joints and edges of composite board. Apply joint strips as recommended by roofing sheet manufacturer.

3.3.5 Cant Strips

Where indicated, provide cant strips at intersections of roof with walls, parapets, and curbs extending above roof. Wood cant strips must bear on and be anchored to wood blocking. Fit cant strips flush to vertical surfaces. Where possible, nail cant strips to adjoining surfaces. Where cant strips are installed against non-nailable materials, install in an approved adhesive.

3.3.6 Tapered Edge Strips

Where indicated, provide edge strips in the right angle formed by the juncture of roof and wood nailing strips that extend above the level of the roof. Install edge strips flush to vertical surfaces of wood nailing strips. Where possible, nail edge strips to adjoining surfaces. Where installed against non-nailable materials, install in a heavy mopping of asphalt or set in a heavy coating of asphalt roof cement or an approved adhesive.

3.4 PROTECTION

3.4.1 Protection of Applied Insulation

Completely cover each day's installation of insulation with finished roofing specified on same day. Phased construction is not permitted. Protect open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, until permanent roofing and flashing are applied. Storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces is not permitted. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary, to distribute weight in accordance with indicated live load limits of roof construction. Protect exposed edges of insulation with cutoffs at the end of each work day or whenever precipitation is imminent. Cutoffs must be two layers of bituminous-saturated felt set in plastic bituminous cement set in roof cement. Fill all profile voids in cutoffs to prevent trapping moisture below the membrane. Remove cutoffs when work resumes.

3.4.2 Damaged Work and Materials

Restore work and materials that become damaged during construction to original condition or replace with new materials.

3.5 INSPECTION

Establish and maintain inspection procedures to assure compliance of the installed roof insulation with contract requirements. Remove, replace, correct in an approved manner, any work found not in compliance. Quality control must include, but is not limited to, the following:

a. Observation of environmental conditions; number and skill level of insulation workers; start and end time of work.

b. Verification of certification, listing or label compliance with FM Data Sheets. (https://www.fmglobal.com/fmglobalregistration/Downloads.aspx)

c. Verification of proper storage and handling of insulation and vapor retarder materials before, during, and after installation.

d. Inspection of vapor retarder application, including edge envelopes and mechanical fastening.

e. Inspection of mechanical fasteners; type, number, length, and spacing.

f. Coordination with other materials, cants, sleepers, and nailing strips.

g. Inspection of insulation joint orientation and laps between layers, joint width and bearing of edges of insulation on deck.

h. Installation of cutoffs and proper joining of work on subsequent days.

i. Continuation of complete roofing system installation to cover insulation installed same day.

j. Verification of required slope to each roof drain.

-- End of Section --

SECTION 07 27 26

FLUID-APPLIED MEMBRANE AIR BARRIERS
05/17

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR BARRIER ASSOCIATION OF AMERICA (ABAA)

ABAA Accreditation	Accreditation
ABAA QAP	Quality Assurance Program

ASTM INTERNATIONAL (ASTM)

ASTM C836/C836M	(2015) High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use With Separate Wearing Course
ASTM D412	(2016) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D4263	(1983; R 2018) Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4541	(2017) Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM D5590	(2000; R 2010; E 2012) Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2016) Standard Test Methods for Water Vapor Transmission of Materials
ASTM E283	(2004; R 2012) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E331	(2000; R 2016) Standard Test Method for Water Penetration of Exterior Windows,

	Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E2178	(2013) Standard Test Method for Air Permeance of Building Materials
ASTM E2357	(2017) Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 285	(2012) Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Qualifications of Manufacturer; G

Qualifications of Installer; G

SD-02 Shop Drawings

Fluid-Applied Membrane Air Barrier; G

SD-03 Product Data

Fluid-Applied Membrane Air Barrier; G

Transition Membrane; G

Primers, Adhesives, and Mastics; G

Reinforcement; G

Safety Data Sheets; G

SD-04 Samples

Fluid-Applied Membrane Air Barrier Mockup; G

SD-06 Test Reports

Capillary Moisture Test; G

Field Peel Adhesion Test; G

Flame Propagation of Wall Assemblies; G

Flame Spread and Smoke Developed Index Ratings; G

Site Inspections Reports; G

SD-07 Certificates

Fluid-Applied Membrane Air Barrier; G

Transition Membrane; G

Qualifications of Manufacturer; G

Qualifications of Installer; G

SD-08 Manufacturer's Instructions

Fluid-Applied Membrane Air Barrier; G

Transition Membrane; G

Primers, Adhesives, and Mastics; G

1.3 MISCELLANEOUS REQUIREMENTS

For fluid-applied membrane air barriers provide the following:

1.3.1 Shop Drawings

Submit fluid-applied membrane air barrier shop drawings showing locations and extent of barrier assemblies, transition membranes, details of all typical conditions, intersections with other envelope assemblies and materials, and membrane counterflashings. Show details for bridging of gaps in construction, treatment of inside and outside corners, expansion joints, methods of attachment of materials covering the self-adhered barrier without compromising the barrier. Indicate how miscellaneous penetrations such as conduit, pipes, electric boxes, brick ties, and similar items will be sealed.

1.3.2 Product Data

Submit manufacturer's technical data indicating compliance with performance and environmental requirements, manufacturer's printed instructions for evaluating, preparing, and treating substrates, temperature and other limitations of installation conditions, safety requirements for installation, and Safety Data Sheets. Indicate flame and smoke spread ratings for all products.

1.3.3 Mockup

Provide a mockup of the fluid-applied membrane air barrier. Apply product in an area designated by the Contracting Officer. Apply an area of not less than 54 square feet. Include all components specified as representative of the complete system. Notify the Contracting Officer a minimum of 48 hours prior to the test application. Select a test area representative of conditions to be covered including window or door openings, wall to ceiling transitions, flashings, and penetrations, as applicable.

1.3.4 Test Reports

Submit test reports indicating that capillary moisture tests and field peel adhesion tests on all substrate materials have been performed and the changes made, if required, in order to achieve successful and lasting adhesion. Submit test reports for flame propagation of wall assemblies tested in accordance with NFPA 285. Submit test reports for flame spread and smoke developed index ratings of barrier materials tested in accordance with ASTM E84.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Deliver and store materials in sufficient quantity to allow for uninterrupted flow of work. Inspect materials delivered to the site for damage and store out of weather. Deliver materials to the jobsite in their original unopened packages, clearly marked with the manufacturer's name, brand designation, description of contents, and shelf life of containerized materials. Store and handle to protect from damage.

1.4.2 Storage

Inspect materials delivered to the site for damage; unload and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling. Protect stored materials from direct sunlight.

1.5 CAPILLARY MOISTURE TEST

Perform a capillary moisture test by plastic sheet method in accordance with ASTM D4263 on the construction mockup and substrate materials. Perform test after curing period as recommended by the air barrier manufacturer. Record mode of failure and area which failed in accordance with ASTM D4263. Once the air barrier material manufacturer has established a minimum adhesion or moisture level for the product on the particular substrate, indicate on the inspection report whether this requirement has been met. Where the manufacturer has not declared a minimum adhesion or moisture value for their product and substrate combination, the inspector must record actual values.

1.6 FIELD PEEL ADHESION TEST

Perform a field peel adhesion test on a construction mockup. Test the applied product for adhesion in accordance with manufacturer's recommendations. Perform test after curing period recommended by the manufacturer. Record mode of failure and area which failed in accordance with ASTM D4541. When the manufacturer has established a minimum adhesion level for the product on the particular substrate, the inspection report must indicate whether this requirement has been met. Where the manufacturer has not declared a minimum adhesion value for their product/substrate combination, the inspector must record actual values.

1.7 QUALITY ASSURANCE

1.7.1 Qualifications of Manufacturer

Submit documentation verifying that manufacturer of fluid-applied membrane air barrier is currently accredited by the Air Barrier Association of

America (ABAA Accreditation https://www.airbarrier.org/).

1.7.2 Qualifications of Installer

Submit documentation verifying that installers of the fluid-applied membrane air barrier are currently certified in accordance with the ABAA QAP Quality Assurance Program (https://www.airbarrier.org/qap/).

1.8 PRECONSTRUCTION MEETING

Conduct a preconstruction meeting a minimum of two weeks prior to commencing work specified in this Section. Agenda must include, at a minimum, construction and testing of construction mock up, sequence of construction, coordination with substrate preparation, materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction. Attendance is required by representatives of related trades including covering materials, substrate materials, adjacent materials, and materials and components of the fluid-applied membrane air barrier.

1.9 ENVIRONMENTAL CONDITIONS

1.9.1 Temperature

Install fluid-applied membrane air barrier within the range of ambient and substrate temperatures as recommended in writing by the fluid-applied membrane air barrier manufacturer. Do not apply fluid-applied membrane air barrier to a damp or wet substrate. Do not apply during inclement weather or when ice, frost, surface moisture, or visible dampness is present on surfaces to be covered, or when precipitation is imminent.

1.9.2 Exposure to Weather

Protect fluid-applied membrane air barrier products from direct exposure to rain, snow, sunlight, mist, and other extreme weather conditions. Replace, at no additional cost to the government, barrier products that have been exposed to ultraviolet (sun)light longer than allowed by manufacturer's written requirements.

PART 2 PRODUCTS

2.1 FLUID-APPLIED MEMBRANE AIR BARRIER

Provide a fluid-applied, vapor permeable, air barrier. This barrier must exhibit no visible water leakage when tested in accordance with ASTM E331 and must perform as a liquid water drainage plane with thru-wall flashing to discharge incidental condensation and water penetration to the exterior of the building enclosure. Provide products suitable for use within temperature ranges specified by manufacturer for the location of the project.

2.1.1 Physical Properties

a. Air Permeance (ASTM E2178): less than 0.004 CFM per sf at 1.57 psf.

b. Air Leakage (ASTM E2357, ASTM E283): in accordance with Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM and Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS.

c. Water Vapor Permeance (Vapor Permeable Membrane) (ASTM E96/E96M, desiccant method A): 10.0 perms.

d. Tensile Strength (ASTM D412): Not less than 138 psi.

e. Elongation (ASTM D412): Not less than 300 percent.

f. Low temperature Flexibility and Crack Bridging (ASTM C836/C836M): Pass at minus 15 degrees F.

g. Solids by Volume: minimum 50 percent.

h. Flame propagation of wall assemblies (NFPA 285): Pass

i. Surface Burning Characteristics (ASTM E84):

(1) Flame Spread Index Rating not higher than 75 .

(2) Smoke Developed Index Rating not higher than 150.

j. Resistance to Mold, Mildew and Fungal Growth (ASTM D5590): 0, No growth.

2.2 PRIMERS, ADHESIVES, AND MASTICS

Provide primers, adhesives, mastics, sealants and other accessories as recommended by manufacturer of fluid-applied membrane air barrier for a complete installation.

2.3 TRANSITION MEMBRANE

Provide as specified in Section 07 27 19.01 SELF-ADHERING AIR BARRIERS.

2.4 SHEET METAL FLASHING

Provide as specified in Section 07 60 00 FLASHING AND SHEET METAL.

2.5 JOINT SEALANTS

Provide as specified in Section 07 92 00 JOINT SEALANTS.

2.6 REINFORCEMENT

Provide fiberglass mesh tape, or fluid-applied air barrier manufacturer's approved comparable equal product, reinforcement at seams, edges, projections and penetrations. Reinforce all joints exceeding1/4 inch with fiberglass mesh.

PART 3 EXECUTION

3.1 EXAMINATION

Before installing fluid-applied membrane air barrier, examine substrates, areas, and conditions under which fluid-applied membrane air barrier assemblies will be applied, with installer present, for compliance with requirements. Ensure the following conditions are met:

a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants detrimental to the adhesion of the

membranes.

b. Concrete and masonry surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions. Do not proceed with installation until after minimum concrete curing period recommended by fluid-applied membrane air barrier manufacturer.

c. Fill voids, gaps and spalled areas in substrate to provide an even plane. Strike masonry joints full flush.

d. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263 and take suitable measures until substrate passes moisture test.

e. Verify sealants used in substrates, and in joints between substrates, are compatible with fluid-applied membrane air barrier.

3.2 PREPARATION

Clean, prepare, and treat substrate in accordance with manufacturer's written instructions. Ensure clean, dust-free, and dry substrate for fluid-applied membrane air barrier application.

a. Remove dust, dirt and other contaminants from joints and cracks before coating surfaces.

b. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through fluid-applied membrane air barrier.

c. At changes in substrate plane, provide transition material (bead of sealant, mastic, extruded silicone sealant, membrane counterflashing or other material recommended by manufacturer) under transition membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition from one plane to another.

d. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Continuously support membrane with substrate.

e. For exterior sheathing substrates, ensure that exterior sheathing is stabilized, with corners and edges fastened with appropriate screws. Treat all joints in accordance with the air barrier manufacturer's instructions prior to application of air barrier material. Allow sufficient time for joint treatments to fully cure before application of transition membranes and fluid-applied membrane air barrier.

f. For concrete and masonry substrates, fill all voids and holes, particularly in mortar joints, with non-shrinking grout.

g. Mask off and cover adjacent surfaces to protect from spillage and overspray.

3.3 INSTALLATION

3.3.1 Installation of Transition Membrane

Install transittion membrane materials in accordance with the details on the drawings, Section 07 27 19.01 SELF-ADHERING AIR BARRIERS, and the

following:

a. Install transition membrane at all required locations prior to installation of the fluid-applied membrane air barrier.

b. Verify transition membrane is fully adhered to substrate and that its surface is clean, dry and wrinkle free prior to installation of the fluid-applied membrane air barrier.

c. Verify transition membrane completely covers all transition areas and will provide continuity of the finished fluid-applied membrane air barrier without gaps or cracks.

3.3.2 Installation of Flashing

Counterflash upper edge of thru-wall flashing and fluid-applied air barrier. Counter flashing and thru-wall flashing are specified in Section 07 60 00 FLASHING AND SHEET METAL.

3.3.3 Installation of Fluid-Applied Membrane Air Barrier

Install materials in accordance with manufacturer's recommendations and the following:

a. Apply fluid-applied membrane air barrier in single or dual coat application by spray or roller. Apply fluid-applied membrane air barrier within manufacturer's recommended temperature range for application.

b. Apply fluid-applied membrane air barrier at rate recommended by manufacturer to yield a wet film thickness of 90 mils.

c. Apply fluid-applied membrane air barrier around all penetrations ensuring a complete and continuous air barrier. Lap fluid-applied membrane air barrier a minimum of 3 inch over transition membrane to seal leading edge.

d. Seal membrane terminations, heads of mechanical fasteners, masonry tie fasteners, around penetrations, HVAC assemblies, plumbing and electrical assemblies, doors, windows, louvers, and other assemblies penetrating the fluid-applied membrane air barrier with a termination sealant recommended by the fluid-applied membrane air barrier manufacturer.

e. Notify the Contracting Officer and Testing Agency upon completion of fluid-applied membrane air barrier installation. Air barrier materials and assemblies must remain exposed until tested and inspected by the ABAA.

f. Do not allow materials to come in contact with chemically incompatible materials.

3.3.4 Installation of Reinforcement

Install reinforcement at projections, corners, joints, and penetrations where applicable.

3.4 FIELD QUALITY CONTROL

3.4.1 Site Inspections

Provide site inspections in accordance with ABAA protocol to verify conformance with the manufacturer's instructions, the ABAA QAP Quality Assurance Program (https://www.airbarrier.org/qap/), Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM.

a. Conduct inspections at 5, 50, and 95 percent completion of this scope of work. Forward written inspection reports to the Contracting Officer within five working days of the inspection and test being performed.

b. If the inspections reveal any defects, promptly remove and replace defective work at no additional expense to the Government.

3.5 PROTECTION AND CLEANING

3.5.1 Protection

Protect fluid-applied membrane air barrier assemblies from damage during application and remainder of construction in accordance with manufacturer's written instructions.

Coordinate installation, testing, and inspection procedures to ensure exposure period does not exceed that recommended by the product manufacturer. Remove and replace, at no additional cost to the government, membrane products that exceed manufacturer's allowed exposure limits.

3.5.2 Cleaning of Adjacent Surfaces

Clean excess product from adjacent construction using cleaning agents and procedures as recommended in writing by the manufacturer of each type of affected construction and as acceptable to same.

3.6 CLEANUP OF SPILLS

Conduct cleanup of uncured product spillage in accordance with manufacturer's written safe handling instructions.

-- End of Section --

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SECTION 07 41 13

METAL ROOF PANELS
05/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA ADM	(2015) Aluminum Design Manual

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI S100	(2012) North American Specification for the Design of Cold-Formed Steel Structural Members
AISI SG03-3	(2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(2017) Minimum Design Loads for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS A5.1/A5.1M	(2012) Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding
AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel
AWS D1.2/D1.2M	(2014) Structural Welding Code - Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M	(2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by

	the Hot-Dip Process
ASTM B117	(2019) Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM C792	(2004; R 2008) Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM D1056	(2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D1308	(2013) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D1654	(2008; R 2016; E 2017) Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D1667	(2017) Standard Specification for Flexible Cellular Materials - Poly (Vinyl Chloride) Foam (Closed-Cell)
ASTM D1970/D1970M	(2017) Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
ASTM D2244	(2016) Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D2247	(2015) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D2794	(1993; R 2010) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D3359	(2017) Standard Test Methods for Rating Adhesion by Tape Test
ASTM D3363	(2005; E 2011; R 2011; E 2012) Film Hardness by Pencil Test
ASTM D4214	(2007; R 2015) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D4587	(2011; R 2019; E 2019) Standard Practice

	for Fluorescent UV-Condensation Exposures of Paint and Related Coatings
ASTM D522/D522M	(2014) Mandrel Bend Test of Attached Organic Coatings
ASTM D523	(2014; R 2018) Standard Test Method for Specular Gloss
ASTM D5894	(2010) Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
ASTM D610	(2008; R 2012) Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D714	(2002; R 2017) Standard Test Method for Evaluating Degree of Blistering of Paints
ASTM D822	(2013) Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
ASTM D968	(2017) Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM E1592	(2005; R 2012) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E2140	(2001; R 2009) Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G152	(2013) Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G153	(2013) Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

FM GLOBAL (FM)

FM 4471	(2010) Class I Panel Roofs

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA RSDM	(2000) Metal Roofing Systems Design Manual

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA 0420	(2010) Architectural Metal Flashing, Condensation Control and Reroofing

NRCA RoofMan (2017) The NRCA Roofing Manual

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793 (2012) Architectural Sheet Metal Manual, 7th Edition

UNDERWRITERS LABORATORIES (UL)

UL 580 (2006; Reprint Nov 2018) UL Standard for Safety Tests for Uplift Resistance of Roof Assemblies

UL Bld Mat Dir (updated continuously online) Building Materials Directory

1.2 DESCRIPTION OF METAL ROOF SYSTEM

1.2.1 Performance Requirements

Steel panels and accessory components must conform to the following standards:

ASTM A1008/A1008M
ASTM A123/A123M
ASTM A36/A36M
ASTM D522/D522M for applied coatings
UL Bld Mat Dir

1.2.1.1 Hydrostatic Head Resistance

No water penetration when tested according to ASTM E2140. Submit leakage test report upon completion of installation.

1.2.1.2 Wind Uplift Resistance

Provide metal roof panel system that conform to the requirements of ASTM E1592 and UL 580. Uplift force due to wind action governs the design for panels. Submit wind uplift test report prior to commencing installation.

Roof system and attachments must resist the wind loads as indicated on the structural drawings. Metal roof panels and component materials must also comply with the requirements in FM 4471 as part of a panel roofing system as listed in Factory Mutual Guide (FMG) "Approval Guide" for class 1 or noncombustible construction, as applicable. Identify all materials with FMG markings.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Flashing and Accessories; G

Gutter/Downspout Assembly; G

SD-03 Product Data

Submit manufacturer's catalog data for the following items:

Factory-Applied Color Finish; G

Accessories; G

Fasteners; G

Pressure Sensitive Tape; G

Underlayments; G

Gaskets and Sealing/Insulating Compounds; G

Coil Stock; G

Galvanizing Repair Paint; G

SD-04 Samples

Roof Panels; G

Factory-applied Color Finish, samples, 9 inch lengths, full width; G

Accessories; G

Fasteners; G

Gaskets and Sealant/Insulating Compounds; G

SD-05 Design Data

Wind Uplift Resistance; G

SD-06 Test Reports

Leakage Test Report; G

Wind Uplift Test Report; G

Factory Finish and Color Performance Requirements; G

SD-07 Certificates

Roof Panels; G

Coil stock compatibility; G

Self-Adhering Modified Bitumen Underlayment; G

Qualification of Manufacturer; G

Qualification of Applicator; G

SD-08 Manufacturer's Instructions

INSULATION; G

Installation Manual; G

SD-09 Manufacturer's Field Reports

Manufacturer's Field Inspection Reports; G

SD-11 Closeout Submittals

Warranties; G

Information Card; G

Date Of Installation Wall-Mounted Placard; G

1.4 QUALITY ASSURANCE

1.4.1 Qualification of Manufacturer

Submit documentation verifying metal roof panel manufacturer has been in the business of manufacturing metal roof panels for a period of not lessthan 5 years.

Manufacturer must also provide engineering services by an authorized engineer, currently licensed in the geographic area of the project, with a minimum of five (5) years experience as an engineer knowledgeable in roof wind design analysis, protocols and procedures for MBMA RSDM, ASCE 7, UL 580, and FM 4471. Engineer must provide certified engineering calculations for the project conforming to the stated references.

1.4.1.1 Manufacturer's Technical Representative

The manufacturer's technical representative must be thoroughly familiar with the products to be installed, installation requirements and practices, and with any special considerations in the geographical area of the project. The representative must perform field inspections and attend meetings as specified.

1.4.1.2 Single Source

Roofing panels, clips, closures, and other accessories must be standard products of the same manufacturer, and the most recent design of the manufacturer to operate as a complete system for the intended use.

1.4.2 Qualification of Applicator

Metal roof system applicator must be approved, authorized, or licensed in writing by the roof panel manufacturer and have a minimum of three years experience as an approved, authorized, or licensed applicator with that manufacturer, approved at a level capable of providing the specified warranty. Supply the names, locations and client contact information of 5 projects of similar size and scope constructed by applicator using the

manufacturer's roofing products submitted for this project within the previous three years.

1.4.3 Field Verification

Prior to the preparation of drawings and fabrication, verify location of roof framing, roof openings and penetrations, and any other special conditions. Indicate all special conditions and measurements on final shop drawings.

1.4.4 Qualifications for Welding Work

Welding procedures must conform to AWS D1.1/D1.1Mfor steel or AWS D1.2/D1.2M for aluminum.

Operators are permitted to make only those types of weldments for which each is specifically qualified.

1.4.5 Pre-roofing Conference

After approval of submittals and before performing roofing system installation work, hold a pre-roofing conference to review the following:

a. Drawings, specifications, and submittals related to the roof work. Submit, as a minimum; sample profiles of roofing panels, with factory-applied color finish samples, flashing and accessories, gutter/downspout assembly samples, typical fasteners and pressure sensitive tape, sample gaskets and sealant/insulating compounds. Also include data and 1/2 pint sample of galvanizing repair paint, and technical data on coil stock and coil stock compatibility, and manufacturer's installation manual.

b. Roof system components installation;

c. Procedure for the roof manufacturer's technical representative's onsite inspection and acceptance of the roofing substrate, the name of the manufacturer's technical representatives, the frequency of the onsite visits, distribution of copies of the inspection reports from the manufacturer's technical representative;

d. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing; and

e. Quality control plan for the roof system installation;

f. Safety requirements.

Coordinate pre-roofing conference scheduling with the Contracting Officer. Attendance is mandatory for the Contractor, the Contracting Officer's designated personnel, personnel directly responsible for the installation of metal roof system, flashing and sheet metal work, mechanical and electrical work, other trades interfacing with the roof work, and representative of the metal roofing manufacturer. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

1.5 DELIVERY, HANDLING, AND STORAGE

Deliver, store, and handle panel materials, bulk roofing products, accessories, and other manufactured items in a manner to prevent damage and deformation, as recommended by the manufacturer, and as specified.

1.5.1 Delivery

Package and deliver materials to the site in undamaged condition. Provide adequate packaging to protect materials during shipment. Do not uncrate materials until ready for use, except for inspection. Immediately upon arrival of materials at jobsite, inspect materials for damage, deformation, dampness, and staining. Remove affected materials from the site and immediately replace. Remove moisture from wet materials not otherwise affected, restack and protect from further moisture exposure.

1.5.2 Handling

Handle materials in a manner to avoid damage. Select and operate material handling equipment so as not to damage materials or applied roofing.

1.5.3 Storage

Stack materials stored on site on platforms or pallets, and cover with tarpaulins or other weathertight covering which prevents trapping of water or condensation under the covering. Store roof panels so that water which may have accumulated during transit or storage will drain off. Do not store panels in contact with materials that might cause staining. Secure coverings and stored items to protect from wind displacement.

1.6 PROJECT CONDITIONS

Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements, and specified safety requirements.

1.7 FABRICATION

Fabricate and finish metal roof panels and accessories on a factory stationary industrial type rolling mill to the greatest extent possible, per manufacturer's standard procedures and processes, and as necessary to fulfill indicated performance requirements. Comply with indicated profiles, dimensional and structural requirements.

Provide panel profile, as indicated on drawings and as specified for full length of panel. Fabricate panel side laps with factory installed captive gaskets providing a weather tight seal and preventing metal-to metal contact, and minimizing noise from movements within the panel assembly.

1.7.1 Finishes

Finish quality and application processes must conform to the related standards specified within this section. Noticeable variations within the same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved samples and are assembled or installed to minimize any contrasting variations.

1.7.2 Accessories

Fabricate flashing and trim to comply with recommendations in SMACNA 1793 as applicable to the design, dimensions, metal, and other characteristics of the item indicated.

a. Form exposed sheet metal accessories which are free from excessive oil canning, buckling, and tool marks, and are true to line and levels indicated, with exposed edges folded back to form hems.

b. End Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

c. Sealed Joints: Form non-expansion, but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA 1793.

d. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

e. Fabricate cleats and attachments devices of size and metal thickness recommended by SMACNA or by metal roof panel manufacturer for application, but not less than the thickness of the metal being secured.

1.8 WARRANTIES

Provide metal roof system material and workmanship warranties meeting specified requirements. Provide revision or amendment to manufacturer's standard warranty as required to comply with the specified requirements.

1.8.1 Metal Roof Panel Manufacturer Warranty

Furnish the metal roof panel manufacturer's 20-year no dollar limit roof system materials and installation workmanship warranty, including flashing, components, trim, and accessories necessary for a watertight roof system construction. Make warranty directly to the Government, commencing at time of Government's acceptance of the roof work. The warranty must state that:

a. If within the warranty period, the metal roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, displaces, corrodes, perforates, separates at the seams, or shows evidence of excessive weathering due to defective materials or installation workmanship, the repair or replacement of the defective and damaged materials of the metal roof system and correction of defective workmanship is the responsibility of the metal roof panel manufacturer. All costs associated with the repair or replacement work are the responsibility of the metal roof panel manufacturer.

b. If the manufacturer or his approved applicator fail to perform the repairs within 48 hours of notification, emergency temporary repairs performed by others does not void the warranty.

1.8.2 Manufacturer's Finish Warranty

Provide a manufacturer's no-dollar-limit 20 year warranty for the roofing system. Issue the warranty directly to the Government at the date of Government acceptance.warranting that the factory color finish, under

normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of 8 when measured in accordance with ASTM D4214; or fade or change colors in excess of 5 NBS units as measured in accordance with ASTM D2244.

1.8.3 Metal Roof System Installer Warranty

Provide roof system installer warranty for a period of not less than five years that the roof system, as installed, is free from defects in installation workmanship, to include the roof panel installation, flashing, insulation, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Issue warranty directly to the Government. Correction of defective workmanship and replacement of damaged or affected materials is the responsibility of the metal roof system installer. All costs associated with the repair or replacement work are the responsibility of the installer.

1.8.4 Continuance of Warranty

Repair or replacement work that becomes necessary within the warranty period must be approved, as required, and accomplished in a manner so as to restore the integrity of the roof system assembly and validity of the metal roof system manufacturer warranty for the remainder of the manufacturer warranty period.

1.9 CONFORMANCE AND COMPATIBILITY

The entire metal roofing and flashing system must be in accordance with specified and indicated requirements, including wind resistance requirements. Work not specifically addressed and any deviation from specified requirements must be in general accordance with recommendations of the MBMA RSDM, NRCA RoofMan, the metal panel manufacturer's published recommendations and details, and compatible with surrounding components and construction. Submit any deviation from specified or indicated requirements to the Contracting Officer for approval prior to installation.

1.10 High-Velocity Hurricane Zone (HVHZ) Florida Building Code

Tyndall AFB requires all new construction, additions, and renovations to comply with the Florida Building Code (FBC) High-Velocity Hurricane Zone (HVHZ), Section 1602.2 criteria for Miami Dade County, Risk Category III buildings with a windspeed of 165 mph. Per FBC HVHZ provisions, all exterior building envelope materials such as, but not limited to windows, glazing, roofing systems, concrete masonry unit or metal panel walls, and doors and others must have a current Miami-Dade Notice of Acceptance (NOA) and installation of HVHZ standards that match the specified minimum 165mph wind requirement at Tyndall AFB. In addition, the Contractor must submit for review and approval test results of systems meeting the high wind requirements or a set of drawings sealed by a Professional Engineer stating conformance with HVHZ standards in place of materials pre-approved by Miami-Dade County.

PART 2 PRODUCTS

2.1 ROOF PANELS (AND FASCIA PANELS)

2.1.1 Aluminum Sheet Panels

Roll-form aluminum roof panels to the specified profile, with fy = 40 ksi, .040inch

thickness minimum and depth as indicated.

Material must be plumb and true, and within the tolerances listed:

a. Aluminum sheet conforming to ASTM B209, and AA ADM

b. Individual panels to have continuous length sufficient to cover the entire length of any unbroken roof slope with no joints or seams and formed without warping, waviness, or ripples that are not a part of the panel profile and free from damage to the finish coating system.

c. Provide panels with thermal expansion and contraction consistent with the type of system specified, and the following profile:

    1. Profile to be a 2 inch high standing seam, 16 inch coverage with mechanical single or double lock seams with concealed clips and fasteners.

    2. Profile to be smooth, flatsurface.

2.1.2 Steel Sheet Panels

Roll-form steel sheet roof panels to the specified profile, with fy = 40 ksi,24 gauge minimum and depth as indicated. Material must be plumb and true, and within the tolerances listed:

a. Galvanized steel sheet conforming to ASTM A653/A653M and AISI SG03-3.

c. Individual panels to have continuous length sufficient to cover the entire length of any unbroken roof slope with no joints or seams and formed without warping, waviness, or ripples that are not a part of the panel profile and free from damage to the finish coating system.

d. Provide panels with thermal expansion and contraction consistent with the type of system specified, and the following profile:

    1. Profile to be a 2 inch high standing seam, 16 inch coverage with mechanical single or double lock seams with concealed clips and fasteners.

    2. Profile to be smooth, flatsurface.

2.2 FACTORY FINISH AND COLOR PERFORMANCE REQUIREMENTS

All panels are to receive a factory applied Kynar 500/Hylar 5000 finish consisting of a baked topcoat with a manufacturer's recommended prime coat conforming to the following:

a. Metal Preparation: All metal is to have the surfaces carefully prepared for painting on a continuous process coil coating line by alkali cleaning, hot water rinsing, application of chemical conversion coating, cold water rinsing, sealing with an acid rinse, and thorough drying.

b. Prime Coating: A base coat of epoxy paint, specifically formulated to interact with the top-coat, is to be applied to the prepared surfaces by roll coating to a dry film thickness of 0.20 plus 0.05 mils. The prime coat must be oven cured prior to application of the finish coat.

c. Exterior Finish Coating: Apply the exterior finish coating over the primer by roll coating to a dry film thickness of 0.80 plus 0.05 mils (3.80 plus 0.05 mils for Vinyl Plastisol) for a total dry film thickness of 1.00 plus 0.10 mils (4.00 plus 0.10 mils for Vinyl Plastisol). This exterior finish coat must be oven-cured.

d. Interior finish coating: Apply a wash coat on the reverse side over primer by roll coating to a dry film thickness of 0.30 plus 0.05 mils for a total dry fill thickness of 0.50 plus 0.10 mils. The wash coat must be oven cured.

e. Color: The exterior finish chosen from the manufacturer's standard color chart.

f. Physical Properties: Coating must conform to the industry and manufacturer's standard performance criteria as listed by the following certified test reports:

General:	ASTM D5894 and ASTM D4587
Abrasion:	ASTM D968
Adhesion:	ASTM D3359
Chalking:	ASTM D4214
Chemical Pollution:	ASTM D1308
Color Change and Conformity:	ASTM D2244
Creepage:	ASTM D1654
Cyclic Corrosion Test:	ASTM D5894
Flame Spread:	ASTM E84
Flexibility:	ASTM D522/D522M
Formability:	ASTM D522/D522M
Gloss at 60 and 85 degrees:	ASTM D523
Humidity:	ASTM D2247 and ASTM D714
Oxidation:	ASTM D610
Pencil Hardness:	ASTM D3363
Reverse Impact:	ASTM D2794
Salt Spray:	ASTM B117
Weatherometer:	ASTM G152, ASTM G153 and ASTM D822

2.2.1 Specular Gloss

Finished roof surfaces to have a specular gloss value of 30 plus or minus 5 at an angle of 60 degrees when measured in accordance with ASTM D523.

2.2.2 Solar Reflectance and Cool Roof Certification

Provide coating system with SRI of 29 minimum and listed with Cool Roof Council (CRRC)

2.3 MISCELLANEOUS METAL FRAMING

2.3.1 General

Provide cold formed metallic-coated steel sheet conforming to ASTM A653/A653M, AISI S100, and as specified in 05 40 00 COLD-FORMED METAL FRAMING unless otherwise indicated.

2.3.2 Fasteners and Miscellaneous Metal Framing

Provide compatible type, corrosion resistant, of sufficient size and length to penetrate the supporting element a minimum of one inch with other required properties to fasten miscellaneous metal framing members to substrates in accordance with the roof panel manufacturer's and ASCE 7 requirements.

2.3.2.1 Exposed Fasteners

Fasteners for roof panels must be corrosion resistant stainless steel, compatible with the sheet panel or flashing material and of the type and size recommended by the manufacturer to meet the performance requirements and design loads. Fasteners for accessories must be the manufacturer's standard. Provide an integral metal washer, matching the color of attached material with compressible sealing EPDM gasket approximately 3/32 inch thick for exposed fasteners.

2.3.2.2 Screws

Provide corrosion resistant screws, stainless steel of the type and size recommended by the manufacturer to meet the performance requirements.

2.3.2.3 Rivets

Provide closed-end type rivets, corrosion resistant stainless steel where watertight connections are required.

2.3.2.4 Attachment Clips

Provide hot-dip galvanized, conforming to ASTM A653/A653M, or stainless steel, series 300 clips. Size, shape, thickness and capacity must meet the thickness and design load criteria specified, including loads generated by fall protection system which will attach to roof panel standing seams with S5 clips.

2.3.3 Electrodes for Manual, Shielded Metal Arc Welding

Electrodes for manual, shielded metal arc welding must meet the requirements of AWS D1.1/D1.1M, and be covered, mild-steel electrodes conforming to AWS A5.1/A5.1M.

2.4 ACCESSORIES

Accessories must be compatible with the metal roof panels and approved by metal roof panel manufacturer for requirements for curbs, equipment supports, roof hatches, heat and smoke vents, ventilators and preformed flashing sleeves.. Sheet metal flashing, trim, fascia, edge metal, roof penetration flashings, metal closure strips, caps, soffit panels, and similar metal accessories must be not less than the minimum thicknesses and finish system specified for roof panels. Provide exposed metal accessories to match the panels furnished. Molded foam rib, ridge and other closure strips must be closed-cell or solid-cell synthetic rubber or neoprene premolded to match configuration of the panels and not absorb or retain water.

2.4.1 Pre-manufactured Accessories

Pre-manufactured accessories must be manufacturer's standard for intended purpose, compatible with the metal roof system and approved for use by the metal roof panel manufacturer. Construct curbs to match roof slope.

2.4.2 Metal Closure Strips

Provide factory fabricated aluminum closure strips or steel closure strips of the same gauge, color, finish and profile as the specified roof panel.

2.4.3 Rubber Closure Strips

Provide closed-cell, expanded cellular rubber closure strips conforming to ASTM D1056 and ASTM D1667, extruded or molded to the configuration of the specified roof panel profile and in lengths supplied by roof panel manufacturer.

2.4.4 Soffit Panels

Provide soffit panel of a 1-inch nominal x 12 inch wide flush seam design with concealed fasteners. Panels gauge and finish shall match roof panel system.

2.5 JOINT SEALANTS

2.5.1 Sealants

Sealants are to be an approved gun type for use in hand or air pressure caulking guns at temperatures above 40 degrees F (or frost-free application at temperatures above 10 degrees F) with a minimum solid content of 85 percent of the total volume. Sealant must dry with a tough, durable surface skin which permits it to remain soft and pliable underneath, providing a weather tight joint. No migratory staining, in conformance with to ASTM C792, is permitted on painted or unpainted metal, stone, glass, vinyl or wood.

Prime all joints to receive sealants with a compatible one-component or two-component primer as recommended by the roof panel manufacturer.

2.5.1.1 Shop Applied Sealants

Sealant for shop-applied caulking must be an approved gun grade, non-sag one-component polysulfide or silicone conforming to ASTM C792 and ASTM C920,

Type II, with a curing time which ensures the sealants plasticity at the time of field erection. Color to match panel color.

2.5.1.2 Field Applied Sealants

Sealants for field-applied caulking must be an approved gun grade, non-sag on-component polysulfide or two component polyurethane with an initial maximum Shore A durometer hardness of 25, conforming to ASTM C920, Type II. Color to match panel color.

2.5.1.3 Tape Sealants

Provide pressure sensitive, 100 percent solid tape sealant with a release paper backing; permanently elastic, non-sagging, non-toxic and non-staining as approved by the roof panel manufacturer.

2.5.2 Sheet Metal Flashing and Trim

2.5.2.1 Fabrication, General

Custom fabricate sheet metal flashing and trim to comply with recommendations within the SMACNA 1793 that apply to design, dimensions, metal type, and other characteristics of design indicated. Shop fabricate items to the greatest extent possible. Obtain and verify field measurements for accurate fit prior to shop fabrication. Fabricate flashing and trim without excessive oil canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

2.5.2.2 Roof Drainage Sheet Metal Fabrications

Gutters: Fabricate to cross section indicated, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required. Fabricate in minimum 96 inch long sections. Fabricate expansion joints and accessories from the same metal as gutters, unless otherwise indicated.

Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangars of same material as downspouts and anchors.

2.6 INSULATION

Insulation, facer material and attachment must be compatible with metal roof system specified, as approved by the roof panel manufacturer. Polyisocyanurate Board: ASTM C1289 Type II, fibrous felt or glass mat membrane both sides, except minimum compressive strength shall be 20 pounds per square inch (psi). Provide R-30, minimum insulation.

2.7 UNDERLAYMENTS

2.7.1 Self-Adhering Modified Bitumen Underlayment

Provide 40 mil (minimum) self-adhering modified bitumen membrane underlayment material in compliance with ASTM D1970/D1970M, suitable for use as underlayment for metal roofing. Use membrane resistant to cyclical elevated temperatures for extended period of time in high heat service conditions. Provide membrane with integral non-tacking top surface of polyethylene film or other surface material to serve as separator between

bituminous material and metal products to be applied above.

2.8 GASKETS AND SEALING/INSULATING COMPOUNDS

Gaskets and sealing/insulating compounds must be nonabsorptive and suitable for insulating contact points of incompatible materials. Sealing/insulating compounds must be non-running after drying.

2.9 FINISH REPAIR MATERIAL

Only use repair and touch-up paint supplied by the roof panel manufacturer and is compatible with the specified system.

PART 3 EXECUTION

3.1 EXAMINATION

Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the work. Ensure surfaces are suitable, dry and free of defects and projections which might affect the installation.

Examine primary and secondary roof framing to verify that rafters, purlins, angels, channels, and other structural support members for panels and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer, UL, ASTM, and ASCE 7 requirements.

Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking; and that installation is within flatness tolerances required by metal roof panel manufacturer.

Examine rough-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of panels prior to installation.

Submit a written report to the Contracting Officer, endorsed by the installer, listing conditions detrimental to the performance of the work. Proceed with installation only after defects have been corrected.

3.2 INSTALLATION

Installation must meet specified requirements and be in accordance with the manufacturer's installation instructions and approved shop drawings. Do not install damaged materials. Dissimilar materials which are not compatible when contacting each other must be insulated by means of gaskets or sealing/insulating compounds. Keep all exposed surfaces and edges clean and free from sealant, metal cuttings, hazardous burrs, and other foreign material. Remove stained, discolored, or damaged materials from the site.

3.2.1 Preparation

Clean all substrate substances which may be harmful to insulation, and roof panels including removing projections capable of interfering with with insulation, and roof panel attachment.

Install sub-purlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

3.2.2 Underlayment

Install underlayment according to roof panel manufacturer's written recommendations and recommendation in NRCA "The NRCA Roofing and Waterproofing Manual".

3.2.2.1 Self-Adhering Sheet Underlayment

Install self-adhering sheet underlayment; wrinkle free on roof deck. Comply with low-temperature installation restrictions of manufacturer where applicable. Install at locations indicated on project drawings, lapped in a direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

3.2.2.2 Slip Sheet

Apply specified slip sheet at time of roof panel installation when felt or other underlayment is used that may be in direct contact with and adhere to or adversely impact the underside of roof panels, and as otherwise recommended by the roof panel manufacturer.

3.3 INSULATION INSTALLATION

Install insulation concurrently with metal roof panel installation, in thickness indicated, to cover entire roof, according to manufacturer's written instructions.

3.4 PROTECTION OF APPLIED MATERIALS

Do not permit storing, walking, wheeling, and trucking directly on applied roofing/insulation materials. Provide temporary walkways, runways, and platforms of smooth clean boards or planks as necessary to avoid damage to applied roofing/insulation materials, and to distribute weight to conform to indicated live load limits of roof construction.

3.5 FASTENER INSTALLATION

Anchor metal roof panels and other components of the Work securely in place, using approved fasteners according to manufacturer's written instructions.

3.5.1 Welding

Procedures for manual, shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting welding work must be in accordance with AWS D1.1/D1.1M.

3.6 FLASHING, TRIM, AND CLOSURE INSTALLATION

3.6.1 General Requirements

Comply with performance requirements, manufacturer's written installation instructions, and SMACNA 1793. Provide concealed fasteners where possible. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently water tight and weather resistant. Work is to be accomplished to form weather tight construction without waves, warps, buckles, fastening stresses or

distortion, and to allow for expansion and contraction. Cutting, fitting, drilling, and other operations in connection with sheet metal required to accomplish the work must conform to the manufacturers written instructions.

3.6.2 Metal Flashing

Install exposed metal flashing at building corners, rakes, eaves, junctions between metal siding and roofing, valleys and changes off slope or direction in metal roofing, building expansion joints and gutters.

Exposed metal flashing must be the same material, color, and finish as the specified metal roofing panels. Furnish flashing in minimum 8 foot lengths. Exposed flashing must have 1 inch locked and blind soldered end joints, with expansion joints at intervals of no greater than 16 feet.

Fasten flashing at not more than 8 inches on center for roofs, except where flashing is held in place by the same screws used to secure panels. Exposed flashing and flashing subject to rain penetration must be bedded in specified joint sealant. Flashing which is contact with dissimilar metals must be isolated by means of the specified asphalt mastic material to prevent electrolytic deterioration.

Form drips to the profile indicated, with the edge folded back 1/2 inch to form a reinforced drip edge.

3.7 ROOF PANEL INSTALLATION

Provide metal roof panels of full length from eave to ridge or eave to wall as indicated, unless otherwise indicated or restricted by shipping limitations. Anchor metal roof panels or other components of the Work securely in place, with provisions for thermal and structural movement in accordance with NRCA 0420.

Steel Roof Panels: Use stainless steel fasteners for exterior surfaces and galvanized fasteners for unexposed surfaces.

Aluminum Roof Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior and aluminum or galvanized steel fasteners for unexposed surfaces.

Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using approved fasteners according to manufacturer's written instructions. Provide all blocking and nailers as required. Provide additional clips and fasteners as required to meet loads imposed by fall protection system..

Metal Protection: Where dissimilar metals contact each other or possibly corrosive substrates, protect against galvanic action by permanent separation as recommended by the metal roof panel manufacturer.

Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and required for weatherproof performance of metal roof panel system. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

3.7.1 Handling and Erection

Erect roofing system in accordance with the approved erection drawings,

printed instructions and safety precautions of the manufacturer.

Do not subject panels to overloading, abuse, or undue impact. Do not apply bent, chipped, or defective panels. Damaged panels must be replaced and removed from the site at the contractors expense. Erect panels true, plumb, and in exact alignment with the horizontal and vertical edges of the building, securely anchored, and with indicated rake, eave, and curb overhang. Allow for thermal movement of the roofing, movement of the building structure, and provide permanent freedom from noise due to wind pressure.

Do not permit storage, walking, wheeling or trucking directly on applied roofing materials. Provide temporary walkways, runways, and platforms of smooth clean boards or planks as necessary to avoid damage to the installed roofing materials, and to distribute weight to conform to the indicated live load limits of the roof construction.

Roof panels must be laid with corrugations in the direction of the roof slope. End laps of exterior roofing must not be less than 8 inches; side laps of standard exterior corrugated panels must not be less than 2-1/2 corrugations.

Field cutting of metal roof panels by torch is not permitted. Field cut only as recommended by manufacturer's written instructions.

3.7.2 Closure Strips

Install metal closure strips at open ends of metal ridge rolls; open ends of corrugated or ribbed pattern roofs, and at intersection of wall and roof, unless open ends are concealed with formed eave flashing; rake of metal roof unless open end has a formed flashing member; and in other required areas.

Install closure strips at intersection of the wall with metal roofing; top and bottom of metal siding; heads of wall openings; and in other required locations.

3.7.3 Workmanship

Make lines, arises, and angles sharp and true. Free exposed surfaces from any visible wave, warp, buckle and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections which might affect the application. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and as necessary to make the work watertight.

3.8 ACCEPTANCE PROVISIONS

3.8.1 Erection Tolerances

Erect metal roofing straight and true with plumb vertical lines correctly lapped and secured in accordance with the manufacturer's written

instructions. Horizontal lines must not vary more than 1/8 inch in 40 feet.

3.8.2 Leakage Tests

Finished application of metal roofing is to be subject to inspection and test for leakage by the Contracting Officer or his designated representative. Inspection and tests will be conducted without cost to the Government.

Inspection and testing is to be made promptly after erection to permit correction of defects and removal/replacement of defective materials.

3.8.3 Repairs to Finish

Scratches, abrasions, and minor surface defects of finish may be repaired with the specified repair materials and as recommended by the metal roof panel manufacturer. Finished repaired surfaces must be uniform and free from variations of color and surface texture. Repaired metal surfaces that are not acceptable to the project requirements are to be immediately removed and replaced with new material.

3.8.4 Paint Finished Metal Roofing

Paint finished metal roofing will be tested for color stability by the Contracting Officer during the manufacturer's specified guarantee period. Panels that indicate color changes, fading, or surface degradation, determined by visual examination, must be removed and replaced with new panels at no expense to the Government. New panels will be subject to the specified tests for an additional year from the date of their installation.

3.9 CLEAN UP AND DISPOSAL

Clean exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from roofs. Remove grease and oil films, excess sealants, handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean. Exposed metal surfaces must be free of dents, creases, waves, scratch marks, solder or weld marks, and damage to the finish coating. Touch up scratches in panel finish with manufacturer supplied touch-up paint system to match panel finish. Treat exposed cut edges with manufacturer supplied clear coat.

Collect all scrap/waste materials and place in containers. Promptly dispose of demolished and scrap materials. Do not allow scrap/waste materials to accumulate on-site; transport immediately from the government property and legally dispose of them.

3.10 FIELD QUALITY CONTROL

3.10.1 Manufacturer's Inspection

Manufacturer's technical representative must visit the site a minimum of three times during the installation for purposes of reviewing materials installation practices and adequacy of work in place. Make inspections during the first 20 squares of roof panel installation, at mid-point of the installation, and at substantial completion, at a minimum. After each inspection, submit a report, signed by the manufacturer's technical representative to the Contracting Officer within 3 working days. Note in the report overall quality of work, deficiencies and any other concerns, and recommended corrective action.

Submit three signed copies of the manufacturer's field inspection reports to the Contracting Officer within one week of substantial completion.

3.11 INFORMATION CARD

For each roof, furnish a typewritten information card for facility records and a card laminated in plastic and framed for interior display at roof access point, or a photoengraved 0.032 inch thick aluminum card for exterior display. Format as directed in paragraph titled "Form One".

Make card 8 1/2 by 11 inches minimum. Information card must identify facility name and number; location; contract number; approximate roof area; detailed roof system description, including deck type, roof panel manufacturer and product name, type underlayment(s), date of completion; installing contractor identification and contact information; manufacturer warranty expiration, warranty reference number, and contact information. Install card at location as directed by the Contracting Officer and provide a paper copy to the Contracting Officer.

3.11.1 Form One

FORM 1 - PREFORMED STEEL OR ALUMINUM PANEL ROOFING SYSTEM AND COMPONENTS

1. Contract Number:

2. Building Number & Location:

3. NAVFAC Specification Number:

4. Deck/Substrate Type:

5. Slopes of Deck/Roof Structure:

6. Insulation Type & Thickness:

7. Insulation Manufacturer:

8. Vapor Retarder: ( )Yes ( )No

9. Vapor Retarder Type:

10. Preformed Steel Standing Seam Roofing Description:

a. Manufacturer (Name, Address, & Phone No.):
b. Product Name: c. Width: d. Gage:
e. Base Metal: f. Method of Attachment:

11. Repair of Color Coating:

a. Coating Manufacturer (Name, Address & Phone No.):
b. Product Name:
c. Surface Preparation:
d. Recoating Formula:
e. Application Method:

12. Statement of Compliance or Exception:_____
_____
_____

13. Date Roof Completed:

14. Warranty Period: From_____ To_____

15. Roofing Contractor (Name & Address):

16. Prime Contractor (Name & Address):

Contractor's Signature _____ Date:

Inspector's Signature _____ Date:Text

3.12 DATE OF INSTALLATION WALL-MOUNTED PLACARD

For each metal roof panel installation, furnish an exterior "Date of Installation Placard", 0.032 inch thick aluminum, 8-1/2 inches high by 11 inches wide, with mounting accessories, photoengraved to include the following information:

Facility Name and Number
Approximate Roof Area Newly Installed and Date of Completion
Manufacturer, Type of Roof Panel and Name
Underlayment and Insulation System, R value
Installing Contractor and Contact Information
Warranty Expiration Date
Warranty Reference Number and Contact Information

Install placard as directed by the Contracting Officer.

-- End of Section --

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SECTION 07 60 00

FLASHING AND SHEET METAL
05/17

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 189.1	(2014) Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

AMERICAN WELDING SOCIETY (AWS)

AWS D1.2/D1.2M	(2014) Structural Welding Code - Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A480/A480M	(2019a) Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B32	(2020) Standard Specification for Solder Metal
ASTM B69	(2013) Standard Specification for Rolled Zinc
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM D41/D41M	(2011; R 2016) Standard Specification for Asphalt Primer Used in Roofing,

Dampproofing, and Waterproofing

ASTM D226/D226M — (2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

ASTM D1784 — (2020) Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

ASTM D4586/D4586M — (2007; E 2012; R 2012) Asphalt Roof Cement, Asbestos-Free

ASTM E971 — (2011) Standard Practice for Calculation of Photometric Transmittance and Reflectance of Materials to Solar Radiation

ASTM E1918 — (2016) Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field

ASTM E1980 — (2011) Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793 — (2012) Architectural Sheet Metal Manual, 7th Edition

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star — (1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

1.2 GENERAL REQUIREMENTS

Finished sheet metal assemblies must form a weathertight enclosure without waves, warps, buckles, fastening stresses or distortion, while allowing for expansion and contraction without damage to the system. The sheet metal installer is responsible for cutting, fitting, drilling, and other operations in connection with sheet metal modifications required to accommodate the work of other trades. Coordinate installation of sheet metal items used in conjunction with roofing with roofing work to permit continuous, uninterrupted roofing operations.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval.. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Exposed Sheet Metal Coverings; G

Gutters

Downspouts

Expansion Joints

Gravel Stops and fascia

Splash Pans

Flashing for Roof Drains

Base Flashing

Counterflashing

Flashing at Roof Penetrations and Equipment Supports

Reglets

Copings

Drip Edges

Open Valley Flashing

Eave Flashing

Recycled Content

SD-04 Samples

Finish Samples

SD-08 Manufacturer's Instructions

Instructions for Installation

Quality Control Plan

1.4 MISCELLANEOUS REQUIREMENTS

1.4.1 Product Data

Indicate thicknesses, dimensions, fastenings, anchoring methods, expansion joints, and other provisions necessary for thermal expansion and contraction. Scaled manufacturer's catalog data may be submitted for factory fabricated items.

1.4.2 Finish Samples

Submit two color charts and two finish sample chips from manufacturer's standard color and finish options for each type of finish indicated.

1.4.3 Operation and Maintenance Data

Submit detailed instructions for installation and quality control during installation, cleaning and maintenance, for each type of assembly indicated.

1.5 DELIVERY, HANDLING, AND STORAGE

Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness, and wet-storage stains upon delivery to the job site. Remove from the site and replace damaged materials that cannot be restored to like-new condition. Handle sheet metal items to avoid damage to surfaces, edges, and ends. Store materials in dry, weather-tight, ventilated areas until installation.

PART 2 PRODUCTS

2.1 RECYCLED CONTENT

Provide products with recycled content. Provide data for each product with recycled content, identifying percentage of recycled content.

2.2 MATERIALS

Do not use lead, lead-coated metal, or galvanized steel. Use any metal listed by SMACNA 1793 for a particular item, unless otherwise indicated. Provide materials, thicknesses, and configurations in accordance with SMACNA 1793 for each material. Different items need not be of the same metal, except that if copper is selected for any exposed item, all exposed items must be copper, and that contact between dissimilar metals must be avoided.

Furnish sheet metal items in 8 to 10 foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Factory fabricate corner pieces with minimum 12 inch legs. Provide accessories and other items essential to complete the sheet metal installation. Provide accessories made of the same or compatible materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below and to the gage, thickness, or weight shown in Table I at the end of this section. Provide sheet metal items with mill finish unless specified otherwise. Where more than one material is listed for a particular item in Table I, each is acceptable and may be used, except as follows:

2.2.1 Exposed Sheet Metal Items

Must be of the same material. Consider the following as exposed sheet metal: gutters, including hangers; downspouts; gravel stops and fascia; cap, valley, steeped, base, and eave flashings and related accessories.

2.2.2 Drainage

Do not use copper for an exposed item if drainage from that item will pass over exposed masonry, stonework or other metal surfaces. In addition to the metals listed in Table I, lead-coated copper may be used for such items.

2.2.3 Steel Sheet, Zinc-Coated (Galvanized)

Provide in accordance with ASTM A653/A653M.

2.2.4 Zinc Sheet and Strip

Provide in accordance with ASTM B69, Type I, a minimum of 0.024 inch thick.

2.2.5 Stainless Steel

Provide in accordance with ASTM A480/A480M, Type 302 or 304, 2D Finish, fully annealed, dead-soft temper.

2.2.6 Aluminum Alloy Sheet and Plate

Provide in accordance with ASTM B209 form alloy, and temper appropriate for use. Provide material not less than 0.032-in in thickness.

2.2.6.1 Alclad

When fabricated of aluminum, fabricate the following items with Alclad 3003, Alclad 3004, or Alclad 3005, clad on both sides unless otherwise indicated.

a. Gutters, downspouts, and hangers

b. Gravel stops and fascia

c. Flashing

2.2.7 Finishes

Provide exposed exterior sheet metal and aluminum with a baked on, factory applied color coating of polyvinylidene fluoride (PVF2) or approved equal fluorocarbon coating. Dry film thickness of coatings must be 0.8 to 1.3 mils. Color to be selected from as indicated in Section 09 06 90.

2.2.8 Cool Roof Finishes

Provide cool roof finish coatings and colors in accordance with one of the following methods of analysis:

2.2.8.1 Energy Star Certification

Provide roof finishes having an initial solar reflectance of 0.65 for low slope roofs with a 2:12 pitch or less when tested in accordance with ASTM E1918 and ASTM E1980 0.25 for steep slope roofs with a greater than 2:12 pitch when tested in accordance with ASTM E971or as certified by Energy Star for the particular product proposed. Certified Energy Star roof products are listed at https://www.energystar.gov/productfinder/product/certified-roof-products/results

2.2.8.2 ASHRAE 189.1 Compliance

Provide roof finishes having a minimum initial Solar Reflectance Index of 78 for low slope roofs with a 2:12 pitch or less when tested in accordance with ASTM E1918 and ASTM E1980 29 for steep slope roofs with a greater than 2:12 pitch when tested in accordance with ASTM E971, to comply with ASHRAE 189.1.

2.2.9 Aluminum Alloy, Extruded Bars, Rods, Shapes, and Tubes

ASTM B221.

2.2.10 Solder

Provide in accordance with ASTM B32, 95-5 tin-antimony.

2.2.11 Reglets

2.2.11.1 Polyvinyl Chloride Reglets

Provide in accordance with ASTM D1784, Type II, Grade 1, Class 14333-D, 0.075 inch minimum thickness.

2.2.11.2 Metal Reglets

Provide factory fabricated caulked type or friction type reglets with a minimum opening of 1/4 inch and a depth of 1-1/4 inch, as approved.

2.2.11.2.1 Caulked Reglets

Provide with rounded edges, temporary reinforcing cores, and accessories as required for securing to adjacent construction. Provide built-up mitered corner pieces for inside and outside corners.

2.2.11.2.2 Friction Reglets

Provide with flashing receiving slots not less than 5/8 inch deep, one inch jointing tongues, and upper and lower anchoring flanges installed at 24 inch maximum snap-lock type receiver.

2.2.12 Splash Pans

Provide splash pans where downspouts discharge onto roof surfaces and at locations indicated. Unless otherwise indicated, provide pans not less than 24 inches long by 18 inches wide with metal ribs across bottoms of pans. Provide sides of pans with vertical baffles not less than one inch high in the front, and 4 inches high in the back.

2.2.13 Copings

Unless otherwise indicated, provide copings in copper sheets, 8 or 10 feet long, joined by a 3/4 inch locked and soldered seam.

2.2.14 Bituminous Plastic Cement

Provide in accordance with ASTM D4586/D4586M, Type I.

2.2.15 Roofing Felt

Provide in accordance with ASTM D226/D226M Type I.

2.2.16 Asphalt Primer

Provide in accordance with ASTM D41/D41M.

2.2.17 Fasteners

Use the same metal as, or a metal compatible with the item fastened. Use stainless steel fasteners to fasten. Confirm compatibility of fasteners and items to be fastened to avoid galvanic corrosion due to dissimilar materials.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Workmanship

Make lines and angles sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793, Architectural Sheet Metal Manual. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight. Join sheet metal items together as shown in Table II.

3.1.2 Nailing

Confine nailing of sheet metal generally to sheet metal having a maximum width of 18 inches. Confine nailing of flashing to one edge only. Space nails evenly not over 3 inch on center and approximately 1/2 inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, include in shop drawings, the locations for sleepers and nailing strips required to secure the work.

3.1.3 Cleats

Provide cleats for sheet metal 18 inches and over in width. Space cleats evenly not over 12 inches on center unless otherwise specified or indicated. Unless otherwise specified, provide cleats of 2 inches wide by 3 inches long and of the same material and thickness as the sheet metal being installed. Secure one end of the cleat with two nails and the cleat folded back over the nailheads. Lock the other end into the seam. Where the fastening is to be made to concrete or masonry, use screws and drive in expansion shields set in concrete or masonry. Pre-tin cleats for soldered seams.

3.1.4 Bolts, Rivets, and Screws

Install bolts, rivets, and screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a watertight connection. Provide mechanically formed joints in aluminum sheets 0.040 inches or less in thickness.

3.1.5 Seams

Straight and uniform in width and height with no solder showing on the face.

3.1.5.1 Flat-lock Seams

Finish not less than 3/4 inch wide.

3.1.5.2 Lap Seams

Finish soldered seams not less than one inch wide. Overlap seams not soldered, not less than 3 inches.

3.1.5.3 Loose-Lock Expansion Seams

Not less than 3 inches wide; provide minimum one inch movement within the joint. Completely fill the joints with the specified sealant, applied at not less than 1/8 inch thick bed.

3.1.5.4 Standing Seams

Not less than one inch high, double locked without solder.

3.1.5.5 Flat Seams

Make seams in the direction of the flow.

3.1.6 Soldering

Where soldering is specified, apply to copper, terne-coated stainless steel, zinc-coated steel, and stainless steel items. Pre-tin edges of sheet metal before soldering is begun. Seal the joints in aluminum sheets of 0.040 inch or less in thickness with specified sealants. Do not solder aluminum.

3.1.6.1 Edges

Scrape or wire-brush the edges of lead-coated material to be soldered to produce a bright surface. Flux brush the seams in before soldering. Treat with soldering acid flux the edges of stainless steel to be pre-tinned. Seal the joints in aluminum sheets of 0.040 inch or less in thickness with specified sealants. Do not solder aluminum.

3.1.7 Welding and Mechanical Fastening

Use welding for aluminum of thickness greater than 0.040 inch. Aluminum 0.040 inch or less in thickness must be butted and the space backed with formed flashing plate; or lock joined, mechanically fastened, and filled with sealant as recommended by the aluminum manufacturer.

3.1.7.1 Welding of Aluminum

Use welding of the inert gas, shield-arc type. For procedures, appearance and quality of welds, and the methods used in correcting welding work, conform to AWS D1.2/D1.2M.

3.1.7.2 Mechanical Fastening of Aluminum

Use No. 12, aluminum alloy, sheet metal screws or other suitable aluminum alloy or stainless steel fasteners. Drive fasteners in holes made with a No. 26 drill in securing side laps, end laps, and flashings. Space fasteners 12 inches maximum on center. Where end lap fasteners are required to improve closure, locate the end lap fasteners not more than 2 inches from the end of the overlapping sheet.

3.1.8 Protection from Contact with Dissimilar Materials

3.1.8.1 Copper or Copper-bearing Alloys

Paint with heavy-bodied bituminous paint surfaces in contact with dissimilar metal, or separate the surfaces by means of moistureproof building felts.

3.1.8.2 Aluminum

Do not allow aluminum surfaces in direct contact with other metals except stainless steel, zinc, or zinc coating. Where aluminum contacts another metal, paint the dissimilar metal with a primer followed by two coats of aluminum paint. Where drainage from a dissimilar metal passes over aluminum, paint the dissimilar metal with a non-lead pigmented paint. Aluminum may be used over concrete construction, provided that required reglets are of stainless steel and aluminum surface in contact with concrete or masonry is coated with bituminous paint or zinc chromate primer.

3.1.8.3 Metal Surfaces

Paint surfaces in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

3.1.8.4 Wood or Other Absorptive Materials

Paint surfaces that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

3.1.9 Expansion and Contraction

Provide expansion and contraction joints at not more than 32 foot intervals for aluminum and at not more than 40 foot intervals for other metals. Provide an additional joint where the distance between the last expansion joint and the end of the continuous run is more than half the required interval. Space joints evenly. Join extruded aluminum gravel stops and fascia by expansion and contraction joints spaced not more than 12 feet apart.

3.1.10 Counterflashing

Except where indicated or specified otherwise, insert counterflashing in reglets located from 9 to 10 inches above roof decks, extend down vertical surfaces over upturned vertical leg of base flashings not less than 3 inches. Fold the exposed edges of counterflashings 1/2 inch. Provide end laps in counterflashings not less than 3 inches and make it weathertight with plastic cement. Do not make lengths of metal counterflashings exceed 10 feet. Form flashings to the required shapes before installation. Factory form corners not less than 12 inches from the angle. Secure the flashings in the reglets with lead wedges and space not more than 18 inches apart; on chimneys and short runs, place wedges closer together. Fill caulked-type reglets or raked joints which receive counterflashing with caulking compound. Turn up the concealed edge of counterflashings built into masonry or concrete walls not less than 1/4 inch and extend not less than 2 inches into the walls. Install counterflashing to provide a spring action against base flashing. Where bituminous base flashings are provided, extend down the counter flashing as close as practicable to the top of the cant strip. Factory form counter flashing to provide spring action against the base flashing.

3.1.11 Metal Reglets

Keep temporary cores in place during installation. Ensure factory fabricated caulked type or friction type, reglets have a minimum opening of 1/4 inch and a minimum depth of 1-1/4 inch, when installed.

3.1.11.1 Caulked Reglets

Wedge flashing in reglets with lead wedges every 18 inches, caulked full and solid with an approved compound.

3.1.11.2 Friction Reglets

Install flashing snap lock receivers at 24 inches on center maximum. When flashing has been inserted the full depth of the slot, caulk the slot, lock , and fill with sealant.

3.1.12 Gutters

The hung type of shape indicated and supported on underside by brackets that permit free thermal movement of the gutter. Provide gutters in sizes indicated complete with mitered corners, end caps, outlets, brackets, and other accessories necessary for installation. Bead with hemmed edge or reinforce the outer edge of gutter with a stiffening bar not less than 3/4 by 3/16 inch of material compatible with gutter. Fabricate gutters in sections not less than 8 feet. Lap the sections a minimum of one inch in the direction of flow or provide with concealed splice plate 6 inches minimum. Join the gutters, other than aluminum, by riveted and soldered joints. Join aluminum gutters with riveted sealed joints. Provide expansion-type slip joints midway between outlets. Install gutters below slope line of the roof so that snow and ice can slide clear. Support gutters on adjustable hangers spaced not more than 30 inches on center as indicated. Adjust gutters to slope uniformly to outlets, with high points occurring midway between outlets. Fabricate hangers and fastenings from compatible metals.

3.1.13 Downspouts

Space supports for downspouts according to the manufacturer's recommendation for the masonry or steel substrate. Types, shapes and sizes are indicated. Provide complete including elbows and offsets. Provide downspouts in approximately 10 foot lengths. Provide end joints to telescope not less than 1/2 inch and lock longitudinal joints. Provide gutter outlets with wire ball strainers for each outlet. Provide strainers to fit tightly into outlets and be of the same material used for gutters. Keep downspouts not less than one inch away from walls. Fasten to the walls at top, bottom, and at an intermediate point not to exceed 5 feet on center with leader straps or concealed rack-and-pin type fasteners. Form straps and fasteners of metal compatible with the downspouts.

3.1.13.1 Terminations

Neatly fit into the drainage connection the downspouts terminating in drainage lines and fill the joints with a portland cement mortar cap sloped away from the downspout. Provide downspouts terminating in splash blocks with elbow-type fittings. Provide splash pans as specified.

3.1.14 Splash Pans

Install splash pans lapped with horizontal roof flanges not less than 4 inches wide to form a continuous surface. Bend the rear flange of the pan to contour of can't strip and extend up 6 inches under the side wall covering or to height of base flashing under counterflashing. Bed the pans and roof flanges in plastic bituminous cement and strip-flash as specified.

3.1.15 Open Valley Flashing

Provide valley flashing free of longitudinal seams, of width sufficient to extend not less than 6 inches under the roof covering on each side. Provide a 1/2 inch fold on each side of the valley flashing. Lap the sheets not less than 6 inches in the direction of flow and secure to roofing construction with cleats attached to the fold on each side. Nail the tops of sheets to roof sheathing. Space the cleats not more than 12 inches on center. Provide exposed flashing not less than 4 inches in width at the top and increase one inch in width for each additional 8 feet in length. Where the slope of the valley is 4.5 inches or less per foot, or the intersecting roofs are on different slopes, provide an inverted V-joint, one inch high, along the centerline of the valley; and extend the edge of the valley sheets 8 inches under the roof covering on each side.

Valley flashing for asphalt shingle roofs is specified in Section 07 31 13 ASPHALT SHINGLES.

3.1.16 Eave Flashing

One piece in width, applied in 8 to 10 foot lengths with expansion joints spaced as specified in paragraph EXPANSION AND CONTRACTION. Provide a 3/4 inch continuous fold in the upper edge of the sheet to engage cleats spaced not more than 10 inches on center. Locate the upper edge of flashing not less than 18 inches from the outside face of the building, measured along the roof slope. Fold lower edge of the flashing over and loose-lock into a continuous edge strip on the fascia. Where eave flashing intersects metal valley flashing, secure with one inch flat locked joints with cleats that are 10 inches on center.

3.1.17 Sheet Metal Covering on Flat, Sloped, or Curved Surfaces

Except as specified or indicated otherwise, cover and flash all minor flat, sloped, or curved surfaces such as crickets, bulkheads, dormers and small decks with metal sheets of the material used for flashing; maximum size of sheets, 16 by 18 inches. Fasten sheets to sheathing with metal cleats. Lock seams and solder. Lock aluminum seams as recommended by aluminum manufacturer. Provide an underlayment of roofing felt for all sheet metal covering.

3.1.18 Single Pipe Vents

See Table I, footnote (d). Set flange of sleeve in bituminous plastic cement and nail 3 inches on center. Bend the top of sleeve over and extend down into the vent pipe a minimum of 2 inches. For long runs or long rises above the deck, where it is impractical to cover the vent pipe with lead, use a two-piece formed metal housing. Set metal housing with a metal sleeve having a 4 inches roof flange in bituminous plastic cement and nailed 3 inches on center. Extend sleeve a minimum of 8 inches above the roof deck and lapped a minimum of 3 inches by a metal hood secured to the vent pipe by a draw band. Seal the area of hood in contact with vent pipe with

an approved sealant.

3.1.19 Stepped Flashing

Provide stepped flashing where sloping roofs surfaced with shingles abut vertical surfaces. Place separate pieces of base flashing in alternate shingle courses.

3.1.20 Copings

Provide coping with locked and soldered seam. Terminate outer edges in edge strips. Install with sealed as indicated.

3.2 PAINTING

Touch ups in the field may be applied only after metal substrates have been cleaned and pretreated in accordance with manufacturer's written instructions and products.

Field-paint sheet metal for separation of dissimilar materials.

3.2.1 Aluminum Surfaces

Clean with solvent and apply one coat of zinc-molybdate primer and one coat of aluminum paint.

3.3 CLEANING

Clean exposed sheet metal work at completion of installation. Remove grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris, and scrub-clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks, and solder or weld marks.

3.4 REPAIRS TO FINISH

Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged surfaces caused by scratches, blemishes, and variations of color and surface texture. Replace items which cannot be repaired.

3.5 FIELD QUALITY CONTROL

Establish and maintain a Quality Control Plan for sheet metal used in conjunction with roofing to assure compliance of the installed sheet metalwork with the contract requirements. Remove work that is not in compliance with the contract and replace or correct. Include quality control, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of sheet metal workers; condition of substrate.

b. Verification that specified material is provided and installed.

c. Inspection of sheet metalwork, for proper size(s) and thickness(es), fastening and joining, and proper installation.

3.5.1 Procedure

Submit for approval prior to start of roofing work. Include a checklist of

points to be observed. Document the actual quality control observations and inspections. Furnish a copy of the documentation to the Contracting Officer at the end of each day.

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES

Sheet Metal Items	Aluminum, inch	Zinc-coated Steel, U.S. Std. Gage
Downspouts and leaders	0.032	24
Downspout clips and anchors	0.040 clip .125 anchor	-
Downspout straps, 2-inch	0.060	-
Strainers, wire diameter or gage	0.144 diameter	-
Base	0.040	24
Cap (counter-flashing)	0.032	26
Eave	-	24
Stepped	0.032	-
Valley	0.032	-
Pipe Vent Sleave (d)		
Coping	-	-
Gravel Stops and fascia:		
Extrusions	0.075	-
Sheets, smooth	0.050	24
Edge Strip	0.050	-
Gutters:		
Gutter Section	0.032	24
Continuous Cleat	0.032	24
Hangers, dimensions	1 inch by 0.080 inch (c)	-
Joint Cover Plates (see Table II)	0.032	24
Reglets (c)	-	-
Splash Pans	0.040	-
(a) Brass.		

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES
(b) May be lead weighing 4 pounds per square foot.
(c) May be polyvinyl chloride.
(d) 2.5 pound minimum lead sleeve with 4 inch flange. Where lead sleeve is impractical, refer to paragraph SINGLE PIPE VENTS for optional

TABLE II. SHEET METAL JOINTS		
TYPE OF JOINT		
Item Designation	Aluminum	Remarks
Joint cap for building expansion seam, cleated joint at roof	1.25 inch single lock, standing	--
Flashings		
Base	One inch flat locked, soldered; sealed; 3 inch lap for expansion joint	Aluminum manufacturer's recommended hard setting sealant for locked aluminum joints. Fill
Cap-in reglet	3 inch lap	Seal groove with joint sealing compound.
Reglets	--	Seal reglet groove with joint sealing compound.
Eave	One inch flat locked, locked, cleated one inch loose locked, sealed expansion joints, cleated	Same as base flashing.
Stepped	3 inch lap	--
Valley	6 inch lap cleated	--
Edge strip	Butt	--
Gravel stops:		
Extrusions	Butt with 1/2 inch space	Use sheet flashing beneath and a cover plate
Sheet, smooth	Butt with 1/4 inch space	Use sheet flashing backup plate.
Sheet, corrugated	Butt with 1/4 inch space	Use sheet flashing beneath and a cover plate or a combination unit.
Gutters	One inch flat locked riveted and sealed	Aluminum producers recommended hard setting sealant for locked aluminum joints.
(a) Provide a 3 inch lap elastomeric flashing with manufacturer's recommended sealant.		

TABLE II. SHEET METAL JOINTS		
TYPE OF JOINT		
Item Designation	Aluminum	Remarks
(b) Seal Polyvinyl chloride reglet with manufacturer's recommended sealant.		

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SECTION 07 84 00

FIRESTOPPING
05/10

PART 1 GENERAL

1.1 SUMMARY

Furnish and install tested and listed firestopping systems, combination of materials, or devices to form an effective barrier against the spread of flame, smoke and gases, and maintain the integrity of fire resistance rated walls, partitions, floors, and ceiling-floor assemblies, including through-penetrations and construction joints and gaps.

a. Through-penetrations include the annular space around pipes, tubes, conduit, wires, cables and vents.

b. Construction joints include those used to accommodate expansion, contraction, wind, or seismic movement; firestopping material shall not interfere with the required movement of the joint.

Gaps requiring firestopping include gaps between the curtain wall and the floor slab and between the top of the fire-rated walls and the roof or floor deck above and at the intersection of shaft assemblies and adjoining fire resistance rated assemblies.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E119	(2019) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E814	(2013a; R 2017) Standard Test Method for Fire Tests of Penetration Firestop Systems
ASTM E1399/E1399M	(1997; R 2017) Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems
ASTM E1966	(2015; R 2019) Standard Test Method for Fire-Resistive Joint Systems
ASTM E2174	(2014b) Standard Practice for On-Site Inspection of Installed Fire Stops

ASTM E2307	(2015a) Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus
ASTM E2393	(2010a) Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers

FM GLOBAL (FM)

FM 4991	(2013) Approval of Firestop Contractors
FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

UNDERWRITERS LABORATORIES (UL)

UL 723	(2018) UL Standard for Safety Test for Surface Burning Characteristics of Building Materials
UL 1479	(2015) Fire Tests of Through-Penetration Firestops
UL 2079	(2004; Reprint Dec 2014) Tests for Fire Resistance of Building Joint Systems
UL Fire Resistance	(2014) Fire Resistance Directory

1.3 SEQUENCING

Coordinate the specified work with other trades. Apply firestopping materials, at penetrations of pipes and ducts, prior to insulating, unless insulation meets requirements specified for firestopping. Apply firestopping materials. at building joints and construction gaps, prior to completion of enclosing walls or assemblies. Cast-in-place firestop devices shall be located and installed in place before concrete placement. Pipe, conduit or cable bundles shall be installed through cast-in-place device after concrete placement but before area is concealed or made inaccessible. Firestop material shall be inspected and approved prior to final completion and enclosing of any assemblies that may conceal installed firestop.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Firestopping System; G

SD-06 Test Reports

Inspection; G

SD-07 Certificates

Inspector Qualifications
Firestopping Materials
Installer Qualifications; G

1.5 QUALITY ASSURANCE

1.5.1 Installer

Engage an experienced Installer who is:

a. FM Research approved in accordance with FM 4991, operating as a UL Certified Firestop Contractor, or

b. Certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary staff, training, and a minimum of 3 years experience in the installation of manufacturer's products in accordance with specified requirements. Submit documentation of this experience. A manufacturer's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer installer qualifications on the buyer. The Installer shall have been trained by a direct representative of the manufacturer (not distributor or agent) in the proper selection and installation procedures. The installer shall obtain from the manufacturer and submit written certification of training, and retain proof of certification for duration of firestop installation.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver materials in the original unopened packages or containers showing name of the manufacturer and the brand name. Store materials off the ground, protected from damage and exposure to elements and temperatures in accordance with manufacturer requirements. Remove damaged or deteriorated materials from the site. Use materials within their indicated shelf life.

PART 2 PRODUCTS

2.1 FIRESTOPPING SYSTEM

Submit detail drawings including manufacturer's descriptive data, typical details conforming to UL Fire Resistance or other details certified by another nationally recognized testing laboratory, installation instructions or UL listing details for a firestopping assembly in lieu of fire-test data or report. For those firestop applications for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment, derived from similar UL system designs or other tests, shall be submitted for review and approval prior to installation. Submittal must indicate the firestopping material to be provided for each type of application. When more than a total of 5 penetrations and/or construction joints are to receive firestopping, provide drawings that indicate location, "F" "T" and "L" ratings, and type of application.

Also, submit a written report indicating locations of and types of

penetrations and types of firestopping used at each location; record type by UL list printed numbers.

2.2 FIRESTOPPING MATERIALS

Provide firestopping materials, supplied from a single domestic manufacturer, consisting of commercially manufactured, asbestos-free, nontoxic products FM APP GUIDE approved, or UL listed, for use with applicable construction and penetrating items, complying with the following minimum requirements:

2.2.1 Fire Hazard Classification

Material shall have a flame spread of 25 or less, and a smoke developed rating of 50 or less, when tested in accordance with ASTM E84 or UL 723. Material shall be an approved firestopping material as listed in UL Fire Resistance or by a nationally recognized testing laboratory.

2.2.2 Toxicity

Material shall be nontoxic and carcinogen free to humans at all stages of application or during fire conditions and shall not contain hazardous chemicals or require harmful chemicals to clean material or equipment.

2.2.3 Fire Resistance Rating

Firestop systems shall be UL Fire Resistance listed or FM APP GUIDE approved with "F" rating at least equal to fire-rating of fire wall or floor in which penetrated openings are to be protected. Where required, firestop systems shall also have "T" rating at least equal to the fire-rated floor in which the openings are to be protected.

2.2.3.1 Through-Penetrations

Firestopping materials for through-penetrations, as described in paragraph SUMMARY, shall provide "F", "T" and "L" fire resistance ratings in accordance with ASTM E814 or UL 1479. Fire resistance ratings shall be as follows:

2.2.3.1.1 Penetrations of Fire Resistance Rated Walls and Partitions

F Rating = Rating of wall or partition being penetrated.

2.2.3.1.2 Penetrations of Fire Resistance Rated Floors, Floor-Ceiling Assemblies and the Ceiling Membrane of Roof-Ceiling Assemblies

F Rating = 1 hour, T Rating = 1 hour. Where the penetrating item is outside of a wall cavity the F rating must be equal to the fire resistance rating of the floor penetrated, and the T rating shall be in accordance with the requirements of ICC IBC.

2.2.3.1.3 Penetrations of Fire and Smoke Resistance Rated Walls, Floors, Floor-Ceiling Assemblies, and the ceiling membrane of Roof-Ceiling Assemblies

F Rating = 1 hour, T Rating = 1 hour and L Rating = <10 cfm/sf Where L rating is required.

2.2.3.2 Construction Joints and Gaps

Fire resistance ratings of construction joints, as described in paragraph SUMMARY, and gaps such as those between floor slabs and curtain walls shall be the same as the construction in which they occur. Construction joints and gaps shall be provided with firestopping materials and systems that have been tested in accordance with ASTM E119, ASTM E1966 or UL 2079 to meet the required fire resistance rating. Curtain wall joints shall be provided with firestopping materials and systems that have been tested in accordance with ASTM E2307 to meet the required fire resistance rating. Systems installed at construction joints shall meet the cycling requirements of ASTM E1399/E1399M or UL 2079. All joints at the intersection of the top of a fire resistance rated wall and the underside of a fire-rated floor, floor ceiling, or roof ceiling assembly shall provide a minimum class II movement capability.

2.2.4 Material Certification

Submit certificates attesting that firestopping material complies with the specified requirements. For all intumescent firestop materials used in through penetration systems, manufacturer shall provide certification of compliance with UL 1479.

PART 3 EXECUTION

3.1 PREPARATION

Areas to receive firestopping must be free of dirt, grease, oil, or loose materials which may affect the fitting or fire resistance of the firestopping system. For cast-in-place firestop devices, formwork or metal deck to receive device prior to concrete placement must be sound and capable of supporting device. Prepare surfaces as recommended by the manufacturer.

3.2 INSTALLATION

Completely fill void spaces with firestopping material regardless of geometric configuration, subject to tolerance established by the manufacturer. Firestopping systems for filling floor voids 4 inches or more in any direction must be capable of supporting the same load as the floor is designed to support or be protected by a permanent barrier to prevent loading or traffic in the firestopped area. Install firestopping in accordance with manufacturer's written instructions. Provide tested and listed firestop systems in the following locations, except in floor slabs on grade:

a. Penetrations of duct, conduit, tubing, cable and pipe through floors and through fire-resistance rated walls, partitions, and ceiling-floor assemblies.

b. Penetrations of vertical shafts such as pipe chases, elevator shafts, and utility chutes.

c. Gaps at the intersection of floor slabs and curtain walls, including inside of hollow curtain walls at the floor slab.

d. Gaps at perimeter of fire-resistance rated walls and partitions, such as between the top of the walls and the bottom of roof decks.

e. Construction joints in floors and fire rated walls and partitions.

f. Other locations where required to maintain fire resistance rating of the construction.

3.2.1 Insulated Pipes and Ducts

Thermal insulation shall be cut and removed where pipes or ducts pass through firestopping, unless insulation meets requirements specified for firestopping. Replace thermal insulation with a material having equal thermal insulating and firestopping characteristics.

3.2.2 Fire Dampers

Install and firestop fire dampers in accordance with Section 23 30 00 HVAC AIR DISTRIBUTION. Firestop installed with fire damper must be tested and approved for use in fire damper system. Firestop installed with fire damper must be tested and approved for use in fire damper system.

3.2.3 Data and Communication Cabling

Cabling for data and communication applications shall be sealed with re-enterable firestopping products and devices as indicated.

3.2.3.1 Re-Enterable Devices

Firestopping devices shall be pre-manufactured modular devices, containing built-in self-sealing intumescent inserts. Firestopping devices shall allow for cable moves, additions or changes without the need to remove or replace any firestop materials. Devices must be capable of maintaining the fire resistance rating of the penetrated membrane at 0 percent to 100 percent visual fill of penetrants; while maintaining "L" rating of <10 cfm/sf measured at ambient temperature and 400 degrees F at 0 percent to 100 percent visual fill.

3.2.3.2 Re-Sealable Products

Provide firestopping pre-manufactured modular products, containing self-sealing intumescent inserts. Firestopping products shall allow for cable moves, additions or changes. Devices shall be capable of maintaining the fire resistance rating of the penetrated membrane at 0 percent to 100 percent visual fill of penetrants.

3.3 INSPECTION

For all projects, the remainder of the firestopped areas shall not be covered or enclosed until inspection is complete and approved by the Contracting Officer. Inspect the applications initially to ensure adequate preparations (clean surfaces suitable for application, etc.) and periodically during the work to assure that the completed work has been accomplished according to the manufacturer's written instructions and the specified requirements. Submit written reports indicating locations of and types of penetrations and types of firestopping used at each location; type shall be recorded by UL listed printed numbers.

3.3.1 Inspection Standards

Inspect all firestopping in accordance with ASTM E2393 and ASTM E2174 for firestop inspection, and document inspection results to be submitted.

3.3.2 Inspection Reports

Submit inspection report stating that firestopping work has been inspected and found to be applied according to the manufacturer's recommendations and the specified requirements.

-- End of Section --

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SECTION 07 92 00

JOINT SEALANTS
08/16

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C509	(2006; R 2015) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C734	(2015; R 2019) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering
ASTM C834	(2017) Standard Specification for Latex Sealants
ASTM C919	(2012; R 2017) Standard Practice for Use of Sealants in Acoustical Applications
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM C1193	(2013) Standard Guide for Use of Joint Sealants
ASTM C1311	(2014) Standard Specification for Solvent Release Agents
ASTM C1521	(2013) Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
ASTM D217	(2019b) Standard Test Methods for Cone Penetration of Lubricating Grease
ASTM D1056	(2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Sealants; G

Primers; G

Bond Breakers; G

Backstops; G

SD-06 Test Reports

Field Adhesion; G

SD-07 Certificates

Indoor Air Quality For Interior Sealants; S

Indoor Air Quality For Interior Floor Joint Sealants; S

Indoor Air Quality For Interior Acoustical Sealants; S

Indoor Air Quality For Interior Caulking; S

1.3 PRODUCT DATA

Include storage requirements, shelf life, curing time, instructions for mixing and application, and accessories. Provide manufacturer's Safety Data Sheets (SDS) for each solvent, primer and sealant material proposed.

1.4 CERTIFICATIONS

1.4.1 Indoor Air Quality Certifications

Submit required indoor air quality certifications in one submittal package.

1.4.1.1 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party program that products meet the requirements of this Section. Provide current product certification documentation from certification body.. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

1.5 ENVIRONMENTAL CONDITIONS

Apply sealant when the ambient temperature is between 40 and 90 degrees F.

1.6 DELIVERY AND STORAGE

Deliver materials to the jobsite in unopened manufacturers' sealed shipping containers, with brand name, date of manufacture, color, and material designation clearly marked thereon. Label elastomeric sealant containers to identify type, class, grade, and use. Handle and store materials in accordance with manufacturer's printed instructions. Prevent exposure to foreign materials or subjection to sustained temperatures exceeding 90 degrees F or lower than 0 degrees F. Keep materials and containers closed and separated from absorptive materials such as wood and insulation.

1.7 QUALITY ASSURANCE

1.7.1 Compatibility with Substrate

Verify that each sealant is compatible for use with each joint substrate in accordance with sealant manufacturer's printed recommendations for each application.

1.7.2 Joint Tolerance

Provide joint tolerances in accordance with manufacturer's printed instructions.

1.7.3 Mock-Up

Provide a mock-up of each type of sealant using materials, colors, and techniques approved for use on the project. Approved mock-ups may be incorporated into the Work.

1.7.4 Adhesion

Provide in accordance with ASTM C1193 or ASTM C1521.

PART 2 PRODUCTS

2.1 SEALANTS

Provide sealant products that have been tested, found suitable, and documented as such by the manufacturer for the particular substrates to which they will be applied.

2.1.1 Interior Sealants

Provide ASTM C834. Provide sealant products used on the interior of the

building (defined as inside of the weatherproofing system) meeting either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide certification or validation of indoor air quality for interior sealants. Location(s) and color(s) of sealant for the following. Note, color "as selected" refers to manufacturer's full range of color options

LOCATION	COLOR
a. Small voids between walls or partitions and adjacent lockers, casework, shelving, door frames, built-in or surface mounted equipment and fixtures, and similar items.	match adjacent surface color
b. Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces.	match adjacent surface color
c. Joints of interior masonry walls and partitions which adjoin columns, pilasters, concrete walls, and exterior walls unless otherwise detailed.	match adjacent surface color
d. Joints between edge members for acoustical tile and adjoining vertical surfaces.	match adjacent surface color
e. Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.	match adjacent surface color
f. Joints between bathtubs and ceramic tile; joints between shower receptors and ceramic tile; joints formed where non-planar tile surfaces meet.	match adjacent surface color
g. Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occurring where substrates change.	match adjacent surface color
h. Behind escutcheon plates at valve pipe penetrations and showerheads in showers.	match adjacent surface color

2.1.2 Exterior Sealants

For joints in vertical surfaces, provide ASTM C920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T. Provide location(s) and color(s) of sealant as follows. Note, color "as selected" refers to manufacturer's full range of color options:

LOCATION	COLOR
a. Joints and recesses formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations.	Match adjacent surface color
b. Joints between new and existing exterior masonry walls.	match adjacent surface color
c. Masonry joints where shelf angles occur.	match adjacent surface color
d. Joints in wash surfaces of stonework.	match adjacent surface color
e. Expansion and control joints.	match adjacent surface color
f. Interior face of expansion joints in exterior concrete or masonry walls where metal expansion joint covers are not required.	match adjacent surface color
g. Voids where items pass through exterior walls.	match adjacent surface color
h. Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.	match adjacent surface color
i. Metal-to-metal joints where sealant is indicated or specified.	match adjacent surface color
j. Joints between ends of gravel stops, fascia, copings, and adjacent walls.	match adjacent surface color

2.1.3 Floor Joint Sealants

ASTM C920, Type S or M, Grade P, Class 25, Use T. Provide sealant products used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide certification or validation of indoor air quality for interior floor joint sealants. Provide location(s) and color(s) of sealant as follows. Note, color "as selected" refers to manufacturer's full range of color options:

LOCATION	COLOR
a. Seats of metal thresholds for exterior doors.	As selected
b. Control and expansion joints in floors, slabs, ceramic tile, and walkways.	match adjacent surface color

2.1.4 Acoustical Sealants

Rubber or polymer based acoustical sealant in accordance with ASTM C919 to have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E84. Provide non-staining acoustical sealant with a consistency of 250 to 310 when tested in accordance with ASTM D217. Acoustical sealant must remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C734. Provide sealant products used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide certification or validation of indoor air quality for interior acoustical sealants.

2.1.5 Preformed Sealants

Provide preformed sealants of polybutylene or isoprene-butylene based pressure sensitive weather resistant tape or bead sealants capable of sealing out moisture, air and dust when installed as recommended by the manufacturer. At temperatures from minus 30 to plus 160 degrees F, sealants must be non-bleeding and have no loss of adhesion.

2.2 PRIMERS

Non-staining, quick drying type and consistency as recommended by the sealant manufacturer for the particular application. Provide primers for interior applications that meet the indoor air quality requirements of the paragraph SEALANTS above.

2.3 BOND BREAKERS

Type and consistency as recommended by the sealant manufacturer to prevent adhesion of the sealant to the backing or to the bottom of the joint. Provide bond breakers for interior applications that meet the indoor air quality requirements of the paragraph SEALANTS above.

2.4 BACKSTOPS

Provide glass fiber roving, neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Provide 25 to 33 percent oversized backing for closed cell and 40 to 50 percent oversized backing for open cell material, unless otherwise indicated. Provide backstop material that is compatible with sealant. Do not use oakum or other types of absorptive materials as backstops.

2.4.1 Rubber

Provide in accordance with ASTM D1056, Type 2, closed cell, Class A, Grade 1, round cross section for cellular rubber sponge backing.

2.4.2 Synthetic Rubber

Provide in accordance with ASTM C509, Option I, Type I preformed rods or tubes for synthetic rubber backing.

2.4.3 Neoprene

Provide in accordance with ASTM D1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2 neoprene backing.

2.4.4 Butyl Rubber Based

Provide in accordance with ASTM C1311, from a single component, with solvent release. color as selected from manufacturer's full range of color choices.

2.5 CLEANING SOLVENTS

Provide type(s) recommended by the sealant manufacturer and in accordance with environmental requirements herein. Protect adjacent aluminum and bronze surfaces from solvents. Provide solvents for interior applications that meet the indoor air quality requirements of the paragraph SEALANTS above.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

Perform a field adhesion test in accordance with manufacturer's instructions and ASTM C1193, Method A or ASTM C1521, Method A, Tail Procedure. Remove sealants that fail adhesion testing; clean substrates, reapply sealants, and re-test. Test sealants adjacent to failed sealants. Submit field adhesion test report indicating tests, locations, dates, results, and remedial actions taken.

3.2 SURFACE PREPARATION

Prepare surfaces according to manufacturer's printed installation instructions. Clean surfaces from dirt, frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would destroy or impair adhesion. Remove oil and grease with solvent; thoroughly remove solvents prior to sealant installation. Wipe surfaces 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, provide in accordance with sealant manufacturer's printed instructions for each specific surface.

3.2.1 Steel Surfaces

Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finished work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue free solvent. Remove resulting debris and solvent residue prior to sealant installation.

3.2.2 Aluminum or Bronze Surfaces

Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive prior to sealant application. For removing protective coatings and final cleaning, use non-staining solvents recommended by the manufacturer of the item(s) containing aluminum or bronze surfaces.

3.2.3 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, remove materials by sandblasting or wire brushing. Remove laitance, efflorescence and loose mortar from the joint cavity. Remove resulting debris prior to sealant installation.

3.2.4 Wood Surfaces

Ensure wood surfaces that will be in contact with sealants are free of splinters, sawdust and other loose particles.

3.3 SEALANT PREPARATION

Do not add liquids, solvents, or powders to sealants. Mix multicomponent elastomeric sealants in accordance with manufacturer's printed instructions.

3.4 APPLICATION

3.4.1 Joint Width-To-Depth Ratios

Acceptable Ratios:

JOINT WIDTH	JOINT DEPTH	
	Minimum	Maximum
For metal, glass, or other nonporous surfaces:		
1/4 inch (minimum)	1/4 inch	1/4 inch
over 1/4 inch	1/2 of width	Equal to width
For wood, concrete, masonry or stone:		
1/4 inch (minimum)	1/4 inch	1/4 inch
over 1/4 inch to 1/2 inch	1/4 inch	Equal to width
over 1/2 inch to 1 inch	1/2 inch	5/8 inch
Over 1 inch	prohibited	

Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding is prohibited at metal surfaces.

3.4.2 Unacceptable Sealant Use

Do not install sealants in lieu of other required building enclosure weatherproofing components such as flashing, drainage components, and joint closure accessories, or to close gaps between walls, floors, roofs, windows, and doors, that exceed acceptable installation tolerances. Remove sealants that have been used in an unacceptable manner and correct building enclosure deficiencies to comply with contract documents requirements.

3.4.3 Masking Tape

Place masking tape on the finished surface on one or both sides of joint cavities to protect adjacent finished surfaces from primer or sealant smears. Remove masking tape within 10 minutes of joint filling and tooling.

3.4.4 Backstops

Provide backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide joints in specified depths. Provide backstops where indicated and where backstops are not indicated but joint cavities exceed the acceptable maximum depths specified in JOINT WIDTH-TO-DEPTH RATIOS Table.

3.4.5 Primer

Clean out loose particles from joints immediately prior to application of. Apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's printed instructions. Do not apply primer to exposed finished surfaces.

3.4.6 Bond Breaker

Provide bond breakers to surfaces not intended to bond in accordance with, sealant manufacturer's printed instructions for each type of surface and sealant combination specified.

3.4.7 Sealants

Provide sealants compatible with the material(s) to which they are applied. Do not use a sealant that has exceeded its shelf life or has jelled and cannot be discharged in a continuous flow from the sealant gun. Apply sealants in accordance with the manufacturer's printed instructions with a gun having a nozzle that fits the joint width. Work sealant into joints so as to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Apply sealant uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply additional sealant, and tool smooth as specified. Apply sealer over sealants in accordance with the sealant manufacturer's printed instructions.

3.5 PROTECTION AND CLEANING

3.5.1 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 and no residual tape marks remain.

3.5.2 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 remove fresh sealant that has been smeared on adjacent masonry, rub clean with a solvent, and remove solvent residue, in accordance with sealant manufacturer's printed instructions. Allow excess sealant to cure for 24 hour then remove by wire brushing or sanding. Remove resulting debris.

b. Metal and Other Non-Porous Surfaces: Remove excess sealant with a solvent moistened cloth. Remove solvent residue in accordance with solvent manufacturer's printed instructions.

-- End of Section --

SECTION 08 11 13

STEEL DOORS AND FRAMES
02/10

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A879/A879M	(2012) Standard Specification for Steel Sheet, zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
ASTM C578	(2018) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C591	(2019a) Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C612	(2014; R 2019) Mineral Fiber Block and Board Thermal Insulation
ASTM D2863	(2019) Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
ASTM E1300	(2016) Standard Practice for Determining Load Resistance of Glass in Buildings
ASTM F2248	(2012) Standard Practice for Specifying an Equivalent 3-Second Duration Design Loading for Blast Resistant Glazing Fabricated with Laminated Glass

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.115	(2016) Hardware Preparation in Steel Doors and Steel Frames

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(2016; TIA 16-1) Standard for Fire Doors and Other Opening Protectives

NFPA 252	(2017) Standard Methods of Fire Tests of Door Assemblies

STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR 113	(2001; R2006) Standard Practice for Determining the Steady State Thermal Transmittance of Steel Door and Frame Assemblies
SDI/DOOR A250.4	(2011) Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing
SDI/DOOR A250.6	(2003; R2009) Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames
SDI/DOOR A250.8	(2003; R2008) Recommended Specifications for Standard Steel Doors and Frames
SDI/DOOR A250.11	(2001) Recommended Erection Instructions for Steel Frames

UNDERWRITERS LABORATORIES (UL)

UL 10C	(2016) UL Standard for Safety Positive Pressure Fire Tests of Door Assemblies

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Doors; G

Recycled Content for Steel Door Product; S

Frames; G

Recycled Content for Steel Frame Product; S

Accessories

Show elevations, construction details, metal gages, hardware provisions, method of glazing, and installation details.

Schedule of Doors; G

Schedule of Frames; G

Submit door and frame locations.

SD-03 Product Data

Doors; G

Frames; G

Accessories

Submit manufacturer's descriptive literature for doors, frames, and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction. When "custom hollow metal doors" are provided in lieu of "standard steel doors," provide additional details and data sufficient for comparison to SDI/DOOR A250.8 requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Strap knock-down frames in bundles. Provide temporary steel spreaders securely fastened to the bottom of each welded frame. Store doors and frames 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.

1.4 High-Velocity Hurricane Zone (HVHZ) Florida Building Code

Tyndall AFB requires all new construction, additions, and renovations to comply with the Florida Building Code (FBC) High-Velocity Hurricane Zone (HVHZ), Section 1602.2 criteria for Miami Dade County, Risk Category III buildings with a windspeed of 165 mph. Per FBC HVHZ provisions, all exterior building envelope materials such as, but not limited to windows, glazing, roofing systems, concrete masonry unit or metal panel walls, and doors and others must have a current Miami-Dade Notice of Acceptance (NOA) and installation of HVHZ standards that match the specified minimum 165mph wind requirement at Tyndall AFB. In addition, the Contractor must submit for review and approval test results of systems meeting the high wind requirements or a set of drawings sealed by a Professional Engineer stating conformance with HVHZ standards in place of materials pre-approved by Miami-Dade County.

PART 2 PRODUCTS

2.1 STANDARD STEEL DOORS

SDI/DOOR A250.8, except as specified otherwise. Prepare doors to receive door hardware as specified in Section 08 71 00. Undercut where indicated. Provide exterior doors with top edge closed flush and sealed to prevent water intrusion. Provide doors at 1-3/4 inch thick, unless otherwise indicated. Provide door material that uses a minimum of 25 percent recycled content. Provide data indicating percentage of recycled content for steel door product. Provide exterior glazing in accordance with ASTM F2248 and ASTM E1300.

2.1.1 Classification - Level, Performance, Model

2.1.1.1 Heavy Duty Doors

SDI/DOOR A250.8, Level 2, physical performance Level B, Model 2, with core construction as required by the manufacturer for interior doors and for exterior doors, of size(s) and design(s) indicated. Where vertical stiffener cores are required, the space between the stiffeners must be

filled with mineral board insulation.

2.2 INSULATED STEEL DOOR SYSTEMS

Provide insulated steel doors with a core of polyurethane foam; face sheets, edges, and frames of galvanized steel not lighter than 23 gage, 16 gage, and 16 gage respectively; magnetic weatherstripping; nonremovable-pin hinges; thermal-break aluminum threshold; and vinyl door bottom. Provide to doors and frames a phosphate treatment, rust-inhibitive primer, and baked acrylic enamel finish. Test doors in accordance with SDI/DOOR A250.4 and meet the requirements for Level C. Prepare doors to receive specified hardware. Provide doors 1-3/4 inch thick. Provide insulated steel doors and frames where shown.

2.3 SOUND RATED STEEL DOORS

Provide sound rated doors with a Sound Transmission Class (STC) as indicated on the drawings.

2.4 ACCESSORIES

2.4.1 Astragals

For pairs of exterior steel doors which will not have aluminum astragals or removable mullions, as specified in Section 08 71 00 DOOR HARDWARE provide overlapping steel astragals with the doors. For interior pairs of fire rated doors, provide stainless steel astragals complying with NFPA 80 for fire rated assemblies.

2.4.2 Moldings

Provide moldings around glass of interior and exterior doors and louvers of interior doors. Provide nonremovable moldings on outside of exterior doors and on corridor side of interior doors. Other moldings may be stationary or removable. Secure inside moldings to stationary moldings, or provide snap-on moldings. Provide muntins that interlock at intersections and are fitted plus welded to stationary moldings.

2.5 INSULATION CORES

Provide insulating cores of the type specified, and provide an apparent U-factor of .48 in accordance with SDI/DOOR 113 and conforming to:

a. Rigid Cellular Polyisocyanurate Foam: ASTM C591, Type I or II, foamed-in-place or in board form, with oxygen index of not less than 22 percent when tested in accordance with ASTM D2863; or

b. Rigid Polystyrene Foam Board: ASTM C578, Type I or II; or

c. Mineral board: ASTM C612, Type I.

2.6 STANDARD STEEL FRAMES

SDI/DOOR A250.8, Level 2, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners. Provide steel frames for doors and cased openings unless otherwise indicated. Provide frame product that uses a minimum of 25 percent recycled content. Provide data indicating percentage of recycled content for steel frame product.

2.6.1 Welded Frames

Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets. Grind welds smooth.

Weld frames in accordance with the recommended practice of the Structural Welding Code Sections 1 through 6, AWS D1.1/D1.1M and in accordance with the practice specified by the producer of the metal being welded.

2.6.2 Stops and Beads

Form stops and beads from 20 gage steel. Provide for glazed and other openings in standard steel frames. Secure beads to frames with oval-head, countersunk Phillips self-tapping sheet metal screws or concealed clips and fasteners. Space fasteners approximately 12 to 16 inch on center. Miter molded shapes at corners. Butt or miter square or rectangular beads at corners.

2.6.3 Cased Openings

Fabricate frames for cased openings of same material, gage, and assembly as specified for metal door frames, except omit door stops and preparation for hardware.

2.6.4 Anchors

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gage.

2.6.4.1 Wall Anchors

Provide at least three anchors for each jamb. For frames which are more than 7.5 feet in height, provide one additional anchor for each jamb for each additional 2.5 feet or fraction thereof.

a. Masonry: Provide anchors of corrugated or perforated steel straps or 3/16 inch diameter steel wire, adjustable or T-shaped;

b. Stud partitions: Weld or otherwise securely fasten anchors to backs of frames. Design anchors to be fastened to closed steel studs with sheet metal screws, and to open steel studs by wiring or welding;

2.6.4.2 Floor Anchors

Provide floor anchors drilled for 3/8 inch anchor bolts at bottom of each jamb member. Where floor fill occurs, terminate bottom of frames at the indicated finished floor levels and support by adjustable extension clips resting on and anchored to the structural slabs.

2.7 FIRE DOORS AND FRAMES

NFPA 80 and this specification. The requirements of NFPA 80 takes precedence over details indicated or specified.

2.7.1 Labels

Provide fire doors and frames bearing the label of Underwriters

Laboratories (UL), Factory Mutual Engineering and Research (FM), or Warnock Hersey International (WHI) attesting to the rating required. Testing must be in accordance with NFPA 252 or UL 10C. Provide labels that are metal with raised letters, bearing the name or file number of the door and frame manufacturer. Labels must be permanently affixed at the factory to frames and to the hinge edge of the door. Do not paint door and labels.

2.7.2 Oversized Doors

For fire doors and frames which exceed the size for which testing and labeling are available, furnish certificates stating that the doors and frames are identical in design, materials, and construction to a door which has been tested and meets the requirements for the class indicated.

2.7.3 Astragal on Fire Doors

On pairs of labeled fire doors, conform to NFPA 80 and UL requirements.

2.8 WEATHERSTRIPPING

As specified in Section 08 71 00 DOOR HARDWARE.

2.9 HARDWARE PREPARATION

Provide minimum hardware reinforcing gages as specified in SDI/DOOR A250.6. Drill and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of SDI/DOOR A250.8 and SDI/DOOR A250.6. For additional requirements refer to ANSI/BHMA A156.115. 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 SDI/DOOR A250.8, as applicable. Punch door frames , with the exception of frames that will have weatherstripping or lightproof or soundproof gasketing, to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

2.10 FINISHES

2.10.1 Factory-Primed Finish

Thoroughly clean all surfaces of doors and frames then chemically treat and factory prime with a rust inhibiting coating as specified in SDI/DOOR A250.8. , or paintable A25 galvannealed steel without primer. Where coating is removed by welding, apply touchup of factory primer.

2.10.2 Electrolytic Zinc-Coated Anchors and Accessories

Provide electrolytically deposited zinc-coated steel in accordance with ASTM A879/A879M, Commercial Quality, Coating Class A. Phosphate treat and factory prime zinc-coated surfaces as specified in SDI/DOOR A250.8.

2.11 FABRICATION AND WORKMANSHIP

Provide finished doors and frames that are strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Provide molded members that are clean cut, straight, and true, with joints coped or mitered, well formed, and in true

alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints must be well formed and in true alignment. Conceal fastenings where practicable. On wraparound frames for masonry partitions, provide a throat opening 1/8 inch larger than the actual masonry thickness. Design frames in exposed masonry walls or partitions to allow sufficient space between the inside back of trim and masonry to receive caulking compound.

2.11.1 Grouted Frames

For frames to be installed in exterior walls and to be filled with mortar or grout, fill the stops with strips of rigid insulation to keep the grout out of the stops and to facilitate installation of stop-applied head and jamb seals.

2.12 PROVISIONS FOR GLAZING

Materials are specified in Section 08 81 00, GLAZING.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Frames

Set frames in accordance with SDI/DOOR A250.11. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Backfill frames with mortar. Coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

3.1.2 Doors

Hang doors in accordance with clearances specified in SDI/DOOR A250.8. After erection and glazing, clean and adjust hardware.

3.1.3 Fire Doors and Frames

Install fire doors and frames, including hardware, in accordance with NFPA 80.

3.2 PROTECTION

Protect doors and frames from damage. Repair damaged doors and frames 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.

-- End of Section --

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SECTION 08 14 00

WOOD DOORS
08/16

PART 1 GENERAL

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.

ASTM INTERNATIONAL (ASTM)

ASTM E90	(2009; R2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
ASTM E2226	(2015; R 2019b) Standard Practice for Application of Hose Stream

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(2016; TIA 16-1) Standard for Fire Doors and Other Opening Protectives
NFPA 105	(2016; TIA 16-1) Standard for Smoke Door Assemblies and Other Opening Protectives
NFPA 252	(2017) Standard Methods of Fire Tests of Door Assemblies

UNDERWRITERS LABORATORIES (UL)

UL 10B	(2008; Reprint Feb 2015) Fire Tests of Door Assemblies

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

ANSI/WDMA I.S.1A	(2013) Interior Architectural Wood Flush Doors
ANSI/WDMA I.S.6A	(2013) Interior Architectural Stile and Rail Doors

WOODWORK INSTITUTE (WI)

NAAWS 3.1	(2017; 2018 Errata Edition) North American Architectural Woodwork Standards

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00

SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Doors; G

Submit drawings or catalog data showing each type of door unit. Indicate within drawings and data the door types and construction, sizes, thickness, and glazing.

SD-03 Product Data

Doors; G

Accessories

Water-resistant Sealer

Sample Warranty

Sound Transmission Class Rating; G

Fire Resistance Rating; G

SD-04 Samples

Doors

Prior to the delivery of wood doors, submit a sample section of each type of door which shows the stile, rail, veneer, finish, and core construction.

Door Finish Colors; G

Submit a minimum of three color selection samples , minimum 3 by 5 inches in size representing wood stain for selection by the Contracting Officer.

SD-06 Test Reports

Cycle-Slam

Hinge Loading Resistance

Submit cycle-slam test report for doors tested in accordance with ANSI/WDMA I.S.1A, and hinge loading resistance test report for doors tested in accordance with ANSI/WDMA I.S.6A.

SD-07 Certificates

Certificates of Grade

SD-11 Closeout Submittals

Warranty

1.3 CERTIFICATIONS

1.3.1 Certified Wood Grades

Provide certificates of grade from the grading agency on acoustical doors, and fire doors.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver doors to the site in an undamaged condition and protect against damage and dampness. Stack doors flat under cover. Support on blocking, a minimum of 4 inch thick, located at each end and at the midpoint of the door. Store doors in a well-ventilated building so that they will not be exposed to excessive moisture, heat, dryness, direct sunlight, or extreme changes of temperature and humidity. Do not store in a building under construction until concrete, masonry work, and plaster are dry. Replace defective or damaged doors with new ones.

1.5 WARRANTY

Warrant doors free of defects as set forth in the door manufacturer's standard door warranty.

PART 2 PRODUCTS

2.1 DOORS

Provide doors of the types, sizes, and designs specified free of urea-formaldehyde resins.

2.1.1 Flush Doors

Conform to ANSI/WDMA I.S.1A for flush doors. Provide hollow core doors with lock blocks and 1 inch minimum thickness hinge stile. Hardwood stile edge bands of doors receives a natural finish, compatible with face veneer. Provide mill option for stile edge of doors scheduled to be painted. No visible finger joints will be accepted in stile edge bands. When used, locate finger-joints under hardware.

2.1.1.1 Interior Flush Doors

Provide staved lumber core, Type II flush doors conforming to ANSI/WDMA I.S.1A with faces of select premium white birch. Hardwood veneers must be plain sliced book matched.

2.1.2 Acoustical Doors

ANSI/WDMA I.S.1A, solid core, constructed to provide Sound Transmission Class rating of 45 when tested in accordance with ASTM E90.

2.1.3 Fire Doors

Provide doors specified or indicated to have a fire resistance rating conforming to the requirements of UL 10B, ASTM E2226, or NFPA 252 for the class of door indicated. Affix a permanent metal label with raised or incised markings indicating testing agency's name and approved hourly fire rating to hinge edge of each door.

2.2 ACCESSORIES

2.2.1 Door Light Openings

Provide glazed openings with the manufacturer's standard wood moldings. Provide moldings for doors to receive natural finish of the same wood species and color as the wood face veneers. Provide moldings on the exterior doors with sloped surfaces.

2.2.2 Additional Hardware Reinforcement

Provide the minimum lock blocks to secure the specified hardware. The measurement of top, bottom, and intermediate rail blocks are a minimum 125 mm 5 inch by full core width. Comply with the manufacturer's labeling requirements for reinforcement blocking, but not mineral material similar to the core.

2.3 FABRICATION

2.3.1 Marking

Stamp each door with a brand, stamp, or other identifying mark indicating quality and construction of the door.

2.3.2 Quality and Construction

Identify the standard on which the construction of the door was based and identify doors having a Type I glue bond.

2.3.3 Preservative Treatment

Treat doors scheduled for restrooms, janitor closets and other possible wet locations including exterior doors with a water-repellent preservative treatment and so marketed at the manufacturer's plant.

2.3.4 Adhesives and Bonds

ANSI/WDMA I.S.1A. Use Type I bond for exterior doors and Type II bond for interior doors. Provide a nonstaining adhesive on doors with a natural finish.

2.3.5 Prefitting

Provide factory finished and factory prefitted doors for the specified hardware, door frame and door-swing indicated. Machine and size doors at the factory by the door manufacturer in accordance with the standards under which the doors are produced and manufactured. The work includes sizing, beveling edges, mortising, and drilling for hardware and providing necessary beaded openings for glass and louvers. Provide the door manufacturer with the necessary hardware samples, and frame and hardware schedules to coordinate the work.

2.3.6 Finishes

2.3.6.1 Field Painting

Factory prime or seal doors, and field paint.

2.3.6.2 Factory Finish

Provide doors finished at the factory by the door manufacturer as follows: NAAWS 3.1 Section 1500, specification for System No. 4 Conversion varnish alkyd urea or System No. 5 Vinyl catalyzed. The coating is NAAWS 3.1 premium, medium rubbed sheen, closed grain effect. Use stain when required to produce the finish specified for color. Seal edges, cutouts, trim, and wood accessories, and apply two coats of finish compatible with the door face finish. Touch-up finishes that are scratched or marred, or where exposed fastener holes are filled, in accordance with the door manufacturer's instructions. Match color and sheen of factory finish using materials compatible for field application.

2.3.6.3 Color

Provide door finish colors in accordance with Section 09 06 00 SCHEDULES FOR FINISHES.

2.3.7 Water-Resistant Sealer

Provide manufacturer's standard water-resistant sealer compatible with the specified finishes.

2.4 SOURCE QUALITY CONTROL

Meet or exceed the following minimum performance criteria of stiles of "B" and "C" label fire doors utilizing standard mortise leaf hinges:

a. Cycle-slam: Standard Duty Doors: 250,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with the requirements of ANSI/WDMA I.S.1A.

b. Hinge loading resistance: Averages of ten test samples not less than Standard Duty doors: 400 pounds force when tested for direct screw withdrawal in accordance with ANSI/WDMA I.S.6A using a No. 12, 1-1/4 inch long, steel, fully threaded wood screw. Drill 5/32 inch pilot hole, use 1-1/2 inch opening around screw for bearing surface, and engage screw full, except for last 1/8 inch. Do not use a steel plate to reinforce screw area.

PART 3 EXECUTION

3.1 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Before installation, seal top and bottom edges of doors with the approved water-resistant sealer. Seal cuts made on the job immediately after cutting using approved water-resistant sealer. Fit, trim, and hang doors with a 1/16 inch minimum, 1/8 inch maximum clearance at sides and top, and a 3/16 inch minimum, 1/4 inch maximum clearance over thresholds. Provide 3/8 inch minimum, 7/16 inch maximum clearance at bottom where no threshold occurs. Bevel edges of doors at the rate of 1/8 inch in 2 inch. Door warp must not exceed 1/4 inch when measured in accordance with ANSI/WDMA I.S.1A.

3.1.1 Fire Doors

Install fire doors in accordance with NFPA 80. Install smoke doors in

accordance with NFPA 105. Do not paint over labels.

-- End of Section --

SECTION 08 33 23

OVERHEAD COILING DOORS
11/19

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-16	(2017; Errata 2018; Supp 1 2018) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE FUN IP	(2017) Fundamentals Handbook, I-P Edition

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B29.400	(2001; (R 2008) (R 2013) (R 2018)) Combination, "H" Type Mill Chains, and Sprockets

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A47/A47M	(1999; R 2018; E 2018) Standard Specification for Ferritic Malleable Iron Castings
ASTM A48/A48M	(2003; R 2016) Standard Specification for Gray Iron Castings
ASTM A53/A53M	(2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2014; E 2017) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM A666	(2015) Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
ASTM A780/A780M	(2009; R 2015) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A924/A924M	(2020) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E330/E330M	(2014) Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
ASTM F568M	(2007) Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2	(2000; R 2005; Errata 2008) Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 6	(1993; R 2016) Industrial Control and Systems: Enclosures
NEMA MG 1	(2018) Motors and Generators
NEMA ST 1	(1988; R 1994; R 1997) Specialty Transformers (Except General Purpose Type)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 325	(2017; Reprint Feb 2020) UL Standard for Safety Door, Drapery, Gate, Louver, and Window Operators and Systems

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Overhead Coiling Doors; G

Counterbalancing Mechanism; G

Manual Door Operators; G

Electric Door Operators; G

Bottom Bars; G

Guides; G

Mounting Brackets; G

Hood; G

Installation Drawings; G

SD-03 Product Data

Overhead Coiling Doors; G

Hardware; G

Counterbalancing Mechanism; G

Manual Door Operators; G

Electric Door Operators; G

SD-05 Design Data

Overhead Coiling Doors; G

Hardware; G

Counterbalancing Mechanism; G

Manual Door Operators; G

Electric Door Operators; G

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

Materials; G

Devices; G

Procedures; G

Manufacturer's Brochures; G

Parts Lists; G

SD-11 Closeout Submittals

Warranty; G

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors to the jobsite wrapped in a protective covering with the brands and names clearly marked thereon. Store doors in an adequately ventilated dry location that is free from dirt and dust, water, or other contaminants. Store in a manner that permits easy access for inspection and handling.

1.4 High-Velocity Hurricane Zone (HVHZ) Florida Building Code

Tyndall AFB requires all new construction, additions, and renovations to comply with the Florida Building Code (FBC) High-Velocity Hurricane Zone (HVHZ), Section 1602.2 criteria for Miami Dade County, Risk Category III buildings with a windspeed of 165 mph. Per FBC HVHZ provisions, all exterior building envelope materials such as, but not limited to windows, glazing, roofing systems, concrete masonry unit or metal panel walls, and doors and others must have a current Miami-Dade Notice of Acceptance (NOA) and installation of HVHZ standards that match the specified minimum 165mph wind requirement at Tyndall AFB. In addition, the Contractor must submit for review and approval test results of systems meeting the high wind requirements or a set of drawings sealed by a Professional Engineer stating conformance with HVHZ standards in place of materials pre-approved by Miami-Dade County.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide overhead coiling doors, with interlocking slats, complete with anchoring and door hardware, guides, hood, and operating mechanisms, and designed for use on openings as indicated. Use grease-sealed or self-lubricating bearings for rotating members.

2.1.1 Design Requirements

2.1.1.1 Overhead Coiling Door Detail Shop Drawings

Provide installation drawings for overhead coiling door assemblies which show: elevations of each door type, shape and thickness of materials, finishes, details of joints and connections, details of guides and fittings, rough opening dimensions, location and description of hardware, anchorage locations, and counterbalancing mechanism and door operator details. Show locations of replaceable fusible links on wiring diagrams for power, signal and controls. Include a schedule showing the location of each door with the drawings.

2.1.2 Performance Requirements

2.1.2.1 Wind Loading

Design and fabricate door assembly to withstand the wind loading pressure of at least +65/-65 pounds per square foot with a maimum deflection of l/180 of the opening width. Provide test data showing compliance with ASTM E330/E330M. Sound engineering principles may be used to interpolate or extrapolate test results to door sizes not specifically tested. Ensure that the complete assembly meets or exceeds the requirements of ASCE 7-16.

2.1.2.2 Operational Cycle Life

Design all portions of the door, hardware and operating mechanism that are subject to movement, wear, or stress fatigue to operate through a minimum number of 10 cycles per day. One complete cycle of door operation is defined as when the door is in the closed position, moves to the fully open position, and returns to the closed position.

2.2 COMPONENTS

2.2.1 Overhead Coiling Doors

2.2.1.1 Curtain Materials and Construction

Provide curtain slats fabricated from Grade A steel sheets conforming to ASTM A653/A653M, with the additional requirement of a minimum yield point of 33,000 psi. Provide sheets, galvanized in conformance with ASTM A653/A653M and ASTM A924/A924M.

Fabricate doors from interlocking cold-rolled slats, with section profiles as specified, designed to withstand the specified wind loading. Ensure the provided slats are continuous without splices for the width of the door.

Provide slats filled with manufacturer's standard thermal insulation, complying with the maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84. Enclose the insulation completely within the slat faces on the interior surface of the slats.

2.2.1.2 Insulated Curtains

Form curtains from manufacturer's standard shapes of interlocking slats. Supply a slat system with a minimum R-value of 4 when calculated in accordance with ASHRAE FUN IP. Slats to consist of a core not less than 11/16 inch thick, completely enclosed within metal facings. Slat steel thickness as required by the size of the door to meet specified performance requirements. The insulated slat assembly requires a flame spread rating of not more than 25 and a smoke development factor of not more than 50 when tested in accordance with ASTM E84.

2.2.1.3 Curtain Bottom Bar

Install curtain bottom bars as pairs of angles or using extrusions from the manufacturer's standard steel, stainless and aluminum extrusions not less than 2.0 by 2.0 inches by 0.188 inch.Ensure steel extrusions conform to ASTM A36/A36M. Stainless steel extrusions conforming to ASTM A666, Type 304. Aluminum extrusions conforming to ASTM B221. Galvanize angles and fasteners in accordance with ASTM A653/A653M and ASTM A924/A924M. Coat welds and abrasions with paint conforming to ASTM A780/A780M.

2.2.1.4 Locks

Provide end and/or wind locks of Grade B cast steel conforming to ASTM A47/A47M, galvanized in accordance with ASTM A153/A153M. Secure locks at every other curtain slat.

2.2.1.5 Weather Stripping

Provide a hood baffle inside the hood that is a minimum 1/16 inch thick sheet of vinyl, neoprene rubber or equivalent. Provide guide weather stripping that is a minimum 1/16 inch thick sheet of vinyl, neoprene rubber, or equivalent.

Provide bottom bar weather-stripping that is a minimum1/16 inch thick sheet of vinyl, neoprene rubber, or equivalent.

2.2.1.6 Locking Devices

Ensure that the slide bolt engages through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

Provide a locking device assembly which includes cylinder lock, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

Provide a chain lock keeper suitable for a standard padlock.

2.2.1.7 Safety Interlock

Equip power-operated doors with a safety interlock switch to disengage power supply when the door is locked, or provide an operator with an internal lock sensing device to prevent the door opening when the door is locked.

2.2.1.8 Slats

22 gauge, Grade 40 steel, ASTM A653/A653M galvanized steel zinc coating.

2.2.2 Hardware

Ensure that all hardware conforms to ASTM A153/A153M, ASTM A307, and ASTM F568M.

2.2.2.1 Guides

Fabricate curtain jamb guides from the manufacturer's standard angles or channels of same material and finish as curtain slats unless otherwise indicated. Provide guides with sufficient depth and strength to retain curtain, and to withstand loading. Ensure curtain operates smoothly. Slot bolt holes for track adjustment.

Fabricate with structural steel angles. Provide windlock bars of same material when windlocks are required to meet specified wind load. Flare the top of inner and outer guide angles outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar.

2.2.2.2 Hood

Provide a hood with a minimum 24-gaugegalvanized sheet metal, flanged at top for attachment to header and flanged at bottom to provide longitudinal stiffness. The hood encloses the curtain coil and counterbalance mechanism.

Provide intermediate support brackets as required to prevent excessive sag.

2.2.3 Counterbalancing Mechanism

Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted, around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed or self-lubricating bearings for rotating members.

2.2.3.1 Brackets

Provide the manufacturer's standard mounting brackets with one located at each end of the counterbalance barrel conforming to ASTM A36/A36M. Provide brackets of hot-rolled steel.

2.2.3.2 Counterbalance Barrels

Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, conforming to ASTM A53/A53M or equivalent. Ensure the barrel is of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats. Limit barrel deflection to not more than 0.03 inch per foot of span under full load.

a. Barrel

Provide steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot of width.

b. Spring Balance

Provide an oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door. Ensure that effort to operate manually operated units does not exceed 25 lbs. Provide wheel for applying and adjusting spring torque.

2.2.4 Manual Door Operators

2.2.4.1 Manual Chain-Hoist Door Operators

Provide door operators which consist of an endless steel hand chain, chain-pocket wheel, guard, and a geared reduction unit of at least a 3 to 1 ratio with a maximum lifting force of 25 lbf. Required pull for operation cannot exceed 35 pounds.

Provide chain hoists with a mechanism allowing the curtain to be stopped at any point in its upward or downward travel and to remain in that position until moved to the fully open or closed position. Provide hand chains of cadmium-plated alloy steel. Ensure that the yield point of the chain is at least three times the required hand-chain pull.

Provide chain sprocket wheels of cast iron conforming to ASTM A48/A48M.

2.2.4.2 Manual Crank-Hoist Door Operators

Provide door operators which consist of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit with a maximum 25 lbf force to turn crank. Fabricate gearbox to be oil tight and to completely enclose operating mechanism.

2.2.5 Electric Door Operators

Provide electrical wiring and door operating controls conforming to the applicable requirements of NFPA 70 and UL 325.

Electric door-operator assemblies needs to be the sizes and capacities recommended and provided by the door manufacturer for specified doors. Furnish complete assemblies with electric motors and factory-prewired motor controls, starter, gear reduction units, solenoid-operated brakes, clutch, remote-control stations, manual or automatic control devices, and accessories as required for proper operation of the doors.

Design the operators so that motors may be removed without disturbing the limit-switch adjustment and affecting the emergency auxiliary operators.

Provide a manual operator of crank-gear or chain-gear mechanisms with a release clutch to permit manual operation of doors in case of power failure. Arrange the emergency manual operator so that it may be put into and out of operation from floor level, and its use does not affect the adjustment of the limit switches. Provide an electrical or mechanical device that automatically disconnects the motor from the operating mechanism when the emergency manual operating mechanism is engaged.

2.2.5.1 Door-Operator Types

Provide an operator mounted to the right or left door head plate with the operator on top of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.

2.2.5.2 Electric Motors

Provide motors which are the high-starting-torque, reversible, constant-duty electrical type with overload protection of sufficient torque and horsepower to move the door in either direction from any position. Ensure they produce a door-travel speed of not less than 8 nor more than 12 inches per second without exceeding the horsepower rating.

Provide motors which conform to NEMA MG 1 designation, temperature rating, service factor, enclosure type, and efficiency to the requirements specified.

2.2.5.3 Motor Bearings

Select bearings with bronze-sleeve or heavy-duty ball or roller antifriction type with full provisions for the type of thrust imposed by the specific duty load.

Pre-lubricate and factory seal bearings in motors less than 1/2 horsepower.

Equip motors coupled to worm-gear reduction units with either ball or

roller bearings.

Equip bearings in motors 1/2 horsepower or larger with lubrication service fittings. Fit lubrication fittings with color-coded plastic or metal dust caps.

In any motor, bearings that are lubricated at the factory for extended duty periods do not need to be lubricated for a given number of operating hours. Display this information on an appropriate tag or label on the motor with instructions for lubrication cycle maintenance.

2.2.5.4 Motor Starters, Controls, and Enclosures

Provide each door motor with: a factory-wired, unfused, disconnect switch; a reversing, across-the-line magnetic starter with thermal overload protection; 24-volt operating coils with a control transformer limit switch; and a safety interlock assembled in a NEMA ICS 6 type enclosure as specified herein. Ensure control equipment conforms to NEMA ICS 2.

Provide adjustable switches, electrically interlocked with the motor controls and set to stop the door automatically at the fully open and fully closed position.

2.2.5.5 Control Enclosures

Provide control enclosures that conform to NEMA ICS 6 for general purpose NEMA Type 1 .

2.2.5.6 Transformer

Provide starters with 230/460 to 115 volt control transformers with one secondary fuse when required to reduce the voltage on control circuits to 24volts or less. Provide a transformer conforming to NEMA ST 1.

2.2.5.7 Sensing-Edge Device

Provide each door with a pneumatic or electric sensing device that meets UL 325, extends the full width of the door, and is located within a U-section neoprene or rubber astragal, mounted on the bottom rail of the bottom door section. Device needs to immediately stop and reverse the door upon contact with an obstruction in the door opening during downward travel and cause the door to return to full-open position. A sensing device is not a substitute for a limit switch.

Connect sensing device to the control circuit through a retracting cord and reel.

2.2.5.8 Remote-Control Stations

Provide interior remote control stations that are full-guarded, momentary-contact three-button, heavy-duty, surface-mounted NEMA ICS 6 type enclosures as specified. Mark buttons "OPEN," "CLOSE," and "STOP." Ensure the "CLOSE" button requires a constant pressure to maintain the closing motion of the door. When the door is in motion and the "STOP" button is pressed, ensure the door stops instantly and remains in the stopped position. From the stopped position, the door may then be operated in either direction.

2.2.5.9 Speed-Reduction Units

Provide speed-reduction units consisting of hardened-steel worm and bronze worm gear assemblies or planetary gear reducers running in oil or grease and inside a sealed casing, coupled to the motor through a flexible coupling. Drive shafts need to rotate on ball- or roller-bearing assemblies that are integral with the unit.

Provide minimum ratings of speed reduction units in accordance with AGMA provisions for class of service.

Ground worm gears to provide accurate thread form; machine teeth for all other types of gearing. Surface harden all gears.

Provide antifriction type bearings equipped with oil seals.

2.2.5.10 Chain Drives

Provide roller chains that are a power-transmission series steel roller type conforming to ASME B29.400, with a minimum safety factor of 10 times the design load.

Heat-treat or otherwise harden roller-chain side bars, rollers, pins, and bushings.

Provide high-carbon steel chain sprockets with machine-cut hardened teeth, finished bore and keyseat, and hollow-head setscrews.

2.2.5.11 Brakes

Provide 360-degree shoe brakes or shoe and drum brakes. Ensure the brakes are solenoid-operated and electrically interlocked to the control circuit to set automatically when power is interrupted.

2.2.5.12 Clutches

Ensure clutches are friction type or adjustable centrifugal type.

2.2.5.13 Weather/Smoke Seal Sensing Edge

Provide automatic stop control by an automatic sensing switch within neoprene astragal extending the full width of door bottom bar.

Provide an electric sensing edge device. Ensure the door immediately stops downward travel when contact occurs before door fully closes. Provide a self-monitoring sensing edge connection to the motor operator.

2.2.6 Surface Finishing

Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Noticeable variations in the same metal component are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

2.2.6.1 Baked-Enamel or Powder-Coat Finish

Manufacturer's standard baked-on finish consisting of prime coat and

thermosetting topcoat. Comply with the coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 EXECUTION

3.1 INSTALLATION

Install overhead coiling door assembly, anchors and inserts for guides, brackets, motors, switches, hardware, and other accessories in accordance with approved detail drawings and manufacturer's written instructions. Upon completion of installation, ensure doors are free from all distortion.

Install overhead coiling doors, motors, hoods, and operators at the mounting locations as indicated for each door in the contract documents and as required by the manufacturer.

Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility and as required by the manufacturer.

3.1.1 Field Painted Finish

Ensure field painted steel doors and frames are in accordance with Section 09 90 00 PAINTS AND COATINGS and the manufacturer's written instructions. Protect the weather stripping from paint. Ensure that the finishes are free of scratches or other blemishes.

3.2 ADJUSTING AND CLEANING

3.2.1 Acceptance Provisions

After installation, adjust the hardware and moving parts. Lubricate bearings and sliding parts as recommended by manufacturer to provide smooth operating functions for ease movement, free of warping, twisting, or distortion of the door assembly.

Adjust seals to provide a weather-tight fit around entire perimeter.

Engage a factory-authorized service representative to perform startup service and checks according to the manufacturer's written instructions.

Test the door opening and closing operation when activated by controls system. Adjust controls and safeties. Replace damaged and malfunctioning controls and equipment. Reset the door-closing mechanism after a successful test.

Test and make final adjustment of new doors at no additional cost to the Government.

3.2.1.1 Maintenance and Adjustment

Not more than 90 calendar days after completion and acceptance of the project, examine, lubricate, test, and re-adjust doors as required for proper operation.

3.3 CLOSEOUT ACTIVITIES

3.3.1 Warranty

Furnish a written guarantee that the helical spring and counterbalance mechanism are free from defects in material and workmanship for not less than two years after completion and acceptance of the project.

Warrant that upon notification by the Government, any defects in material, workmanship, and door operation are immediately correct within the same time period covered by the guarantee, at no cost to the Government.

3.3.2 Operation And Maintenance

Submit 6 copies of the Operation and Maintenance Manuals 30 calendar days prior to testing the Overhead Coiling Door Assemblies. Update and resubmit data for final approval no later than 30 calendar days prior to contract completion.

Submit Operation and Maintenance Manuals for Overhead Coiling Door Assemblies, including the following items:

Materials

Devices

Electric Door Operators

Hood

Counterbalancing Mechanism

Painting

Procedures

Manufacturer's Brochures

Parts Lists

Provide operation and maintenance manuals which are consistent with manufacturer's standard brochures, schematics, printed instructions, operating procedures, and safety precautions. Provide test data that is legible and of good quality.

-- End of Section --

SECTION 08 34 02

BULLET-RESISTANT COMPONENTS
08/09

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 611	(2014) Voluntary Specification for Anodized Architectural Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C1036	(2016) Standard Specification for Flat Glass
ASTM C1048	(2018) Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
ASTM C1172	(2019) Standard Specification for Laminated Architectural Flat Glass
ASTM D1003	(2013) Haze and Luminous Transmittance of Transparent Plastics
ASTM D1044	(2013) Resistance of Transparent Plastics to Surface Abrasion
ASTM D1922	(2015) Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method
ASTM D256	(2010) Determining the Izod Pendulum Impact Resistance of Plastics

ASTM D3595	(2014) Polychlorotrifluoroethylene (PCTFE) Extruded Plastic Sheet and Film
ASTM D3951	(2015) Commercial Packaging
ASTM D4093	(1995; R 2014) Photoelastic Measurements of Birefringence and Residual Strains in Transparent or Translucent Plastic Materials
ASTM D4802	(2016) Standard Specification for Poly(Methyl Methacrylate) Acrylic Plastic Sheet
ASTM D542	(2014) Index of Refraction of Transparent Organic Plastics
ASTM D5420	(2016) Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Strike Impacted by a Falling Weight (Gardner Impact)
ASTM D570	(1998; E 2010; R 2010) Standard Test Method for Water Absorption of Plastics
ASTM D635	(2018) Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
ASTM D638	(2014) Standard Test Method for Tensile Properties of Plastics
ASTM D696	(2016) Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C With a Vitreous Silica Dilatometer
ASTM D792	(2013) Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM D882	(2012) Tensile Properties of Thin Plastic Sheeting
ASTM D905	(2008; E 2009) Strength Properties of Adhesive Bonds in Shear by Compression Loading
ASTM E1300	(2016) Standard Practice for Determining Load Resistance of Glass in Buildings
ASTM E169	(2016) Standard Practices for General Techniques of Ultraviolet-Visible Quantitative Analysis
ASTM E204	(1998; R 2007) Identification of Material by Infrared Absorption Spectroscopy, Using the ASTM Coded Band and Chemical

	Classification Index
ASTM E831	(2014) Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis
ASTM F428	(2009; R 2014) Intensity of Scratches on Aerospace Glass Enclosures
ASTM F520	(2016) Standard Test Method for Environmental Resistance of Aerospace Transparencies to Artificially Induced Exposures
ASTM F521	(2016) Standard Test Methods for Bond Integrity of Transparent Laminates
ASTM F548	(2009; R 2014ntensity of Scratches on Aerospace Transparent Plastics
ASTM F735	(2011) Abrasion Resistance of Transparent Plastics and Coatings Using the Oscillating Sand Method
ASTM F791	(1996; R 2013) Stress Crazing of Transparent Plastics
ASTM G155	(2013) Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
GLASS ASSOCIATION OF NORTH AMERICA (GANA)	
GANA Glazing Manual	(2009) Glazing Manual
NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)	
NAAMM HMMA 840	(2007) Installation and Storage of Hollow Metal Doors and Frames
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)	
NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code

1.2 SYSTEM DESCRIPTION

1.2.1 Design Requirements

Provide bullet resistant components conforming to the requirements specified for the particular items and, as much as possible, complete assemblies by a single manufacturer.

1.2.2 Performance Requirements

All items specified shall be bullet resistant to the threat specified. Movable and operable components shall operate smoothly and freely. When a reference for performance is listed, operation shall conform to referenced requirements.

1.2.3 Submittal Requirement Details

The following shall be submitted:

a. Manufacturer's descriptive data and installation instructions. Descriptive data shall include cleaning instructions as recommended by the plastic sheet manufacturer.

d. Lists including schedule of all components to be incorporated in the work with manufacturer's model or catalog numbers, specification and drawing reference numbers, warranty information, threat level certified, fire ratings, sound transmission coefficient ratings, insulation "U" value, and number of items provided.

e. Evidence that standard products essentially duplicate items that have been satisfactorily in use for two years or more, including name of purchasers, locations of installations, dates of installations, and service organizations.

f. Manufacturer's certificates attesting that all components conform to the requirements on drawings and in specifications. Submittal shall include testing reports from independent testing laboratories indicating conformance to regulatory requirements.

Six copies of operation and six copies of maintenance manuals for the bifold doors furnished. The manuals shall be approved prior to beneficial occupancy.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29.00 25 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation; G

SD-03 Product Data

Bullet Resistant Components

SD-07 Certificates

Bullet Resistant Components

SD-10 Operation and Maintenance Data

Bullet Resistant Components; G

1.4 QUALITY ASSURANCE

Provide Bullet-resistant components at locations shown on the drawings. Bullet-resistant components where indicated shall be in accordance with UL

752, Level 7, Ballistic Resistant Glazing and ASTM F1233.98.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver components to the job site with the brand, name, and model number clearly marked thereon. All components shall be delivered, stored and handled so as not to be damaged or deformed, and in accordance with ASTM D3951. Doors, windows, and louvers shall be handled carefully to prevent damage to the faces, edges, corners, ends, and glazing. Abraded, scarred, or rusty areas shall be cleaned, repaired, or replaced immediately upon detection. Replace damaged components that cannot be restored to like-new condition. Components and equipment shall be stored in a dry location on platforms or pallets that are ventilated adequately, free of dust, water, and other contaminants, and stored in a manner which permits easy access for inspection and handling.

1.6 SCHEDULING

Glazing of bullet-resistant windows, except factory-glazed units, shall occur only after all concrete, masonry, ceiling, electrical, mechanical, plumbing and adjacent finish work has been completed to avoid damage to the glazing material. Cover factory-glazed windows to protect them from damage during adjacent finish work.

1.7 WARRANTY

Manufacturer's warranty for 5 years shall be furnished for glazing materials. Warranty shall provide for replacement and installation of glazing if delamination, discoloration, or cracking, or crazing occurs.

PART 2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

Provide materials and components which are the standard products of a manufacturer regularly engaged in the manufacture of such products, unless otherwise indicated and detailed on the drawings, and that essentially duplicate items that have been in satisfactory use for at least two years prior to bid opening. Components shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site, or by the manufacturer. Where components are detailed on the drawings and do not conform to a manufacturer's standard product, components shall be constructed of manufacturer's standard materials which conform to the specified ballistic standard or test. Bullet-resistant component assemblies shall be of size and type indicated and shall be provided at locations shown. All items included for exterior installation shall be designed to resist water penetration or entrapment.

2.2 BULLET-RESISTANT STEEL WINDOWS

Fabricate window assemblies from bullet-resistant steel shapes or hollow metal with internal armoring and bullet-resistant glazing materials specified herein; the entire assembly shall meet or exceed the specified regulatory requirements. Frames shall be welded units of sizes and shapes indicated on the drawings with minimum frame face dimensions of 2 inches. Furnish glazing material with window assembly for onsite installation, or windows shall be factory glazed units. Entire assembly shall be furnished by same manufacturer. Exterior (attack side) glazing stops shall be welded or integral to frame. Interior (protected side) glazing stops shall be

removable stops attached with high-strength alloy steel machine screws with tamper-resistant heads.

2.2.1 Glazing Materials

Glazing material shall be factory fabricated units designed to be bullet-resistant to the specified test standard in paragraph COMPONENT TEST REQUIREMENTS. Glazing material shall be glass, plastic, or composite with a no-spall protected (interior) face. Glazing material shall conform to applicable requirements contained in ASTM C1036, ASTM C1048, and ASTM E1300. Test glazing materials in accordance with the applicable sections of the following testing procedures: ASTM D905, ASTM D1003, ASTM F428, ASTM F548, ASTM D4093, and ASTM F520. All plastic glazing exposed to the interior or exterior environment shall have an applied hardcoat.

2.2.1.1 Laminated Glass

Bullet-resistant laminated glass shall be all glass laminated construction conforming to applicable sections of ASTM C1172. The adhesive interlayer material for bonding glass to glass shall be chemically compatible with the surfaces which are to be bonded. Test materials selected for lamination purposes in accordance with the following testing procedures: ASTM D905, ASTM D1044, ASTM F735, ASTM D4093, ASTM F521, ASTM F520, and ASTM D1003. Glass plies used in the lamination shall be annealed float glass conforming to Type I, quality q3 Class 1, in accordance with ASTM C1036 or heat-strengthened or fully heat tempered, float glass, Condition A, Type I, q3 Class 1, in accordance with ASTM C1048.

2.2.1.2 Acrylic Plastic Sheets

Bullet-resistant acrylic plastic glazing sheets shall be for use "as cast" and in stretching operations with improved moisture absorption resistance conforming to ASTM D4802. Test acrylic materials in accordance with the applicable sections of the following testing procedures: ASTM D256, ASTM D5420, ASTM D542, ASTM D570, ASTM D635, ASTM D638, ASTM D696, ASTM D792, ASTM D1003, ASTM E831, ASTM F791, and ASTM G155. Plastic glazing sheets shall be clear and smooth on both sides.

2.2.1.3 Polycarbonate Plastic Sheets

Bullet-resistant laminated polycarbonate sheets, ultraviolet stabilized, flame resistant and high abrasion resistant sheets shall conform to ASTM D3595. Test polycarbonate materials in accordance with the applicable sections of the following testing procedures: ASTM D256, ASTM D5420, ASTM D792, ASTM F735, ASTM D1003, ASTM D635, ASTM D638, ASTM D1044, ASTM D882, ASTM D1922, ASTM D570, ASTM F520, ASTM E169, ASTM E204, ASTM G155, and ASTM F791. Polyvinyl butyral shall not be used in contact with polycarbonate because its plasticizer may craze polycarbonate.

2.2.1.4 Glass/Plastic Laminate Glazing

Bullet-resistant glass/plastic laminated glazing materials shall be glass/plastic laminated construction or glass-clad plastic "sandwich" construction conforming to applicable sections of ASTM C1172. Polycarbonate shall be ultraviolet stabilized.

2.2.1.5 Glass/Plastic Air-Gap Glazing

Bullet-resistant glass/plastic air-gap glazing shall consist of an assembly

in which glass forms the exterior and interior (protected side) layer, separated by an air space from the laminated plastic plies. Exterior glass plies shall be heat-strengthened or fully heat tempered, float glass, Condition A, Type I, q3 Class 1, in accordance with ASTM C1036 or heat-strengthened or fully heat tempered, float glass, Condition A, Type I, q3 class 1, in accordance with ASTM C1048. Interior (protected side) glass plies shall be heat-strengthened or fully heat tempered, float glass, Condition A, Type I, q3 Class 1, in accordance with ASTM C1048. Where annealed glass is used on the protected side of the window, a sheet of 4 mil thick clear mylar fragment retention film shall be applied to the interior surface in accordance with film manufacturer's instructions. Film that wraps around the edges of the glass shall be applied prior to glazing the window. Plastic plies shall consist of laminated ultraviolet stabilized polycarbonate sheets, conforming to paragraph Polycarbonate Plastic Sheets and/or acrylic sheets for use "as cast" and in stretching operations with improved moisture absorption resistance conforming to applicable requirements of paragraph Polycarbonate Plastic Sheets.

2.2.2 Adhesive Interlayer Materials

Adhesive interlayer materials for bonding laminates (glass-glass, glass-plastic, or plastic-plastic bonds) shall be chemically compatible with the surfaces being bonded. Interlayer materials may be polyvinyl butyral, cast-in-place urethane, proprietary materials, sheet form urethane and other materials. Polyvinyl butyral shall not be used to bond polycarbonate. Adhesives shall be in accordance with ASTM D905 and manufacturer's recommendations.

2.2.3 Sealants

Sealants for glazings shall be chemically compatible with the glazing materials they contact with no deleterious effects to the glazing materials or to the adhesives used in laminates. Sealants shall be in accordance with glazing manufacturer's recommendations and GANA Glazing Manual.

2.3 BULLET-RESISTANT SPEAKING APERTURES

Fabricate speaking apertures to allow passage of voice at normal speaking volume without distortion, to resist the specified threat level for outdoor or indoor use, and designed to prevent direct aim by the insertion of the muzzle of any firearm. Finish shall match window construction in which aperture is installed.

2.4 BULLET-RESISTANT PASS-THROUGH DRAWER

Fabricate pass-through drawer from bullet-resistant steel shapes; the entire assembly shall meet or exceed the specified regulatory requirements. Pass-through drawer shall be of size indicated on the drawings and designed to prohibit forcible entry or direct aim by the insertion of the muzzle of a firearm from exterior side when drawer is in the open position. Assembly shall provide a weather resistant opening. Attachment to wall assembly shall be in accordance with manufacturer's recommendations. All aspects of the assembly, including hardware and method of anchorage to wall, shall be included in the labeling or test certification. Finish shall be satin stainless steel.

2.5 ACCESSORIES

Provide all accessories for the installation or erection of above

components into the surrounding structure. Anchorage shall be as strong and bullet-resistant as the components. Installation/erection shall be in accordance with manufacturer's recommended instructions.

2.6 LABELING

Bullet-resistant equipment shall be plainly and permanently labeled in accordance with regulatory requirements. Label shall be compatible with plastic or coating, visible only on protected side, after installation, including the following information:

a. Manufacturer's name or identifying symbol

b. Model Number, Control Number, or equivalent

c. Date of manufacture by week, month or quarter and year. This may be abbreviated or be in a traceable code such as the lot number.

d. Correct mounting position including threat side and secure side (by removable label on glazing material).

e. Code indicating bullet-resistant rating and test standard used (by removable label on glazing material).

2.7 SHOP/FACTORY FINISHING

Furnish all ferrous metal components, except stainless steel, primed for painting unless indicated otherwise. Finish painting shall be in accordance with Section 09 90 00 PAINTS AND COATINGS, unless otherwise indicated. When anodic coatings are specified, the coatings shall conform to AAMA 611, with coating thickness not less than that specified for protective and decorative type finish in AA DAF45. Items to be anodized shall receive a polished satin finish pretreatment and a clear lacquer overcoat. All factory or manufactured components shall be shop finished as indicated.

2.7.1 Ferrous Metal

Surfaces of ferrous metal, except galvanized and stainless steel surfaces, shall be cleaned and shop coated with the manufacturer's standard protective coating other than a bituminous protective coating, compatible with finish coats. Prior to shop painting, clean surfaces with solvents to remove grease and oil, and with power wire-brushing or sandblasting to remove loose rust, loose mill scale and other foreign substances. Surfaces of items to be embedded in concrete shall not be shop painted.

2.7.2 Galvanizing

Items specified to be galvanized shall be hot-dip processed after fabrication. Galvanizing shall be in accordance with ASTM A123/A123M or ASTM A653/A653M as applicable.

2.7.3 Aluminum

Unless otherwise specified, aluminum items shall be standard mill finish. For anodic coatings see paragraph SHOP/FACTORY FINISHING above.

PART 3 EXECUTION

3.1 EXAMINATION

Field verify dimensions of rough openings for components, and that surfaces of openings are plumb, true, and provide required clearances. Protect surrounding work prior to installation of bullet-resistant components. Surrounding work which is damaged as a result of the installation of bullet-resistant components shall be restored to like-new condition prior to acceptance of the work described herein. Examine existing work to ensure that it is ready for installation or erection of the components. Components shall be checked and corrected for racking, twisting, and other malformation prior to installation. Set frames true, plumb and aligned for proper installation. Examine all surfaces and connections for damage prior to installation.

3.2 FRAMED INSTRUCTIONS

Framed instructions, under glass or in plastic with all edges laminated, including wiring and control diagrams showing the complete layout of each bifold door unit, shall be posted where directed. Condensed operating instructions explaining preventive maintenance procedures, methods of checking for normal safe operation, and procedures for safely starting and stopping shall be prepared in typed form, framed as specified above and posted beside the diagrams. Post the framed instructions before acceptance testing.

3.3 INSTALLATION

The finished work shall be rigid, neat in appearance and free from defects. Install equipment plumb, level, and secured rigidly in place. Installation of doors and frames shall conform to NAAMM HMMA 840. Install doors, frames, and hardware in strict compliance with approved printed instructions and detail drawings provided by the manufacturer. The Contractor is responsible for proper installing of the door assembly so that operating clearances and bearing surfaces conform to manufacturer's instructions. Install weatherstripping and thresholds at exterior door openings to provide a weathertight installation. All other components shall be installed in accordance with approved manufacturer's recommended instructions. Test all operable parts of components for smooth, trouble-free operation, in the presence of the Contracting Officer. Submit Drawings containing complete wiring and schematic diagrams, where appropriate, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout and anchorage of components and appurtenances, and relationship to other parts of work including clearances for operation and maintenance. Drawings shall be sufficient to show conformance to all requirements, including fabrication details, sizes, thickness of materials, anchorage, finishes, hardware location and installation.

3.4 FASTENERS

Fasteners exposed to view shall match in color and finish and shall harmonize with the material to which fasteners are applied. Fasteners shall be in accordance with Section 05 50 13 MISCELLANEOUS METAL FABRICATIONS.

3.5 CORROSION PROTECTION - DISSIMILAR MATERIALS

Contact surfaces between dissimilar metals and aluminum surfaces in contact with concrete, masonry, pressure-treated wood or absorptive materials subject to wetting, shall be given a protective coating in accordance with Section 09 90 00 PAINTS AND COATINGS.

3.6 ELECTRICAL WORK

Perform all electrical work in accordance with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Flexible connections between doors and fixed supports shall be made with extra flexible type SO cable, except in hazardous locations where wiring shall conform to NFPA 70. The cable shall have a spring-loaded automatic take up reel, or an equivalent and approved device.

3.7 ADJUSTING/CLEANING

Adjustments shall be made to doors and pass-thru drawers to assure smooth operation. Units shall be weathertight when closed and locked. All components shall be cleaned in accordance with manufacturer's instructions.

-- End of Section --

SECTION 08 34 73

SOUND CONTROL DOOR ASSEMBLIES
11/19

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WELDING SOCIETY (AWS)

AWS D1.3/D1.3M	(2018) Structural Welding Code - Sheet Steel

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A108	(2013) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A568/A568M	(2019a) Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A1008/A1008M	(2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A1011/A1011M	(2018a) Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C476	(2019) Standard Specification for Grout for Masonry
ASTM C1036	(2016) Standard Specification for Flat Glass
ASTM D1056	(2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D6386	(2016) Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron

	and Steel Product and Hardware Surfaces for Painting
ASTM E90	(2009; R2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
ASTM E336	(2019a) Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings
ASTM E413	(2016) Classification for Rating Sound Insulation
ASTM E1289	(2008; R 2016) Standard Specification for Reference Specimen for Sound Transmission Loss

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(2016; TIA 16-1) Standard for Fire Doors and Other Opening Protectives
NFPA 101	(2021) Life Safety Code
NFPA 252	(2017) Standard Methods of Fire Tests of Door Assemblies

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

WOODWORK INSTITUTE (WI)

NAAWS 3.1	(2017; 2018 Errata Edition) North American Architectural Woodwork Standards

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication Drawings

SD-03 Product Data

Hollow Metal Sound Retardant Doors; G

Wood Sound Retardant Doors; G

Door Frames; G

Door Hardware; G

Door Frame Sound Infill; G

Vision Panels; G

Intumescent Seals and Gasketing; G

Thresholds; G

Astragals; G

SD-06 Test Reports

Wind Loading Tests; G

Water Leakage Tests; G

Acoustical Tests; G

Air Infiltration Tests; G

Positive Pressure Tests; G

SD-07 Certificates

Hollow Metal Sound Retardant Doors; G

Wood Sound Retardant Doors; G

Door Frames; G

Door Hardware; G

Vision Panels; G

Intumescent Seals,Gasketing and Door Bottoms; G

Thresholds; G

Astragals; G

Assembly Test Reports

1.3 QUALITY CONTROL

Ensure work within this section is designed and furnished by one manufacturer, who has been engaged in the manufacture of Sound Retardant Wood Swinging Door and Hollow Metal Door systems for at least five years prior to the start of this work.

Provide acoustic assemblies manufactured by a single source specializing in the production of this type work for a minimum of five years.

1.3.1 Compliance and Labeling

1.3.1.1 Compliance with Accessibility Requirements

Americans with Disabilities Act/Architectural Barriers Act (ADA/ABA) 36 CFR 1191

Accessibility Guidelines for Buildings and Facilities (ADAAG) 36 CFR 1191

1.3.1.2 Category A Positive Pressure Fire Door Construction

Where requirements for positive pressure are met, include for doors all requirements as part of the door construction per Category A guidelines as published by ITS/Warnock-Hersey. Intumescent is not allowed on the frame. Applying smoke gasketing around the perimeter of the frame to meet the "S" smoke rating is permissible in instances where smoke control is required.

1.3.1.3 Category B Positive Pressure Fire Door Construction

Conform all door openings to the applicable portions of NFPA 101 and NFPA 252. Incorporate field applied intumescent materials, applied by a licensed installer according to the manufacturers' instructions. Keep instructions on file. Additional gasketing may be required to meet the 'S' smoke rating. Submit Certificate for intumescent seals, gasketing and door bottoms.

1.3.1.4 Labeling

Ensure all positive pressure door assemblies carry the fire label for the complete opening, clearly identifying the:

a. Manufacturer

b. Third party testing and certification agency

c. Fire door rating

d. Installation limitations

e. Compatible frame, hardware component ratings

f. Compatible lite or vision panel component ratings

g. Required building code information, including temperature and smoke rating

Indicate fire-ratings of applicable components. Provide documentation of ABA/ADA accessibility compliance of applicable components, as required by 36 CFR 1191 Appendix D - Technical.

1.4 DELIVERY, STORAGE, AND HANDLING

Ship all doors in the manufacturer's undamaged individual cartons, securely bundled and wrapped with moisture-resistant covers and stored in accordance with the manufacturer's printed instructions in a dry, clean, and ventilated area.

Deliver and store wood doors in the building following the installation of concrete, terrazzo, plaster, or other wet materials, and only after the

building has dried out and has a roof.

Store all materials on planks in a dry location. Store doors and frames vertically with minimum 1 inch airspace between. Store doors on the edge to eliminate any potential damage to the door bottom seal. Cover all material to protect from damage but in a manner to allow proper circulation.

Maintain relative humidity in the building between 30 and 65 percent. Maintain the ambient temperature at 60 degrees F minimum at the time of installation of wood doors.

Perform final adjustment of seals when temperatures and humidity conditions replicate the interior conditions that will exist when the building is occupied.

1.5 WARRANTY

Manufacturer's warranty for 5 years from date of supply, covering material and workmanship. Failures include, but are not limited to, the following:

a. Failure to meet sound rating requirements

b. Faulty operation of sound seals

c. Deterioration of metals, metal finishes, and other materials beyond normal use or weathering.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide sound retardant door assemblies of the thickness, width, and height indicated, complete with perimeter seals, seal housings, gasketing, automatic door bottoms, thresholds, door frames, and astragals as required to conform to the specified STC per ASTM E90 and ASTM E1289.

Submit fabrication drawings for Hollow Metal Sound Retardant Doors,Wood Sound Retardant Doors, Door Frames and Door Frame Sound Infill.

Submit certificates showing conformance with the referenced standards in this section, and manufacturer's catalog data including STC ratings and UL fire rating, where applicable, for the following items: Hollow metal sound retardant doors; wood sound retardant doors; door frames; door hardware; vision panels; intumescent seals and gasketing; thresholds; and astragals.

Provide assemblies that are complete with metal frame, wood door(s), sealing system, and Cam-lift hinges (when required). If vision lights are specified for doors, provide metal loose stops and field install glass and glazing when shipped separately.

2.1.1 Design Requirements

2.1.1.1 Door Design

Provide sound Retardant Wood Swinging Doors that are a 1-3/4-inch thickness construction with sizes as indicated on drawings. No visible seams are permitted on door faces. Provide face gauges, internal sound retardant core and perimeter door edge construction per manufacturer's standard for the specified STC rating. No lead or asbestos is permitted in door

construction to achieve STC performance. Provide face veneer species cut and color as selected from manufacturer's full range of available colors and patterns. No lead or asbestos is permitted in door construction to achieve performance requirements.

2.1.1.2 Frame Design

Provide sound Retardant Metal Frames conforming to ASTM A1008/A1008M, not less than 0.0747-inch thick, and free from pitting, scale, stretcher strains, fluting, and surface defects with integral trim and shipped with temporary spreader. Knockdown frames are not acceptable.

Provide frames with 2 inch faces, profiles and dimensions as indicated, with mitered reinforced corners, welded the full depth of frame and trim, with exposed surfaces ground smooth and flush. Close contact edges to hairline joints.

2.1.2 Performance Requirements

2.1.2.1 STC (Sound Transmission Classification) Rating

Provide doors with an STC per the door schedule.

2.2 FABRICATION

Provide doors that are minimum 16 gauge, 1 3/4 inch thick with welded, seamless construction. No visible joints are permitted on the exposed faces or edges. Join door skins at vertical edges by continuous welds, ground and dressed smooth to provide a flush finish. Reinforce top and bottom with 16 gauge continuous inverted steel channels spot welded to both faces. Finish both top and bottom to provide a smooth flush condition. Bevel both vertical edges 1/8 inch in 2 inches.

Clean and sand to smooth finish all doors to remove handling and storage marks, raised grain, minor surface marks and abrasions which are to receive a job site finish.

2.2.1 Hollow Metal Sound Retardant Doors

2.2.1.1 Construction

Conform to ASTM A1008/A1008M for door construction utilizing steel facing sheets. Conform stretcher level flatness to ASTM A568/A568M; not less than 0.0598 inch thick; free from pitting, scale, and surface defects; separated by a core construction designed to meet the required STC; and tested and rated in accordance with ASTM E90.

Provide doors that have flush seamless face sheets and vertical edges, with continuous welded and smooth joints. Provide edges that are flush or rabbeted as required for perimeter seals.

Provide door surfaces that are visually flat and free from warp, waviness, and other surface irregularities and defects. Maximum allowable warp or twist-can not exceed 1/8 inch when measured with a 7 foot straightedge along the diagonal and not exceed 1/16 inch when measured with a 7 foot straightedge in the width or in any position along the length of the door.

Provide hardware reinforcement that is steel drilled, tapped to template requirements and welded in place. Provide minimum thicknesses as follows:

a. Butts, 0.1494 inch

b. Lock strike, 0.1196 inch

c. Surface applied hardware 0.0747 inch

Provide doors, including sound retardant type, to bear the UL label fire rating and the specified STC as indicated on the Fire Door Schedule.

2.2.1.2 Coating

Thoroughly clean all mill scale, rust, oil, grease, dirt, and other foreign materials from surfaces before the application of the shop coat of paint.

After cleaning, provide galvanized surfaces free of paint in accordance with ASTM D6386, Method A, B, C, or D.

Apply to clean prepared dry surfaces one shop coat of rust inhibitive metallic oxide or synthetic resin primer by brush, dipping, or other approved method to provide a continuous minimum dry film thickness (dft) of 0.9 mil.

Shop paint the exposed door surfaces, including surfaces that are galvanized.

Shop paint the concealed exterior door surfaces except galvanized surfaces.

2.2.2 Wood Sound Retardant Doors

Construct doors with wood veneer facings separated by a core construction designed to meet the required STC. Test, rate, and label in accordance with ASTM E90.

Comply with the NAAWS 3.1, "Guide Specifications and Quality Certification Program," for premium grade constructions and to the requirements specified.

Perform beveling, prefitting, machining, mortising, and routing for hardware, perimeter seals, and door bottom cutouts at the mill.

Furnish premium grade door facings with standard thickness face veneers conforming to NAAWS 3.1, Type 1 for stain and transparent job site-applied finish.

2.2.2.1 Faces

Single-ply wood veneer not less than 1/50 inch thick.

a. Species: Natural Birch.

b. Cut: Plain sliced (flat sliced).

c. Match between Veneer Leaves: Book match.

d. Assembly of Veneer Leaves on Door Faces: Balance match.

e. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.

f. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet or more.

g. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.

h. Transom Match: Continuous match.

i. Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling.

2.2.3 Door Finishing

Conform factory finishing of Sound Retardant Wood Swinging Doors in accordance with AWI Quality Standards. Provide factory finish of a water-base stain and ultraviolet (UV) cured polyurethane sealer to comply with EPA Title 5 guidelines for Volatile Organic Compound (VOC) emissions limitations. Conform finish to meet or exceed performance standards of NAAWS 3.1 catalyzed polyurethane.

2.3 COMPONENTS

2.3.1 Frames

Construct frames for Sound Retardant Wood Swinging Doors from formed sheet steel or structural shapes and bars. Provide sheet steel that is commercial quality, level, cold rolled steel conforming to ASTM A1008/A1008M or hot rolled, pickled and oiled steel conforming to ASTM A1011/A1011M. Comply steel shapes with ASTM A36/A36M and steel bars with ASTM A108, Grade 1018.

2.3.2 Door Frame Sound Infill

Grout: Comply with ASTM C476, with a slump of not more than 4 inches as measured according to ASTM C143/C143M.

Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15 mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

Select the appropriate infill material.

2.3.3 Hardware Reinforcements

Factory mortise, reinforce, drill and tap frames for all mortise hardware as required by hardware manufacturer's template. Provide necessary reinforcement plates as required for surface mounted hardware; installer to perform all field drilling and tapping. Provide dust cover boxes on all frame mortises. Provide minimum thicknesses as follows:

a. Butts, 3/16 inch

b. Lock strike, 0.1196 inch

c. Surface applied hardware 0.0747 inch

2.3.4 Jamb Anchors

Provide number and spacing of anchors as follows:

2.3.4.1 Masonry Type

Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

a) Two anchors per jamb up to 60 inches in height.

b) Three anchors per jamb from 60 to 90 inches in height.

c) Four anchors per jamb from 90 to 96 inches in height.

d) Four anchors per jamb plus one additional anchor per jamb for each 24 inches, or fraction thereof, more than 96 inches in height.

2.3.4.2 Stud-Wall Type

Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

a) Three anchors per jamb up to 60 inches in height.

b) Four anchors per jamb from 60 to 90 inches in height.

c) Five anchors per jamb from 90 to 96 inches in height.

d) Five anchors per jamb plus one additional anchor per jamb for each 24 inches, or fraction thereof, more than 96 inches in height.

e) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

2.3.4.3 Post-installed Expansion Type

Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

2.3.5 Door Hardware

Provide the following STC related hardware with the door; cam-lift hinges, perimeter seals, astragals, door bottoms, thresholds, hardware standoff brackets.

Include on Fabrication drawings a finish hardware schedule for each door and a hollow metal door frame schedule for each door indicating profile, dimensions, hardware reinforcement, and frame anchorage. Also indicate perimeter seals, door-bottom devices and other hardware items that are assembled in the shop.

Refer to Section 08 71 00 DOOR HARDWARE for remaining hardware requirements.

2.3.6 Vision Panels

Furnish doors with vision panels complete with glazing. Provide 0.0747 inch steel or wood frames, moldings, and stop to match the door finish, with profile indicated. Assemble with mitered corners and flush joints,

and secured with countersunk phillips-head screws.

Provide either a single thickness of acoustical plate glass laminated to an inner face of water-clear plastic or multiple thicknesses of 1/4 inch plate glass, clear or patterned as indicated, and set in glazing gaskets and frames as required to meet the specified STC.

Provide glass to conform to ASTM C1036, Type I, Class 1. Provide acoustical plate glass that has been tested and rated in accordance with ASTM E90, with an STC of not less than 36 and a minimum thickness of 9/32 inch.

2.3.7 Head and Jamb Seals

Provide a closed-cell, expanded cellular rubber Seal material conforming to ASTM D1056, Type S, Grade SBE-42 or SCE-42 for heads, jambs, and door bottoms.

Install seals in formed steel or extruded aluminum shapes designed to receive and hold seals and to provide concealed adjustable attachment to door frames. Provide concealed adjustment screws that are not more than 12 inches on center and provide at least 3/8 inch adjustment.

2.3.8 Door Bottoms

Neoprene or silicone gasket held in place by metal housing; mortised into bottom edge of door.

2.3.8.1 Automatic Door Bottoms

Neoprene or silicone gasket, held in place by metal housing, that automatically drops to form seal when door is closed; mounted to bottom edge of door with screws.

Mounting: Mortised or semimortised into bottom of door as required by testing to achieve STC rating indicated.

2.3.9 Thresholds

Provide metal thresholds where indicated. Provide thresholds that are extruded aluminum, 6063-T5 alloy, mill finish, not less than 1/8 inch thick, with integral seal grooves formed to the indicated section.

Provide flat, smooth, unfluted thresholds as recommended by manufacturer; fabricated from aluminum.

a. Finish: Clear anodic finish.

2.3.10 Astragals

Provide steel astragals for the inactive leaf of each pair of doors, as indicated. Surface mount to the door by welded connections or by countersunk, flat-head screws, within integral groove to receive perimeter seal material.

2.4 TESTS, INSPECTIONS, AND VERIFICATIONS

2.4.1 Sound Transmission Classification

Provide test reports prepared by a nationally recognized, independent laboratory for Acoustical Tests, Air Infiltration Tests, Wind Loading Tests, and Water Leakage Tests indicating that the sound transmission classification (STC) of the proposed door, based on tests at 16 third-octave band frequencies from 125 to 4,000 hertz, is no less than the specified STC when tested in accordance with ASTM E90, and that the door tested is hung in substantially the type of wall and frame as indicated and is fully operable with hardware and perimeter seals installed.

2.4.2 Positive Pressure

Provide test reports, prepared by a nationally recognized, independent laboratory for Positive Pressure Tests, for all fire rated door assemblies, including Intumescent Seals,Gasketing, and Door Bottoms.

2.4.3 Cam Lift Hinges

When required to achieve STC, manufacturer to furnish laboratory test data certifying hinges have been cycled a minimum of 1,000,000 while supporting a minimum door weight of 350 pounds.

Full-mortise template type that raises the door 1/2 inch when door is fully open; with hardened pin; fabricated from stainless steel.

2.4.4 Guarantee

Provide written guarantee that each door delivered to the project is equal in construction, sound transmission classification (STC), and positive pressure test rating where applicable, with appropriate labeling and markings, to that of the sample door tested. Clearly state in written guarantee that each door assembly, when installed in accordance with the manufacturer's printed instructions, has an in-place STC within 3 decibels of the specimen tested. Submit the following test data and Certificates with the written Guarantee:

a. Wind Loading Tests

b. Water Leakage Tests

c. Acoustical Tests

d. Air Infiltration Tests

e. Positive Pressure Tests

PART 3 EXECUTION

3.1 PREPARATION

Upon receipt of material, thoroughly inspect all frames, doors and accessories. Verify quantities and tag numbers according to the packing list provided. Report all discrepancies, deficiencies and/or damages immediately to Contracting Officer.

Prior to installation check all doors and frames for correct size and

swing. Verify that frames are plumb, square and aligned without twist in accordance with tolerances published by NAAMM/HMMA and SDI.

3.1.1 Frame Painting and Cleaning

Clean thoroughly all surfaces of all mill scale, rust, oil, grease, dirt, and other foreign materials before the application of the shop coat of paint.

Apply one shop coat of rust inhibitive metallic oxide or synthetic resin primer applied to clean, dry, and prepared surfaces by brush, dipping, or other approved method to provide a continuous minimum dry film thickness of 0.9 mil.

3.2 INSTALLATION

3.2.1 Frame

Install frames plumb and true with not more than 1/32 inch deviation in vertical alignment in 8 feet. Anchor to the wall in accordance with the manufacturer's instructions. Grout frames solid with mortar in masonry, concrete, and plaster wall construction. Spot grout frames in dry wall partitions with mortar at the jamb anchor clips; fill the space between metal frame and stud partition solidly with fiberglass or mineral wool insulation.

Field splices may be required after installation because of shipping limitations. Field weld splices by certified welders per manufacturer's instructions and in accordance with AWS D1.3/D1.3M.

3.2.2 Door

Install and adjust all doors, hardware, and seals in accordance with the approved drawings, hardware schedules, and the printed instructions of the door manufacturer.

Install and adjust perimeter seals and automatic door bottom seals to provide positive compression contact with the entire sealing surface with no gaps, openings, or breaks. Hinges or hardware which distort or pinch the perimeter seal during operation of the door will be rejected.

Install door bottom devices to seal the space between the door bottoms and the finished floor and the space between the seal and seal housing.

Field apply perimeter seal housings with mitered corners and with flush, aligned hairline joints.

Install wood doors and frames in accordance with NFPA 80.

Install components to manufacturer's written instructions. Coordinate with masonry or gypsum board wall construction for anchor placement. Set frames plumb, square, level and at correct elevation. Adjust operable parts for correct clearances and function. Install and adjust perimeter and bottom acoustic seals.

3.3 FIELD QUALITY CONTROL

Provide third party testing in accordance with ASTM E336. Verify in writing that installed product performs no less than five (5) ASTC or NIC

rating points below the specified laboratory STC rating. Examine, adjust, and retest any installation not meeting that criteria until compliance is obtained.

3.3.1 Testing and Performance

Provide assemblies that are identical to those tested at an independent acoustical laboratory qualified under the National Voluntary Laboratory Accreditation Program (NVLAP) by the National Institute for Science and Technology (NIST) in accordance with ASTM E90 and ASTM E413. For the assembly test reports include the laboratory name, test report number and date of test.

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SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
08/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 1503	(2009) Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections
AAMA 501	(2015) Methods of Test for Exterior Walls
AAMA 800	(2016) Voluntary Specifications and Test Methods for Sealants

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(2017) Minimum Design Loads for Buildings and Other Structures

ASTM INTERNATIONAL (ASTM)

ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM E1105	(2015) Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference
ASTM E1424	(1991; R 2016) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure and Temperature Differences Across the Specimen
ASTM E1996	(2017) Standard Specification for Performance of Exterior Windows, Curtain

	Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
ASTM E283	(2004; R 2012) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E330/E330M	(2014) Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E331	(2000; R 2016) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E783	(2002; R 2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
ASTM F1642/F1642M	(2017) Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings
BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)	
ANSI/BHMA A156.10	(2017) Power Operated Pedestrian Doors
ANSI/BHMA A156.4	(2013) Door Controls - Closers
INTERNATIONAL CODE COUNCIL (ICC)	
ICC IBC	(2018) International Building Code
U.S. GENERAL SERVICES ADMINISTRATION (GSA)	
FS TT-P-645	(Rev C) Primer, Paint, Zinc-Molybdate, Alkyd Type
UNDERWRITERS LABORATORIES (UL)	
UL 325	(2017; Reprint Feb 2020) UL Standard for Safety Door, Drapery, Gate, Louver, and Window Operators and Systems

1.2 ADMINISTRATIVE REQUIREMENTS

1.2.1 Pre-Installation Meetings

Conduct a meeting before installation begins to verify the project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

Within 30 days of the Contract Award, submit the following for review and approval by the Contracting Officer:

a. List of product installations

b. Sample warranty

c. Finish and color samples

d. Manufacturer's catalog data

Concurrently submit certified test reports showing compliance with specified performance characteristics and UL 325 for the following:

a. Wind Load (Resistance) in accordance with AAMA 501

b. Deflection in accordance with ASTM F1642/F1642M

c. Condensation Resistance and Thermal Transmittance Performance Requirements in accordance with AAMA 1503

d. Water Infiltration in accordance with ASTM E331

e. Structural Requirements in accordance with ASTM F1642/F1642M

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Sample Warranty; G

SD-02 Shop Drawings

Installation Drawings; G

Fabrication Drawings; G

SD-03 Product Data

Manufacturer's Catalog Data; G

Finish; G

SD-04 Samples

Finish and Color Samples; G

SD-06 Test Reports

Certified Test Reports; G

Deflection

Air Infiltration

Condensation Resistance and Thermal Transmittance

Water Infiltration

SD-08 Manufacturer's Instructions

Manufacturer's Instructions

SD-11 Closeout Submittals

Manufacturer's Product Warranty

1.4 QUALITY CONTROL

1.4.1 Qualifications

1.4.1.1 Installer Qualifications

Provide documentation of the installer's experience in performing the work specified in this section.

Ensure that the installers are specialized in work similar to that required for this project, and that they are acceptable to product manufacturer.

1.4.1.2 Manufacturer Qualifications

Ensure that manufacturers meet the requirements specified in this section and project drawings.

Ensure that the manufacturer is capable of providing field service representation during construction, approving acceptable installers and approving application methods.

1.4.2 Single-Source Responsibility

When aluminum entrances are part of a building enclosure system, that includes storefront framing, windows, a curtain wall system, and related products, provide building enclosure system products from a single-source manufacturer.

Use a single source manufacturer with sole responsibility for providing design, structural engineering, and custom fabrication for door portal systems and for supplying components, materials, and products. Do not use products provided from numerous sources for assembly at the site. Ensure that the following work items and components are fabricated or supplied by a single source are:

a. Door operating hardware to be installed on or within door portals as specified in Section 08 71 00 DOOR HARDWARE.

b. Glass as specified in Section 08 81 00 GLAZING.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Ordering

To avoid construction delays, comply with the manufacturer's lead-time

requirements and instructions for ordering.

1.5.2 Packing, Shipping, Handling and Unloading

Deliver materials in the manufacturer's original, unopened, undamaged containers with identification labels intact.

1.5.3 Storage and Protection

Store materials in a way that protects them from exposure to harmful weather conditions. Avoid damaging the storefront material and components during handling. Protect storefront material against damage from elements, construction activities, and other hazards before, during, and after storefront installation.

Do not use adhesive papers or sprayed coatings that become firmly bonded when exposed to sunlight. Do not leave coating residue on surfaces.

1.6 PROJECT / SITE CONDITIONS

1.6.1 Field Measurements

Verify actual measurements or openings by taking field measurements before fabrication; record these measurements on shop drawings. To avoid construction delays, coordinate field measurements, and fabrication schedule with construction progress.

1.7 WARRANTY

Provide a written manufacturer's warranty, executed by a company official, warranting against defects in materials and products for 2 years from the date of shipment. Warrant that the door corner construction is for the life of the project. Provide a written installer's warranty, warranting work to be watertight and free from defective materials, defective workmanship, and glass breakage as a result of defective design, and agreeing to replace components that fail within 2 years.

The warranty states the following:

a. Watertight and airtight system installation is completed within specified tolerances.

b. The completed installation remains free of rattles, wind whistles and noise caused by thermal movement and wind pressure.

c. System is structurally sound and free from distortion.

d. Glass and glazing gaskets will not break or "pop" from frames as a result of design, wind load pressure, movement caused by expansion or contraction, or structural loading.

e. Glazing sealants and gaskets remain free of abnormal deterioration or dislocation as a result of sunlight, weather, or oxidation.

Provide written warranty stating that the organic coating finish will not fade more than 10 percent or show chalking, yellowing, peeling, cracking, pitting, corroding or variations in color, or gloss deterioration beyond the manufacturer's descriptive standards for 5 years from the shipment date and agreeing to promptly correct defects.

Provide a written thermal integrity warranty for 5 years from ship date against thermal barrier system failure resulting from the following:

a. Longitudinal and transverse thermal barrier shrinkage.

b. Thermal barrier cracking.

c. Structural failure of the thermal barrier material.

d. Loss of adhesion or loss of prescribed edge pressure on glazing material, resulting in excessive air and water infiltration.

1.8 High-Velocity Hurricane Zone (HVHZ) Florida Building Code

Tyndall AFB requires all new construction, additions, and renovations to comply with the Florida Building Code (FBC) High-Velocity Hurricane Zone (HVHZ), Section 1602.2 criteria for Miami Dade County, Risk Category III buildings with a windspeed of 165 mph. Per FBC HVHZ provisions, all exterior building envelope materials such as, but not limited to windows, glazing, roofing systems, concrete masonry unit or metal panel walls, and doors and others must have a current Miami-Dade Notice of Acceptance (NOA) and installation of HVHZ standards that match the specified minimum 165mph wind requirement at Tyndall AFB. In addition, the Contractor must submit for review and approval test results of systems meeting the high wind requirements or a set of drawings sealed by a Professional Engineer stating conformance with HVHZ standards in place of materials pre-approved by Miami-Dade County.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide aluminum entrances, with glass and glazing, door hardware, and components.

Aluminum entrances include impact resistance entrances; medium stile, 3 1/2 inch vertical face dimension, 1 3/4 inch depth, for interior structural silicone glaze, for high-traffic/impact-resistant applications.:

2.1.1 Design Requirements for Aluminum (Entrances and Components)

Provide a door portal system designed to withstand the following loads without breakage, loss, failure of seals, product deterioration, or other defects.

a. Dead and Live Loads: Determined by ASCE 7 and calculated in accordance with applicable codes.

b. Seismic Loads: Design and install the system to comply with the seismic requirements for the project location in accordance with Section 1613 of the International Building Code, ICC IBC.

c. Wind Loads: Design and install the system so that the effects of wind load acting inward and outward normal to the plane of the wall are in accordance with ASTM E330/E330M refer to Structural drawings for wind loads.

d. Thermal Loads And Movement:

(1) Ambient Temperature Range: 120 degrees F

(2) Material Surfaces Range: 180 degrees F

e. Water and Air Resistance: Provide weatherstripping, exterior gaskets, sealants, and other accessories to resist water and air penetration.

f. Impact-Protective Systems: Provide an impact-protective system in accordance with ASTM E1886 and ASTM E1996.

g. Minimum Anti-terrorism Performance: Windows must meet the minimum antiterrorism performance as follows: Insulating glass units with laminated glass on inside pane composed of two layers of 1/8 inch glass with 0.03 inch PVB inner layer banded between. Set insulating glass unit in accordance with ASTM F2248.

2.1.1.1 Material Standard

ASTM B221; 6063-T5 alloy and tempered.

Provide door stile and rail face dimensions of the entrance doors as follows:

Vertical Stile	Top Rail	Bottom Rail
3-1/2 inches	3-1/2 inches	6-1/2 inches

Provide major portions of the door members at 0.125 inches nominal in thickness and glazing molding at 0.050 inches thick.

2.1.1.2 Sealants

Provide either ethylene propylene diene monomer (EPDM) elastomeric extrusions or thermoplastic elastomer glazing gaskets. Structural silicone sealant is required.

Internal Sealants: Provide sealants that according to the manufacturer will remain permanently elastic, tacky, non-drying, non-migrating, and weather tight.

2.1.1.3 Thermal Barrier

Use a rigid, structural thermal barrier to separate all exterior aluminum from interior aluminum. For purposes of this specification, a structural thermal barrier is defined as a system that transfers shear during bending and, therefore, promotes composite action between the exterior and interior extrusions. Do not use a nonstructural thermal barrier. Ensure that the thermal barrier provides a structural connection between the two sides of the door.

2.2 FABRICATION

Provide the following information when submitting fabrication drawings for custom fabrications:

a. Indicate elevations, detailed design, dimensions, member profiles, joint locations, arrangement of units, and member connections.

b. Show the following items:

(1) Details of special shapes.

(2) Reinforcing.

(3) Anchorage system.

(4) Interfacing with building construction.

(5) Provisions for expansion and contraction.

(6) Thermal breaks.

c. Indicate typical glazing details, and internal sealant requirements as recommended by the sealant manufacturer.

d. Clearly indicate locations of exposed fasteners and joints.

e. Clearly show where and how the manufacturer's system deviates from Contract drawings and these specifications.

2.2.1 Entrance System Fabrication

Provide door corner construction consisting of mechanical clip fastening, SIGMA deep penetration plug welds and 1 1/8 inch long fillet welds inside and outside all four corners. Provide a hook-in type exterior glazing stop with EPDM glazing gaskets reinforced with non-stretchable cord. Provide an interior glazing stop that is mechanically fastened to the door member and that incorporates a silicone-compatible spacer used with silicone sealant.

Accurately fit and secure joints and corners. Make joints hairline in appearance. Remove burrs and smooth edges. Prepare components with internal reinforcement for door hardware. Arrange fasteners and attachments so that they are concealed from view.

Separate dissimilar metals with protective coating or pre-formed separators to prevent contact and corrosion.

2.2.2 Shop Assembly

Fabricate and assemble units with joints only at the intersection of aluminum members with hairline joints; rigidly secure these units, and seal them in accordance with the manufacturer's recommendations.

2.2.2.1 Welding

Conceal welds on aluminum members in accordance with AWS recommendations or methods recommended by the manufacturer. Members showing welding bloom or discoloration on finish or material distortion will be rejected by the Contacting Officer.

2.2.3 Finish

Before fabrication, clean the units and give them a AA-M-10-C22-A42 (color) anodized finish in accordance with the requirements of the AA DAF45. The finish thickness is A42, 0.7 mil or greater.

2.2.4 Fabrication Tolerance

Fabricate and assemble units with joints only at intersection of aluminum members with hairline joints; rigidly secure these units, and seal them in accordance with the manufacturer's recommendations.

Fabricate aluminum entrances in accordance with the entrance manufacturer's prescribed tolerances.

2.2.4.1 Material Cuts

Square to 1/32 inch off square, over largest dimension; proportionate amount of 1/32 inch on the two dimensions.

2.2.4.2 Joints

Between adjacent members in same assembly: Joints are hairline and square to the adjacent member.

2.2.4.3 Variation

In squaring diagonals for doors and fabricated assemblies: 1/16 inch.

2.2.4.4 Flatness

For doors and fabricated assemblies: plus/minus 1/16 inch of neutral plane.

2.3 MATERIALS

2.3.1 Sealants

Ensure that all sealants conform to AAMA 800.

2.3.2 Glass

Refer to Section 08 81 00 GLAZING.

2.4 ACCESSORIES

2.4.1 Fasteners

Provide stainless steel fasteners in areas where the fasteners are exposed.

Use non-corrosive and compatible fasteners with components being fastened. Do not use exposed fasteners, except where unavoidable for application of hardware.

In areas where fasteners are not exposed, use aluminum, non-magnetic stainless steel, or other materials warranted by the manufacturer.

For exposed locations, provide countersunk Phillips head screws when items with a matching finish are fastened. For concealed locations, provide the manufacturer's standard fasteners.

Provide nuts or washers that have been designed with a means to prevent disengagement; do not deform fastener threads.

2.4.2 Perimeter Anchors

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

2.4.2.1 Inserts and Anchorage Devices

Provide manufacturer's standard formed or fabricated assemblies, steel or aluminum, of shapes, plates, bars, or tubes. Shop-coat steel assemblies after fabrication with an alkyd zinc chromate primer complying with FS TT-P-645.

2.4.3 Standard Entrance Hardware

2.4.3.1 Weatherstripping

Equip meeting stiles on pairs of doors with an adjustable astragal using wool pile with a polymeric fin.

Provide door weatherstripping on a single-acting offset pivot or butt-hung door and frame (single or pairs) consisting of a thermoplastic elastomer weatherstripping on a tubular shape with a semi-rigid polymeric backing.

Provide sill-sweep strips: Provide an EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners. (Provide as necessary to meet specified performance tests.)

2.4.3.2 Threshold

Provide an extruded aluminum threshold, one piece per door opening, with ribbed surface.

2.4.3.3 Offset Pivots

Provide the manufacturer's standard top and bottom pivots with one intermediate offset pivot.

2.4.3.4 Panic Device

Provide the manufacturer's recommended standard panic hardware.

2.4.3.5 Closer

Provide a surface closer in accordance with ANSI/BHMA A156.4.

2.4.3.6 Security Lock or Dead Lock

Provide A/R MS 1850A lock with two A/R 1871 cylinder operated flush bolts.

2.4.3.7 Cylinder Guard

Provide the manufacturer's recommended standard.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Site Verification of Conditions

Verify that the condition of substrate previously installed under other sections is acceptable for product installation in accordance with the manufacturer's instructions.

Verify that openings are sized to receive the storefront system and that the sill plate is level in accordance with the manufacturer's acceptable tolerances.

3.2 PREPARATION

Field-verify dimensions before fabricating components for the door portal assembly.

Coordinate the erection of door portal with installation of surrounding glass wall and door assemblies. Ensure that the door portals can provide support and anchorage for assembly components.

Coordinate electrical requirements for electrified door hardware to ensure proper power source, conduit, wiring, and boxes.

3.2.1 Adjacent Surfaces Protection

Protect adjacent work areas and finish surfaces from damage during product installation.

3.2.2 Aluminum Surface Protection

Protect aluminum surfaces from contact with lime, mortar, cement, acids, and other harmful contaminants.

3.3 INSTALLATION

Submit installation drawings for review and approval.

Install the entrance system in accordance with the manufacturer's instructions and the AAMA storefront and entrance guide specifications manual. Attach the entrance system to the structure, allowing it to be adjusted to accommodate construction tolerances and other irregularities. Provide alignment attachments and shims to permanently fasten the system to the building structure. Align the assembly so that it is plumb and level, and free of warp and twist. Maintain assembly dimensional tolerances aligning with adjacent work.

Set thresholds in a bed of mastic and secure the thresholds. Protect aluminum members in contact with masonry, steel, concrete, or dissimilar materials using nylon pads or a bituminous coating. Shim and brace the aluminum system before anchoring the system to the structure. Verify that weep holes are open, and the metal joints are sealed in accordance with the manufacturer's installation instructions. Seal metal-to-metal joints using a sealant recommended by the system manufacturer.

3.3.1 Tolerances

Ensure that tolerances for wall thickness and other cross-sectional dimensions of entrance members are nominal and in compliance with Aluminum Standards and Data, published by the Aluminum Association.

3.3.2 Adjusting

Adjust operating hardware for smooth operation, and as recommended by the manufacturer.

3.3.3 Related Products Installation Requirements

3.3.3.1 Sealants (Perimeter)

Refer to Section 07 92 00 JOINT SEALANTS.

3.3.3.2 Glass

Refer to Section 08 81 00 GLAZING.

3.4 FIELD QUALITY CONTROL

3.4.1 Air Infiltration

Test air infiltration in accordance with ASTM E783

Submit certified test reports showing compliance with specified performance characteristics as follows:

a. For single-acting offset pivot, butt hung, or continuous geared hinge entrances in the closed and locked position, test the specimen in accordance with ANSI/BHMA A156.10, and ASTM E283 at a pressure differential of 1.57 psf for pairs of doors; ensure that maximum infiltration for a pair of 7 foot by 8 foot entrance doors and frame is 1.2 cfm/square foot.

b. Ensure the maximum allowable infiltration for a completed storefront system does not exceed 0.06 cfm/square foot when tested in accordance with ASTM E1424 at a differential static pressure of 6.24 psf.

3.4.2 Wind Loads

Provide a completed storefront system capable of withstanding wind pressure loads, normal to the wall plane indicated in the drawing.

3.4.3 Deflection

Submit certified test reports showing that the maximum allowable deflection in a member when tested in accordance with ASTM E330/E330M with allowable stress is L/175 or 3/4 inches maximum.

3.4.4 Condensation Resistance and Thermal Transmittance

Submit certified test reports showing compliance with specified performance

characteristics as follows:

a. U-Value Requirements:

(1) Perform test in accordance with the AAMA 1503 procedure and on the configuration specified therein.

(2) Thermal Transmittance ("U" Value) maximum 0.65 (6250) BTU/hr/sf/deg F at 15 mph exterior wind.

b. CRF Class Requirements:

(1) Perform a test in accordance with AAMA 1503.

(2) Condensation Resistance Factor Requirements (CRF) minimum 60.

3.4.5 Water Infiltration

Submit certified test reports showing that the system is designed to provide no uncontrolled water when tested in accordance with ASTM E1105 at a static pressure of 8 psf.

3.5 ADJUSTING AND CLEANING

3.5.1 Protection

Protect the installed product's finish surfaces from damage during construction. Protect the aluminum storefront system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

3.5.2 Cleaning

Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions before acceptance remove excess mastic, mastic smears, and other foreign materials. Remove construction debris from the project site and legally dispose of this debris.

3.6 WARRANTY

Submit three signed copies of the manufacturer's product warranty for the entrance system as follows:

a. Warranty Period: Five years from Date of Substantial Completion of the project, provided that the Limited Warranty begins no later than six months from the date of shipment by the manufacturer. In addition, support welded door corner construction with a limited lifetime warranty for the life of the door under normal use.

Ensure that the Warranty's language is identical to the "As Approved" version of the sample warranty submitted to and returned from the Contracting Officer.

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SECTION 08 44 00

CURTAIN WALL AND GLAZED ASSEMBLIES
05/19

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA ADM	(2015) Aluminum Design Manual
AA ASD1	(2017; Errata 2017) Aluminum Standards and Data

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 501.1	(2017) Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure
AAMA 609 & 610	(2015) Cleaning and Maintenance Guide for Architecturally Finished Aluminum
AAMA 800	(2016) Voluntary Specifications and Test Methods for Sealants
AAMA CW-10	(2015) Care and Handling of Architectural Aluminum from Shop to Site
AAMA MCWM-1	(1989) Metal Curtain Wall Manual
AAMA/WDMA/CSA 101/I.S.2/A440	(2011; Update 1 2014) North American Fenestration Standard/Specification for Windows, Doors, and Skylights

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISC/AISI 121	(2004) Standard Definitions for Use in the Design of Steel Structures
AISI SG03-3	(2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(2017) Minimum Design Loads for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS A5.1/A5.1M	(2012) Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding

AWS A5.10/A5.10M	(2017) Welding Consumables - Wire Electrodes, Wires and Rods for Welding of Aluminum and Aluminum-Alloys - Classification
AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M	(2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A1011/A1011M	(2018a) Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A240/A240M	(2018) Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A424/A424M	(2009a; R 2016) Standard Specification for Steel Sheet for Porcelain Enameling
ASTM A501/A501M	(2014) Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A572/A572M	(2018) Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B108/B108M	(2019) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B136	(1984; R 2013) Standard Method for Measurement of Stain Resistance of Anodic

	Coatings on Aluminum
ASTM B137	(1995; R 2014) Standard Test Method for Measurement of Coating Mass Per Unit Area on Anodically Coated Aluminum
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B211/B211M	(2019) Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire
ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM B244	(2009; R 2014) Standard Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments
ASTM B26/B26M	(2014; E 2015) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B308/B308M	(2010) Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
ASTM B316/B316M	(2010) Standard Specification for Aluminum and Aluminum-Alloy Rivet and Cold-Heading Wire and Rods
ASTM B429/B429M	(2010; E 2012) Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM B85/B85M	(2018) Standard Specification for Aluminum-Alloy Die Castings
ASTM C1048	(2018) Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
ASTM C1087	(2016) Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
ASTM C1135	(2015) Standard Test Method for Determining Tensile Adhesion Properties of

	Structural Sealants
ASTM C1184	(2014) Standard Specification for Structural Silicone Sealants
ASTM C1401	(2014) Standard Guide for Structural Sealant Glazing
ASTM C542	(2005; R 2017) Standard Specification for Lock-Strip Gaskets
ASTM C864	(2005; R 2015) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM D1730	(2009; R 2014) Standard Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting
ASTM D2244	(2016) Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D4214	(2007; R 2015) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM E1332	(2016) Standard Classification for Rating Outdoor-Indoor Sound Attenuation
ASTM E1886	(2013a) Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
ASTM E1996	(2017) Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
ASTM E283	(2004; R 2012) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E3061	(2017) Standard Test Method for Analysis of Aluminum and Aluminum Alloys by Inductively Coupled Plasma Atomic Emission Spectrometry (Performance-Based Method)
ASTM E330/E330M	(2014) Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure

	Difference
ASTM E331	(2000; R 2016) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E546	(2014) Frost Point of Sealed Insulating Glass Units
ASTM E576	(2014) Frost Point of Sealed Insulating Glass Units in the Vertical Position
ASTM E90	(2009; R2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 500	(2006) Metal Finishes Manual

PORCELAIN ENAMEL INSTITUTE (PEI)

PEI 1001	(1996) Specification for Architectural Porcelain Enamel (ALS-100)

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC 7/NACE No.4	(2007; E 2004) Brush-Off Blast Cleaning
SSPC SP 1	(2015) Solvent Cleaning
SSPC SP 12/NACE No.5	(2002) Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating
SSPC SP 3	(1982; E 2004) Power Tool Cleaning

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 4-010-01	(2018) DoD Minimum Antiterrorism Standards for Buildings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Glazed Curtain Wall System; G

Installation Drawings

SD-03 Product Data

Glazed Curtain Wall System; G

Metals For Fabrication; G

Nonskinning Sealing Compound; G

Metal Accessories; G

Curtain-Wall Framing Members; G

Aluminum Doors and Frames; G

Thermal Insulation Materials; G

Masonry Anchorage Devices; G

Sample Warranties; G

SD-05 Design Data

Anodic Finish; G

Exposed-to-View Aluminum Finish; G

Structural Calculations for Deflection; G

Design Analysis; G

SD-06 Test Reports

NFPA 285 Factory Test Results; G

Standard Airblast Test; G

Field Water Spray Test Results; G

Air Infiltration Test Results; G

Water Penetration Test Results; G

SD-07 Certificates

Energy Performance Certificates; G

Engineer Qualifications; G

Qualifications for the Curtain-Wall Installer; G

SD-08 Manufacturer's Instructions

Glazed Curtain Wall System; G

Insulating Glass; G

Preventive Maintenance and Inspection; G

SD-11 Closeout Submittals

Warranty; G

1.3 QUALITY ASSURANCE

1.3.1 Engineer Qualifications for Blast Design

All blast design calculations must be performed by or under the direct supervision of a registered engineer with a minimum of 5 years experience performing blast design. The engineer performing the blast design must be able to demonstrate experience on similar size projects using similar design methods to meet the requirements outlined in this specification.

1.3.2 Qualification of Welders

Welding must be performed by certified welders qualified in accordance with AWS D1.1/D1.1M using procedures, materials, and equipment of the type required for the work.

1.3.3 Qualifications for the Curtain-Wall Installer

Submit a written description of the proposed curtain-wall system installer giving the name of the curtain-wall manufacturer, qualifications of personnel, years of concurrent contracting experience, lists of projects similar in scope to the specified work. Installer must be approved by the Manufacturer as a Certified Installer and have a minimum of 5 years experience installing curtain wall systems, and have completed projects similar in size to this project.

1.3.4 Testing Requirements

The components listed below must be tested in accordance with the requirements below, and meet performance requirements specified.

a. Joint and Glazing Sealants: Perform tests as required by applicable publications referenced.

b. Preformed Compression Gaskets and Seals: ASTM C864.

c. Preformed Lock-strip Gaskets: ASTM C542, modified as follows: Heat age specimens seven days at 158 degrees F, in zipped or locked position under full design compression. Unzip, cool for one hour, re-zip, and test lip seal pressure, which must be minimum 2.5 pounds per linear inch on any extruded or corner specimen.

d. Spandrel Glass: Fallout resistance test, ASTM C1048.

e. Porcelain Enamel: Acid resistance, color retention, and spall resistance tests, PEI 1001.

f. Anodized Finishes: Stain resistance, coating weight, and coating thickness tests, ASTM B136, ASTM B137, and ASTM B244, respectively.

g. Insulating Glass: ASTM E546 or ASTM E576 at minus 20 degrees F , no frost or dew point.

1.3.5 Mockup

1.3.5.1 Construction

Construct at job site full size typical wall unit which incorporates horizontal and vertical joints, framing, window units, panels, glazing, and

other accessories as detailed and specified. Mock-up wall unit size and design must be as indicated.

1.3.5.2 Performance Test

Conduct tests after approval of visual aspects has been obtained. Finished work must match approved mock-up.

1.3.5.3 Approved Mock-Up

After completion and approval of test results install, where directed, for reference during construction. Approved mock-up must remain property of the Contractor.

1.3.6 Factory Tests

Perform the following tests except that where a curtain wall system or component of similar type, size, and design as specified for this project has been previously tested, under the conditions specified herein, the resulting test reports may be submitted in lieu of testing the components listed below:

1.3.6.1 Deflection and Structural Tests

Curtain wall framing members must not deflect, in a direction normal to the plane of the wall, more than 1/175 of its clear span or 3/4 inch, whichever is less, when tested in accordance with ASTM E330/E330M, except that when a plastered surface will be affected the deflection must not exceed 1/360 of the span. Framing members must not have a permanent deformation in excess of 0.2 percent of its clear span when tested in accordance with ASTM E330/E330M for a minimum test period of 10 seconds at 1.5 times the design wind pressures specified. Provide Structural Calculations for Deflection.

1.3.6.2 Water Penetration Test

Water penetration must not occur when the wall is tested in accordance with ASTM E331 at a differential static test pressure of 20 percent of the inward acting design wind pressure as specified, but not less than 12 psf. Make provision in the wall construction for adequate drainage to the outside of water leakage or condensation that occurs within the outer face of the wall. Leave drainage and weep openings in members and wall open during test. Test curtain wall systems in areas subject to hurricanes and typhoons in accordance with AAMA 501.1 Dynamic Testing.

1.3.6.3 Air Infiltration Test

Air infiltration through the wall, when tested in accordance with ASTM E283, must not exceed 0.06 cfm per square foot of fixed wall area, plus the permissible allowance specified for operable windows within the test area, at a static air pressure differential of 6.2 psf.

1.3.6.4 Sealant Adhesion and Compatibility Testing

ASTM C1401, submit to structural glazing sealant manufacturer, for testing indicated below. Samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that is in close proximity to or is touching the structural or nonstructural sealants of a structural glazed system.

a. Compatibility: Test materials or components using ASTM C1087.

b. Adhesion: Test for adhesion or lack of adhesion of a structural sealant to the surface of another material or component using ASTM C1135.

c. Submit no fewer than 8 pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.

d. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

e. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

f. Testing will not be required if data based on previous testing of current sealant products match those submitted.

1.3.6.5 Energy Performance Tests

Energy Performance Certificates for Glazed Aluminum Curtain Wall, Accessories, and Components from Manufacturer Confirming NFRC- Certified Energy Performance Values for Each Glazed Aluminum Curtain Wall.

1.3.6.6 Window Tests

Provide windows that meet the same requirements for deflection and structural adequacy as specified for framing members when tested in accordance with ASTM E330/E330M, except permanent deformation must not exceed 0.4 percent; there must be no glass breakage, and no permanent damage to fasteners, anchors, hardware, or operating devices. Provide windows that have no water penetration when tested in accordance with ASTM E331.

1.3.6.7 Noise Reduction

Test according to ASTM E90, with ratings determined by ASTM E1332, as follows: Sound Transmission Class: Minimum 40.

1.4 GLAZED CURTAIN WALL SYSTEM REQUIREMENTS

Provide system complete with framing, mullions, trim, framed pre-assembled units, panels, windows, glass, glazing, sealants, insulation, fasteners, anchors, accessories, concealed auxiliary members, and attachment devices for securing the wall to the structure as specified or indicated.

Submit installation drawings for curtain wall system, accessories, and mock-up. Tentative approval of drawings must be received before fabrication of mock-up. Final approval of drawings will be deferred pending approval of mock-up and accessories. Drawings must indicate in detail all system parts including elevations, full-size sections, framing, jointing, panels, types and thickness of metal, flashing and coping details, field connections, weep and drainage system, finishes, sealing methods, glazing, glass sizes and details, firestopping insulation materials, and erection details.

1.4.1 Source

Furnish curtain wall system components by one manufacturer or fabricator; however, all components need not be products of the same manufacturer.

1.4.2 Design

Unit system with mullions, . Fully coordinate system accessories directly incorporated, and adjacent to contiguous related work and insure materials compatibility, deflection limitations, thermal movements, and clearances and tolerances as indicated or specified.

1.4.3 Tolerances

Design and erect wall system to accommodate tolerances in building frame and other contiguous work as indicated or specified. Provide with the following tolerances:

a. Maximum variation from plane or location shown on approved shop drawings: 1/8 inch per 12 feet of length up to not more than 1/2 inch in any total length.

b. Maximum offset from true alignment between two identical members abutting end to end in line: 1/16 inch.

1.4.4 Structural Requirements

Members may not deflect in a direction parallel to the plane of the wall, when carrying its full design load, more than an amount which will reduce the edge cover or glass bite below 75 percent of the design dimension. After deflection under full design load, members may not have a clearance between itself and the top of the panel, glass, sash, or other part immediately below it less than 1/8 inch. The clearance between the member and an operable window or door must be minimum 1/16 inch. Design entire system to withstand the indicated wind and concentrated loads indicated in the drawings.

1.5 DELIVERY AND STORAGE

Inspect materials delivered to the site for damage; unload and store with a minimum of handling in accordance with recommendations contained in AAMA CW-10. Storage spaces must be dry locations with adequate ventilation, free from heavy dust, not subject to combustion products or sources of water, and must allow for easy access for inspection and handling. Deliver caulking and sealing compounds to the job site in sealed containers labeled to show the designated name, formula or specifications number; lot number; color; date of manufacturer; shelf life; and curing time when applicable.

1.5.1 Protective Covering

Prior to shipment from the factory, place knocked-down lineal members in cardboard containers and cover finished surfaces of aluminum with protective covering of adhesive paper, waterproof tape, or strippable plastic. Covering must not chip, peel, or flake due to temperature or weather, must protect against discoloration and surface damage from transportation, and storage, and must be resistant to alkaline mortar and plaster. Do not cover aluminum surfaces that will be in contact with sealants after installation.

1.5.2 Identification

Prior to delivery, mark wall components to correspond with shop and erection drawings placement location and erection.

1.6 WARRANTY

Guarantee insulating glass units not to develop material obstruction of vision as a result of dust or film formation on the inner glass surface caused by failure of the seal, other than through glass breakage, within a period of 5 years from date of acceptance of work by the Government. Replace units failing to comply with the terms of this guarantee with new units without additional cost to the Government. The Contractor must require the manufacturer to execute their warranties in writing directly to the Government.

1.6.1 Sample Warranties

Provide curtain wall and glazing assembly material and workmanship warranties meeting specified requirements. Provide revision or amendment to standard membrane manufacturer warranty to comply with the specified requirements.

a. Project Warranty: Refer to Section 01 11 00 SUMMARY OF WORK.

b. Manufacturer's Warranty: Submit, for acceptance, the Manufacturer's standard warranty document executed by authorized company official. The manufacturer's warranty is in addition to, and not a limitation of, other rights the Government may have under the Contract Documents.

c. Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of steel fire-rated glazed curtain-wall systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.

d. Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering. Deterioration includes, but is not limited to, color fading more than 5 Delta E units when tested according to ASTM D2244, chalking in excess of a No. 8 rating when tested according to ASTM D4214, cracking, peeling, or chipping.

e. Beneficiary: Issue warranty to the Government.

f. Warranty Period: 5 years commencing on Date of Substantial Completion, covering complete curtain wall system for failure to meet specified requirements.

g. Warranty Acceptance: Owner is sole authority who will determine acceptability of manufacturer's warranty documents.

1.7 PERFORMANCE REQUIREMENTS

1.7.1 Antiterrorism Performance Requirements

Curtain Wall assembly must meet the antiterrorism performance criteria specified in UFC 4-010-01.

1.7.1.1 Wind-Borne Debris /Hurricane Performance Requirements

Provide impact resistant or protected curtain wall systems in buildings with an impact-resistant covering meeting the Windborne-Debris-Impact-Resistant Performance requirements of ASTM E1996 for project wind zone when tested in accordance with ASTM E1886, based upon testing of specimens not less than the size required for project and utilizing installation method identical to that specified for project as follows:

a. Project Wind Zone: Wind Zone 3 .

b. Large-Missile Test: For glazing located within 30 feet of grade.

c. Small-Missile Test: For glazing located more than 30 feet above grade.

1.7.2 Allowable Design Stresses

Aluminum-alloy framing member allowable design stresses must be in accordance with the requirements of AA ADM pertaining to building type structures made of the specified aluminum alloy.

Hot-rolled structural-steel member allowable design stresses and design rules must be in accordance with the requirements of AISC/AISI 121 pertaining to the specified structural steel.

Cold-formed light-gage steel structural member allowable design stresses and design rules must be in accordance with the requirements of AISI SG03-3 SG570 pertaining to structural members formed from the specified structural-steel sheet or strip.

1.7.3 Design Wind Load

Design windload must be as indicated in the drawings. Design windload must be in accordance with ASCE 7.

1.7.4 Structural Capacity

Design curtain-wall system, including framing members, windows, doors and frames, metal accessories, panels, and glazing to withstand the specified design windload acting normal to the plane of the curtain wall and acting either inward or outward.

Deflection of any metal framing member in a direction normal to the plane of the curtain wall, when subjected to the test of structural performance, using the specified windload in accordance with AAMA/WDMA/CSA 101/I.S.2/A440, must not exceed 1/175 of the clear span of the member or 3/4 inch, whichever value is less.

Deflection of any metal member in a direction parallel to the plane of the curtain wall, when the metal member is carrying its full design load, must not exceed 75 percent of the design clearance dimension between that member and the glass, sash, panels, or other part immediately below it.

1.7.5 High-Velocity Hurricane Zone (HVHZ) Florida Building Code

Tyndall AFB requires all new construction, additions, and renovations to comply with the Florida Building Code (FBC) High-Velocity Hurricane Zone

(HVHZ), Section 1602.2 criteria for Miami Dade County, Risk Category III buildings with a windspeed of 165 mph. Per FBC HVHZ provisions, all exterior building envelope materials such as, but not limited to windows, glazing, roofing systems, concrete masonry unit or metal panel walls, and doors and others must have a current Miami-Dade Notice of Acceptance (NOA) and installation of HVHZ standards that match the specified minimum 165mph wind requirement at Tyndall AFB. In addition, the Contractor must submit for review and approval test results of systems meeting the high wind requirements or a set of drawings sealed by a Professional Engineer stating conformance with HVHZ standards in place of materials pre-approved by Miami-Dade County.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Aluminum

Must be free from defects impairing strength or durability of surface finish. Provide standard alloys conforming to standards and designations of AA ASD1. Special alloys, not covered by the following ASTM specifications, must conform to standards and designations recommended by the manufacturer for the purpose intended.

2.1.1.1 Wrought Aluminum Alloys

Must be those which include aluminum alloying elements not exceeding the following maximum limits when tested and additional in accordance with ASTM E3061. These limits apply to both bare products and the core of clad products. The cladding of clad products must be within the same limits except that the maximum zinc limit may be 2.5 percent in order to assure that the cladding is anodic to the core. Special wrought alloys with a silicon content not more than 7.0 percent will be acceptable for limited structural uses where special appearance is required:

ALLOY	MAXIMUM PERCENT
Silicon	1.5
Magnesium, Manganese, and Chromium combined	6.0
Iron	1.0
Copper	0.4
Zinc	1.0

Within the chemical composition limits set forth above, wrought aluminum alloys must conform to the following:

a. Extruded bars, rods, shapes and tubes: ASTM B221 and ASTM B308/B308M and ASTM B429/B429M.

b. Sheet and Plate: ASTM B209.

2.1.1.2 Cast Aluminum Alloys

Provide those in which the alloying elements are silicon, magnesium, manganese, or a combination of these. Other elements must not exceed the following limits:

ALLOY	MAXIMUM PERCENT
Iron	1.2
Copper	0.4
Nickel	0.4
Titanium	0.2
Others (total)	0.5

Within the chemical composition limits set forth above, cast aluminum alloys must conform to the following:

a. Sand castings: ASTM B26/B26M.

b. Die casting: ASTM B85/B85M.

c. Permanent mold castings: ASTM B108/B108M.

2.1.1.3 Welding Rods and Electrodes

Provide welding rods and bare electrodes conforming to AWS A5.10/A5.10M as recommended by the manufacturer of the aluminum base metal alloy being used.

2.1.1.4 Strength

Aluminum extrusions for framing members used in curtain walls and main frame and sash or ventilator members in windows must have a minimum ultimate tensile strength of 22,000 psi and a minimum yield strength of 16,000 psi.

2.1.2 Carbon Steel

Conform to the following specifications:

a. Rolled shapes, plates, and bars: ASTM A36/A36M.

b. Galvanized sheets: ASTM A653/A653M.

c. Sheets for porcelain enameling: ASTM A424/A424M.

d. Other sheets: ASTM A1011/A1011M or ASTM A1008/A1008M.

2.1.3 Stainless Steel

Conform to ASTM A240/A240M. Conform to Type 302 or 304, and finish in accordance with the NAAMM AMP 500. Conform to Metal Finishes Manual as follows:

a. Concealed flashings: Dead soft fully annealed, 2 D finish .

b. Exposed work: No. 4 finish to match approved sample.

2.1.4 High-Strength, Low-Alloy Steel

Conform to ASTM A572/A572M for structural shapes, plates, and bars.

2.1.5 Metal Fasteners

Provide fasteners as specified in paragraph entitled "Fastener Metals for Joining Various Metal Combinations" in "Part 2 - Products" of the AAMA MCWM-1. Metals for fasteners must be chemically and galvanically compatible with contiguous materials.

2.1.6 Joint Sealants and Accessories

Provide manufacturer's standard colors to closely match adjacent surfaces. For interior application of joint sealants comply with applicable regulations regarding reduced VOC's as specified in Sections 07 92 00 JOINT SEALANTS.

2.1.6.1 Elastomeric, Single or Multiple Component

ASTM C920, Type S, single component or Type M, multiple component. Use Grade NS, nonsag type in joints on vertical surfaces and use Grade P, self-leveling or flow type, in joints on horizontal surfaces.

2.1.6.2 Single Component Silicone Rubber Base

ASTM C920, Type S, Grade NS (Silicone).

2.1.6.3 Solvents and Primers

Provide material which is quick drying, colorless, nonstaining, compatible with compound used, as recommended by sealant manufacturer. Where primer is specified or recommended by sealant manufacturer, manufacturer's data related to that material must include primer.

2.1.6.4 Structural Sealant

ASTM C1184 and ASTM C1401. Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant must occur before adhesive failure. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate, because sealant-to-substrate bond strength exceeds sealant's internal strength.

2.1.6.5 Backing Material

Provide material which is nonstaining, nonabsorbent, and compatible with sealing compound. Closed cell resilient urethane, polyvinylchloride or polyethylene foam; closed-cell sponge of vinyl or rubber; closed cell neoprene or butyl rod; or polychloroprene tubes or beads.

2.1.6.6 Bond Preventive Materials

Provide polyethylene tape with pressure-sensitive adhesive; aluminum foil or waxed paper.

2.1.6.7 Preformed Sealing Compound

Provide nonskinning type conforming to AAMA 800. Tapes, beads, ribbons or other shapes as required.

2.1.7 Glass and Glazing

Materials are specified under Section 08 81 00 GLAZING.

2.1.8 Paint and Finishes

See Section 09 90 00 PAINTS AND COATINGS, for field applied coatings.

2.1.9 Metal Accessories

Flashings, Metal sills, Closures. Fabricate accessories of sizes and shapes indicated from similar materials and finish as specified for wall system.

2.2 METALS FOR FABRICATION

2.2.1 Aluminum-Alloy Extrusions

Extrusions must conform to ASTM B221.

Extrusions to receive an integral-color anodic coating must be the alloy and temper recommended by the aluminum producer for the specified finish with integral-color anodic coating and have mechanical properties equal to or exceeding those of ASTM B221 6063-T5.

2.2.2 Aluminum-Alloy Sheets and Plates

Unless otherwise specified, sheets and plates must conform to ASTM B209, Alloy 3003-H16.

Sheets and plates to receive a clear anodic coating must conform to ASTM B209, Alloy 5005-H16.

Sheets and plates to receive an integral-color anodic coating must be the alloy and temper recommended by the aluminum producer for the specified coating and have mechanical properties equal to or exceeding those of 5005-H16.

2.2.3 Structural Steel

Hot-rolled shapes, plates, and bars must conform to ASTM A36/A36M.

Hot-formed tubing must conform to ASTM A501/A501M.

Sheet and strip for cold-formed, light-gage, structural members must conform to ASTM A1011/A1011M.

2.2.4 Metals for Fasteners

Provide aluminum-alloy bolts and screws made from rod conforming to ASTM B211/B211M, Alloy 2024-T351.

Provide aluminum-alloy nuts made from rod conforming to ASTM B211/B211M, Alloy 6061-T6.

Provide aluminum-alloy washers made from sheet conforming to ASTM B209, ASTM B211/B211M, Alloy 2024-T4.

Provide aluminum-alloy rivets made from rod or wire conforming to ASTM B316/B316M, Alloy 6053-T61.

Provide steel fasteners made from corrosion-resistant chromium-nickel Type 302, 303, 304, 305, or 316 with the form and condition best suited for the work.

2.3 NONSKINNING SEALING COMPOUND

Sealing compound must be nonskinning, gun-grade type conforming to AAMA 800.

2.4 FABRICATION

2.4.1 Workmanship

Metal Accessories must be accurately formed; joints, except those designed to accommodate movement, accurately fitted and rigidly assembled.

Insofar as practical, fitting and assembly of the work must be done in the manufacturer's plant. Mark work that cannot be permanently factory-assembled before shipment to ensure proper assembly at the site.

2.4.2 Shop-Painting Aluminum

Shop prime aluminum surfaces that will come in contact with dissimilar metals, masonry, concrete, or wood.

Prepare aluminum surfaces for painting in accordance with ASTM D1730, Type B, Method 2 or 3.

Give aluminum surfaces one shop coat of paint applied to dry, clean, surfaces to provide a continuous minimum dry-film thickness of 1.5 mils.

2.4.3 Shop-Painting Steel

Shop prime surfaces of concealed steel.

Remove scale, rust, and other deleterious materials. Remove heavy rust and loose mill scale in accordance with SSPC SP 3 or SSPC 7/NACE No.4. Remove oil, grease, and similar contaminants in accordance with SSPC SP 1.

Give steel surfaces two coats of paint; the second coat must have a color different from the first coat. Apply paint to dry, clean, surfaces to provide a continuous minimum dry-film thickness of 1.5 mils for the first coat and 1 mil for the second coat.

2.4.4 Depth of Glazing Rabbets

Depth of glazing rabbets for openings to receive glass materials or panels must be as follows:

MATERIAL	NOMINAL THICKNESS	MAXIMUM SIZE	MINIMUM RABBET DEPTH
Single-glass lights	Double strength	Up to 5 square feet	3/8 inch
	Double strength	Over 5 square feet	1/2 inch
	1/8 inch	Up to 5 square feet	3/8 inch
	1/8 inch	5 to 25 square feet	1/2 inch
	1/8 inch	25 to 70 square feet	5/8 inch
	3/16 inch	Up to 25 square feet	1/2 inch
	3/16 inch	Over 25 square feet	5/8 inch
	7/32 inch	All sizes	5/8 inch
	1/4 inch	Up to 100 square feet	5/8 inch
	1/4 inch	Over 100 square feet	3/4 inch
	5/16 inch	All sizes	3/4 inch
	3/8 inch	All sizes	7/8 inch
	1/2 inch	All sizes	7/8 inch
	3/4 inch	All sizes	7/8 inch
Double-glazing units	All thicknesses	Up to 25 square feet	5/8 inch
	All thicknesses	25 to 70 square feet	3/4 inch
Panels	Up to 1 inch	All sizes	5/8 inch
	1 to 1-1/2 inches	All sizes	3/4 inch

2.4.5 Anodic Finish

The following designation of finishes refer to standard finishes as defined in the NAAMM AMP 500. Exposed-to-View Aluminum Finish of surfaces must be:

Polished frosted finish with integral-color anodic coating: Smooth specular buffed mechanical, followed by nonetching inhibitive alkaline cleaning, medium-matte chemical etch, and Architectural Class I (0.7-mil and greater thickness) anodic coating producing an integral-color finish. Color must be:

Medium bronze

Match aluminum-finish color and appearance to that of the sample approved for use in the project within the aluminum producer's standard color range.

Test the anodic coating on aluminum for thickness in accordance with ASTM B244.

Test anodically coated aluminum for the weight of the coating in accordance with ASTM B137.

Test the resistance of anodically coated aluminum to staining by dyes in accordance with ASTM B136.

2.5 CURTAIN-WALL FRAMING MEMBERS

2.5.1 General

Framing members must be thermally broken and be the section dimensions and arrangement indicated and designed to accommodate windows, panels, and other materials to be incorporated into the curtain-wall system.

2.5.2 Construction

Framing members must be aluminum-alloy extrusions with a wall thickness not less than 0.125 inch. Glazing rabbet legs must be an integral part of the frame with the leg depth not less than the minimum depth specified for the thickness and size of the glass material or panel to be installed in the curtain-wall frame. Design and construct frames to receive window sash and louvers of the type specified when required.

Prepare vertical mullions for anchorage to the building construction at the bottom, at each intermediate floor elevation, and at the top.

2.6 METAL ACCESSORIES

2.6.1 Sills

Sills must be the shapes and dimensions indicated and fabricated of aluminum-alloy extrusions having a wall thickness not less than 0.125 inch.

Sills must run continuously under the curtain wall and permit the lower curtain wall frame member to interlock without fastenings.

2.6.2 Coping

Coping must be the shapes and dimensions indicated and welded mitered inside and outside corner sections, concealed cover plates, and other components as required for the installation.

Coping-system components must be aluminum-alloy extrusions with wall thicknesses of 0.05 inch, minimum.

2.6.3 Exterior Architectural Louvers

Exterior architectural louvers are specified in Section 08 91 00 METAL WALL LOUVERS.

2.7 SEALANTS AND CAULKINGS

Sealants and caulkings are specified in Section 07 92 00 JOINT SEALANTS.

2.8 CURTAIN-WALL INSTALLATION MATERIALS

2.8.1 Steel Bolts, Nuts, and Washers

Bolts must be regular hexagon head, low-carbon steel.

Nuts must be hexagon, regular style, carbon steel.

Plain washers must be round, general-assembly purpose, carbon steel.

Lockwashers must be helical spring, carbon steel.

2.8.2 Machine Screws

Provide screws for concealed work that are corrosion-resistant steel, slotted or cross-recessed type, roundhead.

Provide screws for exposed-to-view work that are corrosion-resistant steel, cross-recessed, flathead.

2.8.3 Electrodes for Welding Steel

Electrodes for welding steel by the manual shielded metal arc welding process must meet the requirements of AWS D1.1/D1.1M and be covered mild-steel electrodes conforming to AWS A5.1/A5.1M, E60 series.

PART 3 EXECUTION

3.1 GENERAL

Install curtain walls and accessories in accordance with the approved drawings and as specified.

3.2 FABRICATION

Provide curtain wall components of the materials and thickness indicated or specified. The details indicated are representative of the required design and profiles. Acceptable designs may differ from that shown if the proposed system components conform to the limiting dimensions indicated and the requirements specified herein. Unless specifically indicated or specified otherwise, the methods of fabrication and assembly must be at the discretion of the curtain wall manufacturer. Perform fitting and assembling of components in the shop to the maximum extent practicable. Provide anchorage devices with adjustment capability in three directions. Exposed fastenings used on finished surfaces must be truss head, flat head, or oval head screws or bolts.

3.2.1 Joints

Provide welded or mechanical fasteners as indicated or specified. Match joints in exposed work to produce continuity of line and design. Bed-joints or rabbets receiving caulking or sealing material must be minimum 3/4 inch deep and 3/8 inch wide at mid ambient temperature range.

3.2.2 Welding

Conform to AWS D1.1/D1.1M. Use methods and electrodes recommended by manufacturers of base metal alloys. Provide welding rods of an alloy that matches the color of the metal being welded. Protect glass and other finish from exposure to welding spatter. Ground and finish weld beads on exposed metal surfaces to minimize mismatch and to blend with finish on adjacent parent metal. If flux is used in welding aluminum, completely remove it immediately upon completion of welding operations. Do not use exposed welds on aluminum surfaces.

3.2.3 Soldering and Brazing

Provide as recommended by suppliers. Solder only for filling or sealing joints.

3.2.4 Ventilation and Drainage

Provide internal ventilation and drainage system of weeps based on principles of pressure equalization to ventilate the wall internally and to discharge condensation and water leakage to exterior as inconspicuously as possible. Flashings and other materials used internally must be nonstaining, noncorrosive, and nonbleeding.

3.2.5 Protection and Treatment of Metals

3.2.5.1 General

Remove from metal surfaces lubricants used in fabrication and clean off other extraneous material before leaving the shop.

3.2.5.2 Galvanic Action

Provide protection against galvanic action wherever dissimilar metals are in contact, except in the case of aluminum in permanent contact with galvanized steel, zinc, stainless steel, or relatively small areas of white bronze. Paint contact surfaces with one coat bituminous paint or apply appropriate caulking material or nonabsorptive, noncorrosive, and nonstaining tape or gasket between contact surfaces.

3.2.5.3 Protection for Aluminum

Protect aluminum which is placed in contact with, built into, or which will receive drainage from masonry, lime mortar, concrete, or plaster with one coat of alkali-resistant bituminous paint. Where aluminum is contacted by absorptive materials subject to repeated wetting or treated with preservative noncompatible with aluminum, apply two coats of aluminum paint, to such materials and seal joints with approved caulking compound.

3.3 INSTALLATION

Installation and erection of glazed wall system and all components must be performed under direct supervision of and in accordance with approved recommendations and instructions of wall system manufacturer or fabricator.

Any materials that show visual evidence of biological growth due to the presence of moisture must not be installed on the building project.

3.3.1 Bench Marks and Reference Points

Establish and permanently mark bench marks for elevations and building line offsets for alignment at convenient points on each floor level. Should any error or discrepancy be discovered in location of the marks, stop erection work in that area until discrepancies have been corrected.

3.3.2 Verifying Conditions and Adjacent Surfaces

After establishment of lines and grades and prior to system installation examine supporting structural elements. Verify governing dimensions, including floor elevations, floor to floor heights, minimum clearances between curtain wall and structural frames, and other permissible dimensional tolerances in the building frame.

3.3.3 Materials Embedded In Other Construction

Install materials to be embedded in cast-in-place concrete and masonry prior to the installation of the curtain wall. Provide setting drawings, templates, and instructions for installation.

3.3.4 Fastening To Construction-In-Place

Provide anchorage devices and fasteners for fastening work to construction-in-place. Provide fasteners as specified.

3.3.5 Field-Welding Steel And Touchup Painting

Procedures of manual shielded metal arc welding, the appearance and quality of the welds made, and the methods used in correcting welding work must conform to AWS D1.1/D1.1M.

After completion of welding, clean and paint field welds and scarred surfaces on steel work and on adjacent ferrous-metal surfaces. Paint must be the same as that used for shop painting.

3.3.6 Installation Tolerances

Install curtain walls within the following tolerances:

Deviation in location from that indicated on the drawings	Plus or minus 1/4 inch
Deviation from the plumb or horizontal	
In 12 feet of length	Not more than 1/8 inch
In any total length	Not more than 1/2 inch
Offset from true alignment at joints between abutting members in line	Not more than 1/16 inch

3.3.7 Placing Curtain-Wall Framing Members

Install members plumb, level, and within the limits of the installation tolerances specified.

Connect members to building framing. Provide supporting brackets

adjustments for the accurate location of curtain-wall components. Adjustable connections must be rigidly fixed after members have been positioned.

3.3.8 Joint Sealants

3.3.8.1 Surface Preparation

Surfaces to be primed and sealed must be clean, dry to the touch, free from frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter. Enclose joints on three sides. Clean out grooves to proper depth. Joint dimensions must conform to approved detail drawings with a tolerance of plus 1/8 inch. Do not apply compound unless ambient temperature is between 40 and 90 degrees F. Clean out loose particles and mortar just before sealing. Remove protective coatings or coverings from surfaces in contact with sealants before applying sealants or tapes. Solvents used to remove coatings must be of type that leave no residue on metals.

3.3.8.2 Applications

Match approved sample. Force compound into grooves with sufficient pressure to fill grooves solidly. Sealing compound must be uniformly smooth and free of wrinkles and, unless indicated otherwise, tooled and left sufficiently convex to result in a flush joint when dry. Do not trim edges of sealing material after joints are tooled. Mix only amount of multi-component sealant which can be installed within four hours, not to exceed 5 gallons at any given time.

3.3.8.3 Primer

Apply to masonry, concrete, wood, and other surfaces as recommended by sealant manufacturer. Do not apply primer to surfaces which will be exposed after caulking is completed.

3.3.8.4 Backing

Tightly pack in bottom of joints which are over 1/2 inch in depth with specified backing material to depth indicated or specified. Roll backing material of hose or rod stock into joints to prevent lengthwise stretching.

3.3.8.5 Bond Prevention

Install bond preventive material at back or bottom of joint cavities in which no backstop material is required, covering full width and length of joint cavities.

3.3.8.6 Protection and Cleaning

Remove compound smears from surfaces of materials adjacent to sealed joints as the work progresses. Use masking tape on each side of joint where texture of adjacent material will be difficult to clean. Remove masking tape immediately after filling joint. Scrape off fresh compound from adjacent surfaces immediately and rub clean with approved solvent. Upon completion of caulking and sealing, remove remaining smears, stains, and other soiling, and leave the work in clean neat condition.

3.4 FINISHES

3.4.1 Galvanizing

Conform to ASTM A123/A123M, ASTM A153/A153M, and ASTM A653/A653M, as applicable.

3.4.1.1 Repair of Zinc-Coated Surfaces

Repair zinc coated surfaces damaged by welding or other means with galvanizing repair paint or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved.

3.4.2 Shop Cleaning and Painting

3.4.2.1 Cleaning

Clean steel and iron work by power wire brushing or other approved manual or mechanical means, for removal of rust, loose paint, scale, and deleterious substances. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other foreign matter, with solvents until thoroughly clean in accordance with SSPC SP 12/NACE No.5. Cleaning steel embedded in concrete is not required.

3.4.2.2 Painting Steel or Iron Surfaces

Apply one coat of primer. Apply additional shop coat of specified paint, to which a small amount of tinting material has been added, on surfaces that will be concealed in the finished construction or that will not be accessible for finish painting. Accomplish painting in dry weather or under cover, and on steel or iron surfaces that are free from moisture and frost. Do not paint surfaces of items to be embedded in concrete. Recoat damaged surfaces upon completion of work. Prime coat steel immediately after cleaning. Do not apply bituminous protective coatings to items to be finish painted.

3.5 FIELD TESTS

Notify the Contracting Officer a minimum of seven calendar days prior to performing field tests. Conduct field check test for water leakage on designated wall areas after erection. Conduct test on two wall areas. Conduct test and take necessary remedial action as described in AAMA 501.1.

3.6 CLEANING AND PROTECTION

3.6.1 General

At the completion of the installation, clean the work to remove mastic smears and other foreign materials.

3.6.2 Manufacturer's Information

Preventive Maintenance and Inspection must consist of the aluminum manufacturer's recommended cleaning materials and application methods, including detrimental effects to the aluminum finish when improperly applied.

3.6.3 Glass

Upon completion of wall system installation, thoroughly wash glass surfaces on both sides and remove labels, paint spots, putty, compounds, and other defacements. Replace cracked, broken, and defective glass with new glass at no additional cost to the Government.

3.6.4 Aluminum Surfaces

Protection methods, cleaning, and maintenance must be in accordance with AAMA 609 & 610.

3.6.5 Other Metal Surfaces

After installation, protect windows, panels, and other exposed surfaces from disfiguration, contamination, contact with harmful materials, and from other construction hazards that will interfere with their operation, or damage their appearance or finish. Protection methods must be in accordance with recommendations of product manufacturers or of the respective trade association. Remove paper or tape factory applied protection immediately after installation. Clean surfaces of mortar, plaster, paint, smears of sealants, and other foreign matter to present neat appearance and prevent fouling of operation. In addition, wash with a stiff fiber brush, soap and water, and thoroughly rinse. Where surfaces become stained or discolored, clean or restore finish in accordance with recommendations of product manufacturer or the respective trade association.

3.7 INSPECTION AND ACCEPTANCE PROVISIONS

3.7.1 Finished Curtain-Wall System Requirements

Curtain-wall work which contains any of the following deficiencies, is unacceptable, and will be rejected:

Finish of exposed-to-view aluminum having color and appearance that are outside the color and appearance range of the approved samples.

Installed curtain-wall components having stained, discolored, abraded, or otherwise damaged exposed-to-view surfaces that cannot be cleaned or repaired.

Aluminum surfaces in contact with dissimilar materials that are not protected as specified.

3.7.2 Repair of Defective Work

Remove and replace defective work with curtain-wall materials that meet the specifications at no expense to the Government.

-- End of Section --

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SECTION 08 71 00

DOOR HARDWARE
02/16

PART 1 GENERAL

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.

ASTM INTERNATIONAL (ASTM)

ASTM E283	(2004; R 2012) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM F883	(2013) Padlocks

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.1	(2013) Butts and Hinges
ANSI/BHMA A156.13	(2012) Mortise Locks & Latches Series 1000
ANSI/BHMA A156.14	(2013) Sliding and Folding Door Hardware
ANSI/BHMA A156.15	(2015) Release Devices Closer Holder, Electromagnetic and Electromechanical
ANSI/BHMA A156.16	(2013) Auxiliary Hardware
ANSI/BHMA A156.18	(2016) Materials and Finishes
ANSI/BHMA A156.21	(2014) Thresholds
ANSI/BHMA A156.22	(2012) Door Gasketing and Edge Seal Systems
ANSI/BHMA A156.25	(2013) Electrified Locking Devices
ANSI/BHMA A156.29	(2012) Exit Locks, Exit Alarms, Alarms for Exit Devices
ANSI/BHMA A156.3	(2014) Exit Devices
ANSI/BHMA A156.30	(2014) High Security Cylinders
ANSI/BHMA A156.31	(2013) Electric Strikes and Frame Mounted Actuators
ANSI/BHMA A156.36	(2010) Auxiliary Locks
ANSI/BHMA A156.4	(2013) Door Controls - Closers

ANSI/BHMA A156.5	(2014) Cylinder and Input Devices for Locks
ANSI/BHMA A156.6	(2015) Architectural Door Trim
ANSI/BHMA A156.7	(2016) Template Hinge Dimensions
ANSI/BHMA A156.8	(2015) Door Controls - Overhead Stops and Holders

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(2021) Life Safety Code
NFPA 252	(2017) Standard Methods of Fire Tests of Door Assemblies
NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code
NFPA 72	(2019; TIA 19-1; ERTA 1 2019) National Fire Alarm and Signaling Code
NFPA 80	(2016; TIA 16-1) Standard for Fire Doors and Other Opening Protectives

STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR A250.8	(2003; R2008) Recommended Specifications for Standard Steel Doors and Frames

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir	(updated continuously online) Building Materials Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00.00 06 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Manufacturer's Detail Drawings; G

Hardware Schedule; G

Keying System; G

SD-03 Product Data

Hardware Items; G

SD-08 Manufacturer's Instructions

Installation

SD-10 Operation and Maintenance Data

Hardware Schedule Items, Data Package 1; G

SD-11 Closeout Submittals

Key Bitting

1.3 SHOP DRAWINGS

Submit manufacturer's detail drawings indicating all hardware assembly components and interface with adjacent construction. Indicate power components and wiring coordination for electrified hardware. Base shop drawings on verified field measurements and include verification of existing conditions.

1.4 PRODUCT DATA

Indicate fire-ratings at applicable components. Provide documentation of ABA/ADA accessibility compliance of applicable components, as required by 36 CFR 1191 Appendix D - Technical.

1.5 HARDWARE SCHEDULE

Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publi-cation Type No.	Finish	Mfr Name and Catalog No.	Key Control Symbols	UL Mark (If fire-rated and listed	BHMA Finish Desig-nation

In addition, submit hardware schedule data package 1 in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

1.6 KEY BITTING CHART REQUIREMENTS

1.6.1 Requirements

Submit key bitting charts to the Contracting Officer prior to completion of the work. Include:

a. Complete listing of all keys (e.g. AA1 and AA2).

b. Complete listing of all key cuts (AA1-123456, AA2-123458).

c. Tabulation showing which key fits which door.

d. Copy of floor plan showing doors and door numbers.

e. Listing of 20 percent more key cuts than are presently required in each master system.

1.7 QUALITY ASSURANCE

1.7.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, hinges, and closers of one lock, hinge, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

1.7.2 Key Shop Drawings Coordination Meeting

Prior to the submission of the key shop drawing, the Contractor, Door Hardware Subcontractor, using Activity and Base Locksmith must meet to discuss and coordinate key requirements for the facility.

1.8 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown on hardware schedule. Deliver permanent keys and removable cores to the UCF Locksmith, either directly or by certified mail. Deliver construction master keys with the locks.

PART 2 PRODUCTS

2.1 TEMPLATE HARDWARE

Hardware applied to metal or to prefinished doors must be manufactured using a template. Provide templates to door and frame manufacturers in accordance with ANSI/BHMA A156.7 for template hinges. Coordinate hardware items to prevent interference with other hardware.

2.2 HARDWARE FOR FIRE DOORS AND EXIT DOORS

Provide all hardware necessary to meet the requirements of NFPA 72 for door alarms, NFPA 80 for fire doors, NFPA 101 for exit doors, NFPA 252 for fire tests of door assemblies, ABA/ADA accessibility requirements, and all other requirements indicated, even if such hardware is not specifically mentioned in paragraph HARDWARE SCHEDULE. Provide Underwriters Laboratories, Inc. labels for such hardware in accordance with UL Bld Mat Dir or equivalent labels in accordance with another testing laboratory approved in writing by the Contracting Officer.

2.3 HARDWARE ITEMS

Clearly and permanently mark with the manufacturer's name or trademark, hinges, pivots, locks, latches, exit devices, bolts and closers where the identifying mark is visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

2.3.1 Hinges

Provide in accordance with ANSI/BHMA A156.1. Provide hinges that are 4-1/2 by 4-1/2 inch unless otherwise indicated. Construct loose pin hinges for interior doors and reverse-bevel exterior doors so that pins are

non-removable when door is closed.

2.3.2 Locks and Latches

2.3.2.1 Mortise Locks and Latches

Provide in accordance with ANSI/BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2. Provide mortise locks with escutcheons not less than 7 by 2-1/4 inch with a bushing at least 1/4 inch long. Cut escutcheons to fit cylinders and provide trim items with straight, beveled, or smoothly rounded sides, corners, and edges. Provide knobs and roses of mortise locks with screwless shanks and no exposed screws.

2.3.2.2 Auxiliary Locks

Provide in accordance with ANSI/BHMA A156.36, Grade 1.

2.3.2.3 Pedestrian Door Lock Assembly Preassembled, Panic and Auxiliary Deadbolt

Federal Specification FF-L-2890B Amendment 3 (Type II) PDPL - meeting ANSI/BHMA A156.2 Grade 1 F44 keyless access control - combination preassembled lock; PDPL with integrated, fail secure, electronic release capability for use with automated building access control system, with auxiliary automatic deadbolt FF-L-2740 electromechanical combination lock, life safety and ADA and ABA compliant one-function egress mechanism. Fitted with an exterior key bypass that will allow entry without use of the access control when the combination lock bolt is retracted (removal of the key cylinder shall not permit access to the FF-L-2740 lock mechanism).

Federal Specification FF-L-2890B (Type IV) PDLAP - meeting ANSI/BHMA A156.3 Grade 1 Type I keyless access control - rim lock exit device. Type IV - PDLAP with integrated, fail secure, electronic release capability for use with existing automated building access control system, FF-L-2740 electromechanical combination lock, life safety and ADA and ABA compliant one-function egress mechanism with fire rated panic hardware. Fitted with an exterior key bypass that will allow entry without use of the access control when the combination lock bolt is retracted (removal of the key cylinder shall not permit access to the FF-L-2740 lock mechanism).

2.3.3 Exit Devices

Provide in accordance with ANSI/BHMA A156.3, Grade 1. Provide adjustable strikes for rim type and vertical rod devices. Provide open back strikes for pairs of doors with mortise and vertical rod devices. Provide touch bars in lieu of conventional crossbars and arms. Provide escutcheons not less than 7 by 2-1/4 inch.

2.3.4 Exit Locks With Alarm

Provide in accordance with ANSI/BHMA A156.3 and ANSI/BHMA A156.29, Type E0431 (with full width horizontal actuating bar) for single doors; Type E0431 (with actuating bar) or E0471 (with actuating bar and top and bottom bolts, both leaves active) for pairs of doors, unless otherwise specified.

2.3.5 Cylinders and Cores

Provide cylinders and cores for new locks, including locks provided under other sections of this specification. Provide cylinders and cores with

seven pin tumblers. Provide cylinders from the products of one manufacturer, and provide cores from the products of one manufacturer, (cylinders and cores must be Scott AFB standard locks). Rim cylinders, mortise cylinders, and knobs of bored locksets have interchangeable cores which are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core. Provide temporary combinated (Construction) cores for all cylinders/locks to use during construction. Provide operational GR1, SEC GR1 locks with UL 437 (Level A) cylinders and forged escutcheon trim where indicated.

2.3.5.1 High Security Cylinders (Doors in Security Perimeter Wall

Provide in accordance with ANSI/BHMA A156.30, security level A for all high security cylinder components.

2.3.6 Electrified Hardware

Comply with the requirements of NFPA 70 for wiring of electrified hardware.

2.3.6.1 Electric Strikes and Frame Mounted Actuators

Provide in accordance with ANSI/BHMA A156.31, Grade 1. Provide electric strikes and actuators as required to meet operational requirements. Provide electric strikes that remain secure during power failure. Provide a separate power supply for electric strikes, other locking devices and ancillary parts. Provide strikes and actuators with a minimum opening force of 2300 pounds.

Provide facility interface devices that use direct current (dc) power to energize the solenoids. Provide electric strikes and actuators that incorporate end-of-line resistors to facilitate line supervision by the system. If not incorporated into the electric strike or local controller, provide metal oxide resistors (MOVs) to protect the controller from reverse current surges.

2.3.6.1.1 Solenoid

Provide actuating solenoid for strikes and actuators that are rated for continuous duty, cannot dissipate more than 12 Watts and must operate on 12 or 24 Volts dc. Inrush current cannot exceed 1 ampere and the holding current cannot be greater than 500 milliamperes. Actuating solenoid must move from fully secure to fully open positions in less than 500 milliseconds.

2.3.6.1.2 Signal Switches

Provide strikes and actuators with signal switches to indicate to the system when the bolt is not engaged or the strike mechanism is unlocked. Signal switches must report a forced entry to the system.

2.3.6.1.3 Tamper Resistance

Provide strike guards that prevent tampering with the latch bolt of the locking hardware or the latch bolt keeper of the electric strike. Strike guards to bolt through the door using tamper resistant screws. Provide strike guards made of 1/8 inch thick brass and that are 11-1/14 inch high by 1-5/8 inch wide, with a minimum 5/32 inch wide offset.

2.3.6.1.4 Coordination

Provide electric strikes and actuators of a size, weight and profile compatible with each specified door frame. Field verify installation clearances prior to procurement.

2.3.6.1.5 Mounting Method

Provide electric strikes and actuators suitable for use with single and double doors, with mortise or rim type hardware specified, and for right or left hand mounting as specified. In double door installations, locate the lock in the active leaf and monitor the fixed leaf.

2.3.6.2 Electrified Mortise Locks

Provide in accordance with ANSI/BHMA A156.25, Grade 1. Provide electrified mortise locks that remain secure during power failure (except stair exit doors to be rail safe). Provide facility interface devices that use dc power to energize solenoids. Provide solenoids, resisters, and signal switches in accordance with paragraph ELECTRIC STRIKES AND FRAME MOUNTED ACTUATORS.

2.3.6.2.1 Power Transfer

Provide power transfer with each electrified lock that route power and monitoring signals from the lockset to the door frame. Coordinate power transfer with door frames.

2.3.6.3 GFGI Card Readers and Keypad Access Control System

Coordinate access control hardware, power and wiring, with corresponding devices and systems being provided and installed by the Government (GFGI) by another contract to provide a complete and operational door locking system.

2.3.6.4 Release Devices

In accordance with ANSI/BHMA A156.15, Grade 1.

2.3.7 Keying System

Provide a grand master keying system. Provide key cabinet as specified.

2.3.8 Lock Trim

Provide cast, forged, or heavy wrought construction and commercial plain design for lock trim.

2.3.8.1 Lever Handles

Provide lever handles where indicated in the Hardware Schedule. Provide in accordance with ANSI/BHMA A156.3 for mortise locks of lever handles for exit devices. Provide lever handle locks with a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when force in excess of that specified in ANSI/BHMA A156.13 is applied to the lever handle. Provide lever handles return to within 1/2 inch of the door face.

2.3.9 Keys

Furnish one file key, one duplicate key, and one working key for each key change and for each master keying system. Furnish one additional working key for each lock of each keyed-alike group. Furnish 5 construction master keys, and 5 control keys for removable cores. Furnish a quantity of key blanks equal to 20 percent of the total number of file keys. Stamp one side with - "Do not duplicate" and other side with master key designation. Do not place room number on keys.

2.3.10 Door Bolts

Provide in accordance with ANSI/BHMA A156.16. Provide dustproof strikes for bottom bolts, except at doors having metal thresholds. Provide automatic latching flush bolts in accordance with ANSI/BHMA A156.3, Type 25.

2.3.11 Closers

Provide in accordance with ANSI/BHMA A156.4, Series C02000, Grade 1, with PT 4C. Provide with brackets, arms, mounting devices, fasteners, full size covers, except at storefront mounting, and other features necessary for the particular application. Size closers in accordance with manufacturer's printed recommendations, or provide multi-size closers, Sizes 1 through 6, and list sizes in the Hardware Schedule. Provide manufacturer's 10 year warranty.

2.3.11.1 Identification Marking

Engrave each closer with manufacturer's name or trademark, date of manufacture, and manufacturer's size designation in locations that will be visible after installation.

2.3.12 Overhead Holders

Provide in accordance with ANSI/BHMA A156.8.

2.3.13 Door Protection Plates

Provide in accordance with ANSI/BHMA A156.6.

2.3.13.1 Sizes of Mop and Kick Plates

2 inch less than door width for single doors; 1 inch less than door width for pairs of doors. Provide 10 inch kick plates for flush doors. Provide 4 inch mop plates.

2.3.13.2 Edge Guards

Stainless steel, of same height as armor plates. Apply to lock stile.

2.3.14 Door Stops and Silencers

Provide in accordance with ANSI/BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair.

2.3.15 Padlocks

Provide in accordance with ASTM F883.

2.3.16 Thresholds

Provide in accordance with ANSI/BHMA A156.21. Use J35100, with vinyl or silicone rubber insert in face of stop, for exterior doors opening out, unless specified otherwise.

2.3.17 Weatherstripping Gasketing

Provide in accordance with ANSI/BHMA A156.22. Provide the type and function designation where specified in paragraph HARDWARE SCHEDULE. Provide a set to include head and jamb seals and, for pairs of doors, astragals. Air leakage of weatherstripped doors not to exceed 0.5 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E283. Provide weatherstripping with one of the following:

2.3.17.1 Extruded Aluminum Retainers

Extruded aluminum retainers not less than 0.050 inch wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Provide clear (natural) anodized aluminum.

2.3.17.2 Interlocking Type

Zinc or bronze not less than 0.018 inch thick.

2.3.17.3 Spring Tension Type

Spring bronze or stainless steel not less than 0.008 inch thick.

2.3.18 Soundproofing Gasketing

Provide in accordance with ANSI/BHMA A156.22. Provide adjustable doorstops at heads,jambs and automatic door bottoms in accordance with the hardware set, of extruded aluminum, clear (natural) anodized, surface applied, with vinyl fin seals between plunger and housing. Provide doorstops with solid neoprene tube, silicone rubber, or closed cell sponge gasket. Provide door bottoms with adjustable operating rod and silicone rubber or closed cell sponge neoprene gasket. Provide doorstops that are mitered at corners. Provide type and function designation where specified in paragraph HARDWARE SETS.

2.3.19 Auxiliary Hardware (Other than locks)

Provide in accordance with ANSI/BHMA A156.16, Grade 1.

2.3.20 Sliding and Folding Door Hardware

Provide in accordance with ANSI/BHMA A156.14, Grade 1. Finishes to match other hardware specified herein.

2.3.21 Special Tools

Provide special tools, such as spanner and socket wrenches and dogging keys, as required to service and adjust hardware items.

2.4 FASTENERS

Provide fasteners of type, quality, size, and quantity appropriate to the

specific application. Fastener finish to match hardware. Provide stainless steel or nonferrous metal fasteners in locations exposed to weather. Verify metals in contact with one another are compatible and will avoid galvanic corrosion when exposed to weather.

2.5 FINISHES

Provide in accordance with ANSI/BHMA A156.18. Provide hardware in BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except prime coat finish for surface door closers, and except BHMA 652 finish (satin chromium plated) for steel hinges. Provide hinges for exterior doors in stainless steel with BHMA 630 finish or chromium plated brass or bronze with BHMA 626 finish. Furnish exit devices in BHMA 626 finish in lieu of BHMA 630 finish except where BHMA 630 is specified under paragraph HARDWARE SETS. Match exposed parts of concealed closers to lock and door trim. Match hardware finish for aluminum doors to the doors.

2.6 KEY CABINET AND CONTROL SYSTEM

Provide in accordance with ANSI/BHMA A156.5, Type required to yield a capacity (number of hooks) 50 percent greater than the number of key changes used for door locks.

PART 3 EXECUTION

3.1 INSTALLATION

Provide hardware in accordance with manufacturers' printed installation instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

3.1.1 Weatherstripping Installation

Provide full contact, weathertight seals that allow operation of doors without binding the weatherstripping.

3.1.1.1 Stop Applied Weatherstripping

Fasten in place with color matched sheet metal screws not more than 9 inch on center after doors and frames have been finish painted.

3.1.1.2 Interlocking Type Weatherstripping

Provide interlocking, self adjusting type on heads and jambs and flexible hook type at sills. Nail weatherstripping to door 1 inch on center and to heads and jambs at 4 inch on center.

3.1.1.3 Spring Tension Type Weatherstripping

Provide spring tension type on heads and jambs. Provide bronze nails with bronze. Provide stainless steel nails with stainless steel. Space nails not more than 1-1/2 inch on center.

3.1.2 Soundproofing Installation

Install as required by acoustic door manufacturer for the acoustic (STC/FSTC) tested assembly.

3.1.3 Threshold Installation

Extend thresholds the full width of the opening and notch end for jamb stops. Set thresholds in a full bed of sealant and anchor to floor with cadmium-plated, countersunk, steel screws in expansion sleeves.

3.2 FIRE DOORS AND EXIT DOORS

Provide hardware in accordance with NFPA 72 for door alarms, NFPA 80 for fire doors, NFPA 101 for exit doors, and NFPA 252 for fire tests of door assemblies.

3.3 HARDWARE LOCATIONS

Provide in accordance with SDI/DOOR A250.8, unless indicated or specified otherwise.

a. Kick and Armor Plates: Push side of single-acting doors. Both sides of double-acting doors.

b. Mop Plates: Bottom flush with bottom of door.

3.4 KEY CABINET AND CONTROL SYSTEM

Locate where directed. Tag one set of file keys and one set of duplicate keys. Place other keys in appropriately marked envelopes, or tag each key. Provide complete instructions for setup and use of key control system. On tags and envelopes, indicate door and room numbers or master or grand master key.

3.5 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that testing can be witnessed by the Contracting Officer. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Demonstrate that permanent keys operate respective locks, and give keys to the Contracting Officer. Correct, repair, and finish, errors in cutting and fitting and damage to adjoining work.

3.6 DOOR HARDWARE SETS

Hardware sets are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

Products listed in the Door Hardware Sets must meet the requirements described in the specification sections noted.

a. Section 08 71 00 - Door Hardware.

Manufacturer's Abbreviations:

1. MK - McKinney
2. OT - Other
3. MR - Merkar
4. PE - Pemko
5. SU - Securitron
6. RF - Rixson
7. RO - Rockwood
8. SA - Sargent
9. YA - Yale
10. AD - Admas Rite
11. KA - Kaba Ilco
12. MC - Medeco
13. HS - HES
14. NO - Norton
15. SD - Security Door Controls

3.7 HARDWARE SETS

-- End of Section --

PMEL B267

Hardware Sets

Set: 1.0

Doors: 163

Description: EXT - LAB PR - STC

0	Cam lift hinge	By STC door mfg		OT
1	Removable Mullion (Type 22)	KRM200FWS - DOOR HEIGHT	600	YA
1	Exit Device (Type 1, 01)	7150 WS EO	630	YA
1	Exit Device (Type 1, 03)	7150 WS AU627F	630	YA
1	Interchangeable Core (E09241)	33600006N	26	MC
1	Mortise Cylinder Housing (E09251)	K660	626	YA
1	Mortise Mullion Cylinder Housing (E09251)	K660	626	YA
2	Surface Closer (C02021-PT4G)	3531	689	YA
2	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	STC Gasketing	BY STC door mfg		OT
1	Astragal (R0Y154)	S772D [mtg on mull]		PE

Notes: Hinges, perimeter seals. door bottom, and threshold provided by acoustic door mfg to meet STC and ADA opening requirements.
Install perimeter seal prior to closer, hardware. Special templating required.
Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 2.0

Doors: 150, 172

Description: EXT - SHIPPING PR

6	Hinge (A5111)	T4A3386	US32D	MK
2	Surface Bolt	988	Bright Zinc	SA
1	Dormitory Lock (F13)	AUR 8822FL Temp Core	626	YA
1	Interchangeable Core (E09241)	33600006N	26	MC
2	Surface Closer (C02021-PT4G)	3531	689	YA
2	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Threshold (35100)	2705AT		PE
1	Gasketing (R3E164)	2891AS - Head		PE

1	Gasketing (R3G164)	290AS - Jamb		PE
2	Sweep (R3D534)	345AV		PE
1	Position Switch (E08)*	DPS-M-BK		SU

Notes: Door position switch to signal door open / closed to the access control system.
Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 3.0

Doors: 115
Description: EXT - ELEC

1	Continuous Hinge (A31031G)	CFM (height) HD1		PE
1	Exit Device (Type 1, 03)	7150 WS AU627F	630	YA
1	Interchangeable Core (E09241)	33600006N	26	MC
1	Mortise Cylinder Housing (E09251)	K660	626	YA
1	Surface Closer (C02021-PT4G)	3531	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Threshold (35100)	2705AT		PE
1	Gasketing (R3E164)	2891AS - Head		PE
1	Gasketing (R3G164)	290AS - Jamb		PE
1	Sweep (R3D534)	345AV		PE
1	Position Switch (E08)*	DPS-M-BK		SU

Notes: Door position switch to signal door open / closed to the access control system.
Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 4.0

Doors: S1A
Description: STAIR - RATED

3	Hinge (A8111)	T4A3786	US26D	MK
1	Exit Device (Type 1, 14)	7100F AU628F	630	YA
1	Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1	Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 5.0

Doors: 151A
Description: SHIPPING PR - EAC

6	Hinge (A8112)	TA2714	US26D	MK
2	Flush Bolt (L04251/L04261)	555/557 (TO SUIT)	US26D	RO
1	Dust Proof Strike (L04021)	570	US26D	RO
1	Fail Secure Lock (E01, E06)	AUR 8891FL Temp Core REX	626	YA
1	Interchangeable Core (E09241)	33600006N	26	MC
2	Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
2	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C___		MK
1	Card Reader	BY SECURITY INTEGRATOR		
2	Position Switch (E08)*	By access control - Prep by D/F mfg		SU
1	Power Supply*	AQDxx (TO SUIT)		SU

Notes: Presenting a valid credential releases the lever to allow free entry, door relocks upon closing.
REX (request to exit) switch in the lock allow for free exit at all times
Entry by key override at all times
Door is fail secure

Set: 6.0

Doors: 154, 160A
Description: LAB - EAC- A/O [INTERLOCK] *****

0	Cam lift hinge	By STC door mfg		OT
2	Magnetic Lock (E18501)*	M680EBDX	628	SU
2	Automatic Opener	6000 Series - Mtg as required	689	NO
2	Kick Plate (J102)	K1050 10" CSK	US32D	RO
2	Mop Plate (J103)	K1050 6" CSK	US32D	RO
2	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1	STC Gasketing	BY STC door mfg		OT
1	Pushbutton [Inside]	CB401-AU		SD
1	Pushbutton [Outside]	CB401-B		SD
2	Wall Switch	700		NO
1	Power Supply*	AQDxx (TO SUIT)		SU

Notes: Two door interlock system; doors shall be normally unlocked. Both doors must be closed to lock. The Wave actuator activates the auto operator to open and close the door. Pressing the CB401A push button will lock both doors. Egress by pressing the CB401A push button again. Emergency release by activating either of the CB401B push buttons. Both doors will unlock automatically via signal from the fire alarm.

Set: 7.0

Doors: 160B
Description: LAB PR [EO]

6	Cam lift hinge	By STC door mfg		OT
2	Exit Device (Type 8, 01)	7170 EO	630	YA
2	Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
2	Kick Plate (J102)	K1050 10" CSK	US32D	RO
2	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1	STC Gasketing	BY STC door mfg		OT

Set: 8.0

Doors: 151B
Description: OPEN OFFICE - EAC-CR [STC]

3	Hinge (A8112)	TA2714	US26D	MK
1	Electric Power Transfer*	EL-CEPT		SU
1	Fail Secure Lock (E01, E06)	AUR 8891FL Temp Core REX	626	YA
1	SFIC Core - 7-Pin	Match base standard	626	
1	Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
3	Silencer (L03011)	608		RO
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C___		MK
1	Card Reader	BY SECURITY INTEGRATOR		
1	Position Switch (E08)*	By access control - Prep by D/F mfg		SU
1	Power Supply*	AQDxx (TO SUIT)		SU

Notes:

Set: 9.0

Doors: 155
Description: BAYS

3	Hinge (A5112)	TA2314	US32D	MK
1	Classroom Lock (F05)	AUR 8808FL Temp Core	626	YA
1	Interchangeable Core (E09241)	33600006N	26	MC
1	Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1	Threshold ********	271A		PE
1	Adhesive Gasketing (R0Y154)	S88BL		PE
1	Sweep (R3D534)	345AV		PE

Set: 10.0

Doors: 255, 256
Description: BREAK

3	Hinge (A8112)	TA2714	US26D	MK
1	Classroom Lock (F05)	AUR 8808FL Temp Core	626	YA
1	Interchangeable Core (E09241)	33600006N	26	MC
1	Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Mop Plate (J103)	K1050 6" CSK	US32D	RO
3	Silencer (L03011)	608		RO

Set: 11.0

Doors: 252, 254
Description: RESTROOM

3	Hinge (A8112)	TA2714	US26D	MK
1	Push Plate (J301)	70C-RKW	US32D	RO
1	Door Pull w/ Plate (J405	BF 110x70C	US32D	RO
1	Surface Closer (C02011 / C02021)	R/PR3501 (TO SUIT)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Mop Plate (J103)	K1050 6" CSK	US32D	RO
1	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
3	Silencer (L03011)	608		RO

Set: 12.0

Doors: 151C
Description: MEP PR

6	Hinge (A8112)	TA2714	US26D	MK
2	Flush Bolt (L04251/L04261)	555/557 (TO SUIT)	US26D	RO
1	Dust Proof Strike (L04021)	570	US26D	RO
1	Storeroom Lock (F07)	AUR 8805FL Temp Core	626	YA
1	SFIC Core - 7-Pin	Match base standard	626	
2	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
2	Silencer (L03011)	608		RO

Set: 13.0

Doors: 152, 153
Description: OFFICE - EAC

3	Hinge (A8112)	TA2714	US26D	MK
1	Fail Secure Lock (E01, E06)	AUR 8891FL Temp Core REX	626	YA
1	Interchangeable Core (E09241)	33600006N	26	MC
1	Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C___		MK
1	Card Reader	BY SECURITY INTEGRATOR		
1	Position Switch (E08)*	By access control - Prep by D/F mfg		SU
1	Power Supply*	AQDxx (TO SUIT)		SU

Notes: Presenting a valid credential releases the lever to allow free entry, door relocks upon closing.
REX (request to exit) switch in the lock allow for free exit at all times
Entry by key override at all times
Door is fail secure

Set: 14.0

Doors: 161, 162
Description: OFFICE - EAC [STC]

0	Cam lift hinge	By STC door mfg		OT
1	Fail Secure Lock (E01, E06)	AUR 8891FL Temp Core REX	626	YA
1	Interchangeable Core (E09241)	33600006N	26	MC
1	Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	STC Gasketing	BY STC door mfg		OT

1 Frame Harness	QC-C1500P		MK
1 Door Harness	QC-C___		MK
1 Card Reader	BY SECURITY INTEGRATOR		
1 Position Switch (E08)*	By access control - Prep by D/F mfg		SU
1 Power Supply*	AQDxx (TO SUIT)		SU

Notes: Presenting a valid credential releases the lever to allow free entry, door relocks upon closing.
REX (request to exit) switch in the lock allow for free exit at all times
Entry by key override at all times
Door is fail secure

Set: 15.0

Description: COMM

3 Hinge (A8112)	TA2714	US26D	MK
1 Storeroom Lock (F07)	AUR 8805FL Temp Core	626	YA
1 Interchangeable Core (E09241)	33600006N	26	MC
1 Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
3 Silencer (L03011)	608		RO

Set: 16.0

Doors: 253

Description: JAN

3 Hinge (A8112)	TA2714	US26D	MK
1 Storeroom Lock (F07)	AUR 8805FL Temp Core	626	YA
1 Interchangeable Core (E09241)	33600006N	26	MC
1 Mop Plate (J103)	K1050 6" CSK	US32D	RO
1 Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 17.0

Doors: 173

Description: OFFICE

3 Hinge (A8112)	TA2714	US26D	MK
1 Office Lock (F04)	AUR 8807FL Temp Core	626	YA
1 Interchangeable Core (E09241)	33600006N	26	MC
1 Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO

3	Silencer (L03011)	608		RO

Set: 18.0

Doors: G1
Description: GATE

4	Gate hardware	By gate mfg		OT

LOX PLANT B370

Set: 1.0

Doors: 103A
Description: EXT BAY PR [STC]

0	Cam lift hinge	By STC door mfg		OT
1	Removable Mullion (Type 22)	KRM200FWS - DOOR HEIGHT	600	YA
1	Exit Device (Type 1, 01)	7150 WS EO	630	YA
1	Exit Device (Type 1, 03)	7150 WS AU627F	630	YA
2	Interchangeable Core (E09241)	33600006N	26	MC
1	Mortise Cylinder Housing (E09251)	K660	626	YA
1	Mortise Mullion Cylinder Housing (E09251)	K660	626	YA
2	Surface Closer (C02021-PT4G)	3531	689	YA
2	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Threshold (J36100)	2009APK		PE
1	STC Gasketing	BY STC door mfg		OT
1	Astragal (R0Y154)	S772D [mtg on mull]		PE

Notes: Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 2.0

Doors: 105
Description: EXT - EXT PR

6	Hinge (A5111)	T4A3386	US32D	MK

1	Removable Mullion (Type 22)	KRM200FWS - DOOR HEIGHT	600	YA
1	Exit Device (Type 1, 01)	7150 WS EO	630	YA
1	Exit Device (Type 1, 03)	7150 WS AU627F	630	YA
1	Interchangeable Core (E09241)	33600006N	26	MC
1	Mortise Cylinder Housing (E09251)	K660	626	YA
1	Mortise Mullion Cylinder Housing (E09251)	K660	626	YA
2	Surface Closer (C02021-PT4G)	3531	689	YA
2	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Threshold (J36100)	2009APK		PE
1	Gasketing (R3E164)	2891AS - Head		PE
1	Gasketing (R3G164)	290AS - Jamb		PE
2	Sweep (R3D534)	345AV		PE
2	Astragal (R0Y154)	S772D [mtg on mull]		PE

Notes: Hinges, perimeter seals. door bottom, and threshold provided by acoustic door mfg to meet STC and ADA opening requirements.
Install perimeter seal prior to closer, hardware. Special templating required.
Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 3.0

Doors: 101B, 102A

Description: EXT - BAY [STC]

3	Cam lift hinge	By STC door mfg		OT
1	Exit Device (Type 1, 03)	7150 WS AU627F	630	YA
1	Interchangeable Core (E09241)	33600006N	26	MC
1	Mortise Cylinder Housing (E09251)	K660	626	YA
1	Surface Closer (C02021-PT4G)	3531	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Threshold (35100)	2705AT		PE
1	STC Gasketing	BY STC door mfg		OT
1	Position Switch (E08)*	DPS-M-BK		SU

Notes: Door position switch to signal door open / closed to the access control system.
Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 4.0

Doors: 106

Description: EXT MEP

3	Hinge (A5112)	TA2314	US32D	MK
1	Storeroom Lock (F07)	AUR 8805FL Temp Core	626	YA
1	Interchangeable Core (E09241)	33600006N	26	MC
1	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1	Threshold (J36100)	2009APK		PE
1	Gasketing (R3E164)	2891AS - Head		PE
1	Gasketing (R3G164)	290AS - Jamb		PE
1	Sweep (R3D534)	345AV		PE

Set: 5.0

Doors: 102B, 103B
Description: BAY - RATED

3	Hinge (A8111)	T4A3786	US26D	MK
1	Passage Latch (F01)	AUR 8801FL	626	YA
1	Surface Closer (C02021-PT4G)	2721	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1	Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 6.0

Doors: 104
Description: TOILET

3	Hinge (A8112)	TA2714	US26D	MK
1	Privacy Lock	AUR 8802FL IND	626	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Mop Plate (J103)	K1050 6" CSK	US32D	RO
1	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1	Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 7.0

Doors: G1
Description: GATE

4	Gate hardware	By gate mfg		OT

Set: 8.0

OSI BUILDING

Hardware Sets

Set: 1.0

Doors: 100
Description: EXT LOBBY PRP - ALUM

2 Continuous Hinge (A31031G)	CFM (height) HD1		PE
1 Exit Device (Type 8, 3)	AD8610 106	US32D	SA
1 Exit Device (Type 8, 01)	AD8610 EO	US32D	SA
1 Mortise Cylinder Housing (E09251)	K660	626	YA
1 Cylinder	TYPE AS REQUIRED	626	
2 Overhead Stop (C01541)	1ADJ-X36	652	RF
2 Surface Closer (C02011 / C02021)	R/PR3501 (TO SUIT)	689	YA
1 Threshold (35100)	2705AT		PE
1 Gasketing	by door / frame mfg		

Notes: Perimeter seal and astragal by door supplier.
Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 2.0

Doors: 102A, 102B
Description: EXT - CORR [CIPHER]

1 Continuous Hinge (A31031G)	CFM (height) HD1		PE
1 Exit Device (Type 1, E01, E06)	WS 70 G1-LU8877 ETL	US32D	SA
1 Interchangeable Core (E09241)	33600006N	26	MC

1 Surface Closer (C02021-PT4G)	3531	689	YA
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Threshold (35100)	2705AT		PE
1 Gasketing (R3E164)	2891AS - Head		PE
1 Gasketing (R3G164)	290AS - Jamb		PE
1 Sweep (R3D534)	345AV		PE

Notes: Door position switch to signal door open / closed to the access control system.
Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 3.0

Doors: 105B
Description: EXT - CORR [EO]

1 Continuous Hinge (A31031G)	CFM (height) HD1		PE
1 Exit Device (Type 1, 01)	7150 WS EO	630	YA
1 Surface Closer (C02021-PT4G)	3531	689	YA
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Threshold (35100)	2705AT		PE
1 Gasketing (R3E164)	2891AS - Head		PE
1 Gasketing (R3G164)	290AS - Jamb		PE
1 Sweep (R3D534)	345AV		PE
1 Position Switch (E08)*	DPS-M-BK		SU

Notes: Door position switch to signal door open / closed to the access control system.
Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 4.0

Doors: 140
Description: EXT - ELEC

1 Continuous Hinge (A31031G)	CFM (height) HD1		PE
1 Exit Device (Type 1, 03)	7150 WS AU627F	630	YA
1 Interchangeable Core (E09241)	33600006N	26	MC
1 Mortise Cylinder Housing (E09251)	K660	626	YA
1 Surface Closer (C02021-PT4G)	3531	689	YA
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Threshold (35100)	2705AT		PE

1 Gasketing (R3E164)	2891AS - Head	PE
1 Gasketing (R3G164)	290AS - Jamb	PE
1 Sweep (R3D534)	345AV	PE
1 Position Switch (E08)*	DPS-M-BK	SU

Notes: Door position switch to signal door open / closed to the access control system.
Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 5.0

Doors: 141
Description: EXT - COMM

3 Hinge (A5111)	T4A3386	US32D	MK
1 Dormitory Lock (F13)	AUR 8822FL Temp Core	626	YA
1 Interchangeable Core (E09241)	33600006N	26	MC
1 Surface Closer (C02021-PT4G)	3531	689	YA
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Threshold (35100)	2705AT		PE
1 Gasketing (R3E164)	2891AS - Head		PE
1 Gasketing (R3G164)	290AS - Jamb		PE
1 Sweep (R3D534)	345AV		PE
1 Position Switch (E08)*	DPS-M-BK		SU

Notes: Door position switch to signal door open / closed to the access control system.
Hardware listed for design criteria, confirm with specific door manufacturer the hardware requirements to meet specified windstorm rating - Provide 3rd party test results for confirmation.

Set: 6.0

Doors: 101, 103, 105A
Description: CORR - [CIPHER]

3 Hinge (A8111)	T4A3786	US26D	MK
1 Exit Device (Type 1, E01, E06)	WS 70 G1-LU8877 ETL	US32D	SA
1 Interchangeable Core (E09241)	33600006N	26	MC
1 Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 7.0

Doors: 110A, 113, 119, 122
Description: OFFICE - [CIPHER]

3 Hinge (A8111)	T4A3786	US26D	MK
1 Access Control Mortise Lock	70 G1-8276 LUL	US26D	SA
1 Interchangeable Core (E09241)	33600006N	26	MC
1 Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1 Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 8.0

Doors: 110, 111, 120
Description: WEAPONS STOR - RATED [CIPHER]

3 Hinge (A8111)	T4A3786	US26D	MK
1 Access Control Mortise Lock	70 G1-8276 LUL	US26D	SA
1 Interchangeable Core (E09241)	33600006N	26	MC
1 Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1 Armor Plate (J101)	K1050 (F) 35" CSK	US32D	RO
1 Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1 Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 9.0

Doors: 115, 123, 124, 125
Description: INTERVIEW / OBSERVATION - [CIPHER]

3 Hinge (A8111)	T4A3786	US26D	MK
1 Access Control Mortise Lock	70 G1-8276 LUL	US26D	SA
1 Interchangeable Core (E09241)	33600006N	26	MC
1 Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1 Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 10.0

Doors: 112
Description: JAN - RATED

3 Hinge (A8112)	TA2714	US26D	MK
1 Storeroom Lock (F07)	AUR 8805FL Temp Core	626	YA
1 Interchangeable Core (E09241)	33600006N	26	MC
1 Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Mop Plate (J103)	K1050 6" CSK	US32D	RO
1 Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1 Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 11.0

Doors: 128, 129, 130
Description: OFFICE

3 Hinge (A8112)	TA2714	US26D	MK
1 Office Lock (F04)	AUR 8807FL Temp Core	626	YA
1 Interchangeable Core (E09241)	33600006N	26	MC
1 Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1 Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1 Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 12.0

Doors: 126
Description: CONF

3 Hinge (A8112)	TA2714	US26D	MK
1 Passage Latch (F01)	AUR 8801FL	626	YA
1 Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1 Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1 Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 13.0

Doors: 127
Description: BREAK

3 Hinge (A8112)	TA2714	US26D	MK
1 Passage Latch (F01)	AUR 8801FL	626	YA
1 Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1 Kick Plate (J102)	K1050 10" CSK	US32D	RO
1 Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1 Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 14.0

Doors: 121
Description: OPEN OFFICE - EAC-CR [STC]

0	Cam lift hinge	By STC door mfg		OT
1	Fail Secure Lock (E01, E06)	AUR 8891FL Temp Core REX	626	YA
1	SFIC Core - 7-Pin	Match base standard	626	
1	Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1	STC gasket	By STC door mfg		OT
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C___		MK
1	Card Reader	BY SECURITY INTEGRATOR		
1	Position Switch (E08)*	By access control - Prep by D/F mfg		SU
1	Power Supply*	AQDxx (TO SUIT)		SU
1	Electric Power Transfer*	EL-CEPT		SU

Notes: Hinges, perimeter seals. door bottom, and threshold provided by acoustic door mfg to meet STC and ADA opening requirements.
Doors electronically unlocked or locked during established time zones as programmed by the access control system.
When outside lever locked the card reader grants access upon presentation of a valid credential. Lock to fail secure during power failure.
Door electrically locked. Wall mounted keypad allows entry. Lever unlocks during power failure or fire alarm. Outside lever has a mechanical key override entry

Set: 15.0

Doors: 114, 116
Description: RESTROOM

3	Hinge (A8111)	T4A3786	US26D	MK
1	Push Plate (J301)	70C-RKW	US32D	RO
1	Door Pull w/ Plate (J405)	BF 110x70C	US32D	RO
1	Surface Closer (C02011 / C02021)	2701 R/PA SN-134 (To Suit)	689	YA
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Mop Plate (J103)	K1050 6" CSK	US32D	RO
1	Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1	Adhesive Gasketing (R0Y154)	S88BL		PE

Set: 16.0

Doors: 114A, 116A
Description: SHOWER

3 Hinge (A5112)	TA2314	US32D	MK
1 Privacy Lock	AUR 8802FL IND	626	YA
1 Mop Plate (J103)	K1050 6" CSK	US32D	RO
1 Door Stop (L02251 / L02121)	403/470 (TO SUIT)	US26D	RO
1 Adhesive Gasketing (R0Y154)	S88BL		PE

SECTION 08 81 00

GLAZING
05/19

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 800	(2016) Voluntary Specifications and Test Methods for Sealants

ASTM INTERNATIONAL (ASTM)

ASTM C509	(2006; R 2015) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C864	(2005; R 2015) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM C1021	(2008; R 2014) Standard Practice for Laboratories Engaged in Testing of Building Sealants
ASTM C1036	(2016) Standard Specification for Flat Glass
ASTM C1048	(2018) Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
ASTM C1087	(2016) Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
ASTM C1172	(2019) Standard Specification for Laminated Architectural Flat Glass
ASTM C1184	(2014) Standard Specification for Structural Silicone Sealants
ASTM C1281	(2016) Standard Specification for Preformed Tape Sealants for Glazing Applications
ASTM D395	(2016; E 2017) Standard Test Methods for Rubber Property - Compression Set

ASTM D2287	(2019) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
ASTM E90	(2009; R2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
ASTM E413	(2016) Classification for Rating Sound Insulation
ASTM E2190	(2010) Standard Specification for Insulating Glass Unit Performance and Evaluation
ASTM E2226	(2015; R 2019b) Standard Practice for Application of Hose Stream

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA Glazing Manual	(2009) Glazing Manual
GANA Sealant Manual	(2008) Sealant Manual

INSULATING GLASS MANUFACTURERS ALLIANCE (IGMA)

IGMA TB-1200	(1983; R 2016) Guidelines for Insulating Glass Dimensional Tolerances
IGMA TB-3001	(2001) Guidelines for Sloped Glazing
IGMA TM-3000	(1990; R 2016) North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use

NATIONAL FENESTRATION RATING COUNCIL (NFRC)

NFRC 100	(2014) Procedure for Determining Fenestration Product U-Factors
NFRC 200	(2014) Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(2016; TIA 16-1) Standard for Fire Doors and Other Opening Protectives
NFPA 252	(2017) Standard Methods of Fire Tests of Door Assemblies
NFPA 257	(2012; ERTA 2017) Standard on Fire Test for Window and Glass Block Assemblies

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1201 Safety Standard for Architectural Glazing Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Insulating Glass

Plastic Glazing

Glazing Accessories

Sealants

Joint Backer

SD-04 Samples

Insulating Glass

Plastic Sheet

Glazing Compound

Glazing Tape

Sealing Tapes

SD-07 Certificates

Insulating Glass

Plastic Glazing

SD-08 Manufacturer's Instructions

Setting and Sealing Materials

Glass Setting

SD-11 Closeout Submittals

Warranty for Insulated Glass Units

Warranty for Polycarbonate Sheet

Warranty for Monolithic Reflective Glass

1.3 QUALITY CONTROL

Submit two 8 by 10 inch samples of each of the following: insulating glass

units.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver products to the site in unopened containers, labeled plainly with manufacturers' names and brands. Store glass and setting materials in safe, enclosed dry locations and do not unpack until needed for installation. Handle and install materials in a manner that will protect them from damage.

1.5 ENVIRONMENTAL REQUIREMENTS

Do not start glazing work until the outdoor temperature is above40 degrees F and rising, unless procedures recommended by the glass manufacturer and approved by the Contracting Officer are made to warm the glass and rabbet surfaces. Provide ventilation to prevent condensation of moisture on glazing work during installation. Do not perform glazing work during damp or rainy weather.

1.6 WARRANTY

1.6.1 Warranty for Insulated Glass Units

Warranty insulating glass units against development of material obstruction to vision (such as dust, fogging, or film formation on the inner glass surfaces) caused by failure of the hermetic seal, other than through glass breakage, for a 10-year period following acceptance of the work. Provide new units for any units failing to comply with terms of this warranty within 45 working days after receipt of notice from the Government.

PART 2 PRODUCTS

2.1 GLASS

ASTM C1036, unless specified otherwise. In doors and sidelights, provide safety glazing material conforming to 16 CFR 1201.

2.1.1 Clear Glass

For interior glazing (i.e., pass and observation windows), 1/4 inch thick glass should be used.

Type I, Class 1 (clear), Quality q4 (A). Provide for glazing openings not indicated or specified otherwise. Use double-strength sheet glass or 1/8 inch float glass for openings up to and including 15 square feet, 3/16 inch for glazing openings over 15 square feet but not over 30 square feet, and 1/4 inch for glazing openings over 30 square feet but not over 45 square feet.

2.1.2 Annealed Glass

Annealed glass must be Type I transparent flat type, Class 1 - clear, Quality q3 - glazing select conforming to ASTM C1036.

2.1.3 Wired Glass

Provide UL listed glass for fire-rated windows rated for 45 or 20 minutes when tested in accordance with ASTM E2226. Wired glass must be Type II flat type, Class 1 - translucent. Wire mesh must be polished stainless

steel Mesh 1 - diamond. Wired glass for fire-rated windows must bear an identifying UL label or the label of a nationally recognized testing agency, and be rated for 20 or 45 minutes when tested in accordance with NFPA 257. Wired glass for fire-rated doors must be tested as part of a door assembly in accordance with NFPA 252.

2.1.4 Laminated Glass

ASTM C1172, Laminated glass fabricated from two nominal 1/8 inch pieces of Type I, Class 1, Quality Q3, flat annealed ultraclear glass conforming to ASTM C1036. Flat glass to be laminated together with a minimum of 0.030 inch inch thick, clear polyvinyl butyral laminate, conforming to requirements of 16 CFR 1201 and ASTM C1172. The total thickness of nominally 1/4 inches. Color to be clear for interior applications and warm grey for exterior applications.

2.1.5 Mirrors

2.1.5.1 Glass Mirrors

Glass for mirrors must be Type I transparent flat type, Class 1-clear, Glazing Quality q1 1/4 inch thick conforming to ASTM C1036. Glass must be coated on one surface with silver coating, copper protective coating, and mirror backing paint. Silver coating must be highly adhesive pure silver coating of a thickness which must provide reflectivity of 83 percent or more of incident light when viewed through 1/4 inch thick glass, and must be free of pinholes or other defects. Copper protective coating must be pure bright reflective copper, homogeneous without sludge, pinholes or other defects, and must be of proper thickness to prevent "adhesion pull" by mirror backing paint. Mirror backing paint must consist of two coats of special scratch and abrasion-resistant paint , and must be baked in uniform thickness to provide a protection for silver and copper coatings which will permit normal cutting and edge fabrication.

2.1.6 Tempered Glass

ASTM C1048, Kind FT (fully tempered), Condition A (uncoated), Type I, Class 1 (transparent), Quality q3, 1/4 inch thick. Provide wherever safety glazing material is indicated or specified.

2.2 INSULATING GLASS UNITS

Two panes of glass separated by a dehydrated airspace, filled with argon gas and hermetically sealed, conforming to ASTM E2190. Submit performance and compliance documentation for each type of insulating glass.

Insulated glass units must have a Solar Heat Gain Coefficient (SHGC) maximum of 0.25 determined according to NFRC 200 and a U-factor maximum of 0.29 Btu per square foot by hr by degree F in accordance with NFRC 100.

Glazed panels must be rated for not less than 40 Sound Transmission Class (STC) when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E413.

Dimensional tolerances must be as specified in IGMA TB-1200. Spacer must be black, roll-formed, thermally broken aluminum, with bent or tightly welded or keyed and sealed joints to completely seal the spacer periphery and eliminate moisture and hydrocarbon vapor transmission into airspace through the corners. Primary seal must be compressed polyisobutylene and

the secondary seal must be a specially formulated silicone.

The inner light must be ASTM C1048, Grade B (fully tempered), Style I (uncoated), Type I, Class 1 (transparent), Quality q4, 1/4 inch thick. The outer light must be ASTM C1036, Type I, Class 2 (tinted heat absorbing), 1/4 inch thick laminated glass.

2.2.1 Low Emissivity Coatings

Interior and exterior glass panes for Low-E insulating units must be Type I annealed flat glass with Condition C on No. 2 surface (inside surface of exterior pane), Quality q3 - glazing select, conforming to ASTM C1036. Glass performance must be U value maximum of 0.29 Btu/hr-ft2-F, Solar Heat Gain Coefficient (SHGC) maximum of 0.25. Color must be warm gray.

2.3 SETTING AND SEALING MATERIALS

Provide as specified in the GANA Glazing Manual, IGMA TM-3000, IGMA TB-3001, and manufacturer's recommendations, unless specified otherwise herein. Do not use metal sash putty, nonskinning compounds, nonresilient preformed sealers, or impregnated preformed gaskets. Materials exposed to view and unpainted must be gray or neutral color. Sealant testing must be performed by a testing agency qualified according to ASTM C1021.

Submit glass manufacturer's recommendations for setting and sealing materials and for installation of each type of glazing material specified. Include cleaning instructions for plastic sheets.

2.3.1 Putty and Glazing Compound

Provide glazing compound as recommended by manufacturer for face-glazing metal sash. Putty must be linseed oil type. Do not use putty and glazing compounds with insulating glass or laminated glass.

2.3.2 Glazing Compound

Use for face glazing metal sash. Do not use with insulating glass units or laminated glass.

2.3.3 Sealants

Provide elastomeric and structural sealants.

2.3.3.1 Elastomeric Sealant

ASTM C920, Type S, Grade NS, Class 12.5, Use G. Use for channel or stop glazing metal sash. Sealants must be chemically compatible with setting blocks, edge blocks, and sealing tapes, with sealants used in manufacture of insulating glass units , and with plastic sheet. Color of sealant must be white.

2.3.3.2 Structural Sealant

ASTM C1184, Type S.

2.3.4 Joint Backer

Joint backer must have a diameter size at least 25 percent larger than joint width; type and material as recommended in writing by glass and

sealant manufacturer.

2.3.5 Glazing Tapes

2.3.5.1 Back-Bedding Mastic Glazing Tapes

Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

a. AAMA 804.3 tape, where indicated.

b. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

c. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.3.5.2 Expanded Cellular Glazing Tapes

Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

a. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.

b. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.3.6 Sealing Tapes

Preformed, semisolid, PVC-based material of proper size and compressibility for the particular condition, complying with ASTM D2287. Use only where glazing rabbet is designed for tape and tape is recommended by the glass or sealant manufacturer. Provide spacer shims for use with compressible tapes. Tapes must be chemically compatible with the product being set.

2.3.7 Setting Blocks and Edge Blocks

Closed-cell neoprene setting blocks must be dense extruded type conforming to ASTM C509 and ASTM D395, Method B, Shore A durometer between 70 and 90. Edge blocking must be Shore A durometer of 50 (plus or minus 5). Provide silicone setting blocks when blocks are in contact with silicone sealant. Profiles, lengths and locations must be as required and recommended in writing by glass manufacturer. Block color must be black.

2.3.8 Glazing Gaskets

Glazing gaskets must be extruded with continuous integral locking projection designed to engage into metal glass holding members to provide a watertight seal during dynamic loading, building movements and thermal movements. Glazing gaskets for a single glazed opening must be continuous one-piece units with factory-fabricated injection-molded corners free of flashing and burrs. Glazing gaskets must be in lengths or units recommended by manufacturer to ensure against pull-back at corners. Provide glazing gasket profiles as recommended by the manufacturer for the intended application.

2.3.8.1 Fixed Glazing Gaskets

Fixed glazing gaskets must be closed-cell (sponge) smooth extruded compression gaskets of cured elastomeric virgin neoprene compounds conforming to ASTM C509, Type 2, Option 1.

2.3.8.2 Wedge Glazing Gaskets

Wedge glazing gaskets must be high-quality extrusions of cured elastomeric virgin neoprene compounds, ozone resistant, conforming to ASTM C864, Option 1, Shore A durometer between 65 and 75.

2.3.8.3 Aluminum Framing Glazing Gaskets

Glazing gaskets for aluminum framing must be permanent, elastic, non-shrinking, non-migrating, watertight and weathertight.

2.3.9 Accessories

Provide as required for a complete installation, including glazing points, clips, shims, angles, beads, and spacer strips. Provide noncorroding metal accessories. Provide primer-sealers and cleaners as recommended by the glass and sealant manufacturers. Use ASTM C1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to surface.

PART 3 EXECUTION

Any materials that show visual evidence of biological growth due to the presence of moisture must not be installed on the building project.

3.1 PREPARATION

Preparation, unless otherwise specified or approved, must conform to applicable recommendations in the GANA Glazing Manual, GANA Sealant Manual, IGMA TB-3001, IGMA TM-3000, and manufacturer's recommendations. Determine the sizes to provide the required edge clearances by measuring the actual opening to receive the glass. Grind smooth in the shop glass edges that will be exposed in finish work. Leave labels in place until the installation is approved, except remove applied labels on heat-absorbing glass and on insulating glass units as soon as glass is installed. Securely fix movable items or keep in a closed and locked position until glazing compound has thoroughly set.

3.2 GLASS SETTING

Shop glaze or field glaze items to be glazed using glass of the quality and thickness specified or indicated. Glazing, unless otherwise specified or approved, must conform to applicable recommendations in the GANA Glazing Manual, GANA Sealant Manual, IGMA TB-3001, IGMA TM-3000, and manufacturer's recommendations. Aluminum windows, wood doors, and wood windows may be glazed in conformance with one of the glazing methods described in the standards under which they are produced, except that face puttying with no bedding will not be permitted. Handle and install glazing materials in accordance with manufacturer's instructions. Use beads or stops which are furnished with items to be glazed to secure the glass in place. Verify products are properly installed, connected, and adjusted.

3.2.1 Sheet Glass

Cut and set with the visible lines or waves horizontal.

3.2.2 Patterned Glass

Set glass with one patterned surface with smooth surface on the weather side. When used for interior partitions, place the patterned surface in same direction in all openings.

3.2.3 Insulating Glass Units

Do not grind, nip, or cut edges or corners of units after the units have left the factory. Springing, forcing, or twisting of units during setting will not be permitted. Handle units so as not to strike frames or other objects. Installation must conform to applicable recommendations of IGMA TB-3001 and IGMA TM-3000.

3.2.4 Installation of Wire Glass

Install glass for fire doors in accordance with installation requirements of NFPA 80.

3.2.5 Installation of Heat-Absorbing Glass

Provide glass with clean-cut, factory-fabricated edges. Field cutting will not be permitted.

3.2.6 Installation of Laminated Glass

Sashes which are to receive laminated glass must be weeped to the outside to allow water drainage into the channel.

3.2.7 Plastic Sheet

Conform to manufacturer's recommendations for edge clearance, type of sealant and tape, and method of installation.

3.3 CLEANING

Clean glass surfaces and remove labels, paint spots, putty, and other defacement as required to prevent staining. Glass must be clean at the time the work is accepted. Clean plastic sheet in accordance with manufacturer's instructions.

3.4 PROTECTION

Protect glass work immediately after installation. Identify glazed openings with suitable warning tapes, cloth or paper flags, attached with non-staining adhesives. Protect reflective glass with a protective material to eliminate any contamination of the reflective coating. Place protective material far enough away from the coated glass to allow air to circulate to reduce heat buildup and moisture accumulation on the glass. Upon removal, separate protective materials for reuse or recycling. Remove and replace glass units which are broken, chipped, cracked, abraded, or otherwise damaged during construction activities with new units.

-- End of Section --

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SECTION 08 91 00

METAL WALL LOUVERS
05/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC. (AMCA)

AMCA 500-D	(2018) Laboratory Methods of Testing Dampers for Rating
AMCA 511	(2010; R 2016) Certified Ratings Program for Air Control Devices

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 2603	(2017a) Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M	(2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A167	(2011) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods,

Wire, Profiles, and Tubes (Metric)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Wall louvers

SD-03 Product Data

Metal Wall Louvers

SD-04 Samples

Wall louvers

1.3 DELIVERY, STORAGE, AND PROTECTION

Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper ventilation, drainage, and protection against dampness. Louvers shall be free from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

1.4 DETAIL DRAWINGS

Show all information necessary for fabrication and installation of wall louvers. Indicate materials, sizes, thicknesses, fastenings, and profiles.

1.5 COLOR SAMPLES

Colors of finishes for wall louvers shall closely approximate colors indicated. Where color is not indicated, submit the manufacturer's standard colors to the Contracting Officer for selection.

1.6 High-Velocity Hurricane Zone (HVHZ) Florida Building Code

Tyndall AFB requires all new construction, additions, and renovations to comply with the Florida Building Code (FBC) High-Velocity Hurricane Zone (HVHZ), Section 1602.2 criteria for Miami Dade County, Risk Category III buildings with a windspeed of 165 mph. Per FBC HVHZ provisions, all exterior building envelope materials such as, but not limited to windows, glazing, roofing systems, concrete masonry unit or metal panel walls, and doors and others must have a current Miami-Dade Notice of Acceptance (NOA) and installation of HVHZ standards that match the specified minimum 165mph wind requirement at Tyndall AFB. In addition, the Contractor must submit for review and approval test results of systems meeting the high wind requirements or a set of drawings sealed by a Professional Engineer stating conformance with HVHZ standards in place of materials pre-approved by Miami-Dade County.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Galvanized Steel Sheet

ASTM A653/A653M, coating designation G90.

2.1.2 Aluminum Sheet

ASTM B209, alloy 3003 or 5005 with temper as required for forming.

2.1.3 Extruded Aluminum

ASTM B221, alloy 6063-T5 or -T52.

2.1.4 Stainless Steel

ASTM A167, Type 302 or 304, with 2B finish.

2.1.5 Cold Rolled Steel Sheet

ASTM A1008/A1008M, Class 1, with matte finish. Use for interior louvers only.

2.2 METAL WALL LOUVERS

All louvers shall be Florida Product approved. Weather resistant type, with bird screens and made to withstand a wind load of not less than 30 pounds per square foot. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D and AMCA 511. The rating shall show a water penetration of 0.20 or less ounce per square foot of free area at a free velocity of 800 feet per minute.

2.2.1 Extruded Aluminum Louvers

Fabricated of extruded 6063-T5 or -T52 aluminum with a wall thickness of not less than 0.081 inch.

2.2.2 Screens and Frames

For aluminum louvers, provide 1/2 inch square mesh, 14 or 16 gage aluminum or 1/4 inch square mesh, 16 gage aluminum bird screening. Mount screens in removable, rewirable frames of same material and finish as the louvers.

2.3 FASTENERS AND ACCESSORIES

Provide stainless steel screws and fasteners for aluminum louvers and zinc-coated or stainless steel screws and fasteners for steel louvers. Provide other accessories as required for complete and proper installation.

2.4 FINISHES

2.4.1 Aluminum

Exposed aluminum surfaces shall be factory finished with an organic coating.

2.4.1.1 Organic Coating

Clean and prime exposed aluminum surfaces. Provide a baked enamel finish conforming to AAMA 2603, with total dry film thickness not less than 0.8 mil, color to match exterior wall.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Wall Louvers

Install using stops or moldings, flanges, strap anchors, or jamb fasteners as appropriate for the wall construction and in accordance with manufacturer's recommendations.

3.1.2 Screens and Frames

Attach frames to louvers with screws or bolts.

3.2 PROTECTION FROM CONTACT OF DISSIMILAR MATERIALS

3.2.1 Copper or Copper-Bearing Alloys

Paint copper or copper-bearing alloys in contact with dissimilar metal with heavy-bodied bituminous paint or separate with inert membrane.

3.2.2 Aluminum

Where aluminum contacts metal other than zinc, paint the dissimilar metal with a primer and two coats of aluminum paint.

-- End of Section --

SECTION 09 06 00

SCHEDULES FOR FINISHES
05/09

PART 1 GENERAL

1.1 SUMMARY

This section covers only the color of exterior and interior materials and products that are exposed to view in the finished construction. The word "color", as used herein, includes surface color and pattern. Requirements for quality, product specifications, and method of installation are covered in other appropriate sections of the specifications. Specific locations where the various materials are required are shown on the drawings if not identified in this specification. Items not designated for color in this section may be specified in other sections. When color is not designated for items, propose a color for approval.

PART 2 PRODUCTS

2.1 COLOR SCHEDULE

The color schedule information provided in the following paragraphs lists the colors, patterns and textures required for exterior and interior finishes, including both factory applied and field applied colors. Where color is shown as being specific to one manufacturer, an equivalent color by another manufacturer may be submitted for approval. Manufacturers and materials specified are not intended to limit the selection of equal colors from other manufacturers. In the case of difference between the drawings and specifications, colors identified in this specification govern.

2.2 EXTERIOR FINISHES

Reference drawings for manufacturer and color information.

2.2.1 Exterior Walls

Exterior wall colors apply to exterior wall surfaces including recesses at entrances and projecting vestibules. When applicable, paint conduit to closely match the adjacent surface color. Provide wall colors to match the colors listed below.

2.2.1.1 Mortar

LOX to match Argos Mason's mix mortar OSI + PMEL to match masonry.

2.2.1.2 Concrete Masonry Veneer

LOX masonry veneer to match Scruggs Sandstone 4x8 splitface CMU. Wainscot to match Decrastone Canary Cream - 8x8 ground face CMU.

OSI masonry veneer is to match existing splitface (4x8) light tan color.

PMEL masonry veneer is to match existing split-rib (8x12) light tan and medium tan 4 courses high.

2.2.1.3 Glass and Glazing

Match Guardian SNX 51/23 crystalblue (tint color) storefront glazing

2.2.2 Exterior Trim

Provide exterior trim to match the colors listed below.

2.2.2.1 Steel Doors and Door Frames

LOX is to match Sherwin Williams Balanced Beige #249 OSI to match existing door with light tan color.

2.2.2.2 Aluminum Doors and Door Frames

LOX is to match Sherwin Williams Balanced Beige #249 OSI to match existing door with light tan color.

2.2.2.3 Aluminum Windows (mullion, muntin, sash, trim, and sill)

Color to match Kawneer clear anodized aluminum (matte)

2.2.2.4 Fascia, Standing Seam Metal Roof, Gutters + Downspouts

to match Berridge Zinc-Cote

2.2.2.5 Louvers

Match adjacent material in color.

2.2.2.6 Flashings

Match adjacent material in color.

2.2.2.7 Coping

Match adjacent material in color

2.2.2.8 Precast Concrete Sills

to match Decrastone Deep Ash 8x8

2.2.2.9 Caulking and Sealants

Match adjacent material in color.

2.2.2.10 Bollards

to match Tyndall Standard

2.2.2.11 Control Joints

Match adjacent material in color.

2.2.2.12 Expansion Joint and/or Covers

Match adjacent material in color.

2.2.3 Exterior Roof

Apply roof color to exterior roof surfaces including sheet metal flashings and copings, snow guards, mechanical units, mechanical penthouses, roof trim, pipes, conduits, electrical appurtenances, and similar items. Provide roof color to match the colors listed below.

2.3 INTERIOR FINISHES (LOX)

2.3.1 Interior Floor Finishes

CF1 CONCRETE FINISH: SMOOTH TROWELED FINISH
CF2 CONCRETE FINISH: BROOM FINISH
GR1 GROUT: CUSTOM BUILDING PRODUCTS
COLOR: NATURAL GRAY #09
PA1 PORCELAIN TILE: CROSSVILLE: NOTORIOUS
COLOR: LEADING MAN UPS NTR05; SIZE: 12" X 12"
INSTALLATION METHOD: TCNA F128-19; USE WITH GR1
SC SEALED CONCRETE

2.3.2 Interior Base Finishes

RM1 RESILIENT MATERIALS: TARKETT 4" WALL BASE
COLOR: CHARCOAL
PAB1 PORCELAIN TILE BASE: CROSSVILLE: NOTORIOUS
COLOR: LEADING MAN UPS NTR05; SIZE: COVE BASE 6" X 12"

2.3.3 Interior Wall Finishes

CBB CEMENTITIOUS BACKER BOARD
GWB GYPSUM WALL BOARD
GR2 GROUT: CUSTOM BUILDING PRODUCTS
COLOR: NATURAL GRAY #09
PA2 PORCELAIN TILE: CROSSVILLE: NOTORIOUS
COLOR: LEADING MAN; SIZE: 12" X 12" VERTICAL STACKED BOND;
USE WITH GR2
PT1 PAINT: SHERWIN WILLIAMS: DRIFT OF MIST SW 9166 SATIN FINISH;
FOR USE ON GWB
PT4 PAINT: SHERWIN WILLIAMS: DRIFT OF MIST SW 9166 SEMI-GLOSS FINISH;
FOR USE ON CMU WALLS

2.3.4 Interior Ceiling Finishes

ACT1 ACOUSTICAL CEILING TILE: ARMSTRONG; ULTIMA; 1942 HRC BEVELED
TEGULAR; 24"x24"x3/4"; WHITE. GRID: 9/16" WHITE
EXP1 EXPOSED STRUCTURE, PAINTED PT3
PT3 PAINT: SHERWIN WILLIAMS: SW 7007 CEILING BRIGHT WHITE;
SEMI-GLOSS FINISH

2.3.5 Interior Trim

CG1 CORNER GUARDS: COLOR: STAINLESS STEEL
PT2 PAINT: SHERWIN WILLIAMS: REPOSE GRAY SW 7015 SEMI-GLOSS FINISH

2.3.6 Interior Window Treatment

CG1 CORNER GUARDS: COLOR: STAINLESS STEEL
PT2 PAINT: SHERWIN WILLIAMS: REPOSE GRAY SW 7015 SEMI-GLOSS FINISH

2.3.7 Interior Trim

CG1 CORNER GUARDS: COLOR: STAINLESS STEEL
PT2 PAINT: SHERWIN WILLIAMS: REPOSE GRAY SW 7015 SEMI-GLOSS FINISH

2.3.8 Interior Signage

FACE MATERIAL: BRUSHED ALUMINUM
RAISED COPY: BLACK
INSERT TEXT: BLACK ON WHITE CARDSTOCK
METAL ACCENT BAR: BLACK
INSERT FACE: CLEAR
TEXT STYLE: HELVETICA
BASIS OF DESIGN: TAKEFORM - FUSION 01

2.3.9 General Notes

1. REFER TO REFLECTED CEILING PLAN SHEET A-140 FOR CEILING HEIGHTS.
2. REFER TO SHEET I-101 FOR EXTENT OF FLOOR FINISHES.
3. ALL INTERIOR HOLLOW METAL DOORS AND FRAMES SHALL BE PAINTED PT2.
4. ALL ELECTRICAL SWITCHES, RECEPTACLES, VOICE AND DATA PLATES SHALL BE WHITE.
5. ALL PLUMBING FIXTURES SHALL BE WHITE.
6. ALL EXPOSED STRUCTURE SHALL BE PAINTED PT3.
7. STAINLESS STEEL CORNER GUARD SHALL EXTEND FROM TOP OF WALL BASE TO HEIGHT OF 6'-0" A.F.F..
8. INSTALL PA2 PORCELAIN WALL TILE TO HEIGHT OF 4;-0: A.F.F.. PAINT WALLS ABOVE PT3.

2.4 INTERIOR FINISHES (OSI)

2.4.1 Interior Floor Finishes

GR1 GROUT: CUSTOM BUILDING PRODUCTS COLOR: NATURAL GRAY #09
LVP1 LUXURY VINYL PLANK: INTERFACE;
LEVEL SET COLLECTION: TEXTURED WOODGRAINS A004;
COLOR: GREYWOOD A00429
SIZE: 25cm X 1m
MCT1 MODULAR CARPET TILE: MILLIKEN; LANDMARK COLLECTION: VESTIGE;
COLOR: BAST VES23
BACKING: PVC-FREE WELLBAC COMFORT CUSHION;
SIZE: 1m X 1m;
INSTALLATION METHOD: MONOLITHIC PROVIDE RM3 TRIM AT ALL TRANSITIONS
PA1 PORCELAIN TILE: CROSSVILLE: NOTORIOUS
COLOR: LEADING MAN UPS NTR05;
SIZE: 12" X 12" INSTALLATION METHOD: TCNA F113A-19 WITH UNCOUPLING MEMBRANE; USE WITH GR1
SC SEALED CONCRETE
VT1 VINYL TILE: PATCRAFT; HOMOGENEOUS TILE
ADMIX I347V; SIZE: 36" X 36" X .125"
COLOR: SCALLOP 00520
WM1 WALK-OFF MAT: EXTERIOR: AMERICAN FLOOR MATS VINYL LINK ENTRANCE MAT;
COLOR: BLACK
WM2 WALK-OFF MAT: INTERIOR: MILLIKEN; OBEX CUT; PATTERN: FIZZ;
COLOR: DARK GREEN FZC27-23; SIZE: 20" x 20"

2.4.2 Interior Base Finishes

RM1 RESILIENT MATERIALS: TARKETT; RUBBER 4" WALL BASE
COLOR: CHARCOAL 20
PAB1 PORCELAIN TILE BASE: CROSSVILLE; NOTORIOUS; COVE BASE SIZE 6" X 12";
COLOR: LEADING MAN UPS

2.4.3 Interior Wall Finishes

CBB CEMENTITIOUS BACKER BOARD
FRP1 FIBERGLASS REINFORCED PANEL: CRANE COMPOSITES;
VARIETEX; SANDSTONE TEXTURE;
.09" THICKNESS
COLOR: PEPPER DUST 8044
GWB GYPSUM WALL BOARD
GR2 GROUT: CUSTOM BUILDING PRODUCTS
COLOR: NATURAL GRAY #09
PA2 PORCELAIN TILE: CROSSVILLE: NOTORIOUS COLOR: LEADING MAN UPS NTR05;
SIZE: 12" X 12" VERTICAL STACKED BOND; USE WITH GR2 INSTALLATION
METHOD: TCNA W243-19
PT1 PAINT: SHERWIN WILLIAMS: DRIFT OF MIST SW 9166
SATIN FINISH; FOR USE ON GWB
PT4 PAINT: SHERWIN WILLIAMS: DRIFT OF MIST SW 9166
SEMI-GLOSS FINISH; FOR USE ON CMU WALLS

2.4.4 Interior Ceiling Finishes

ACT1 ACOUSTICAL CEILING TILE: ARMSTRONG; ULTIMA;
1942 HRC BEVELED TEGULAR; 24"x24"x3/4"; WHITE. GRID: 9/16" WHITE
EXP1 EXPOSED STRUCTURE, PAINTED PT3
PT3 PAINT: SHERWIN WILLIAMS: SW 7007 CEILING BRIGHT WHITE;
SEMI-GLOSS FINISH

2.4.5 Interior Trim

CG2 CORNER GUARDS: CS ACROVYN; COLOR: PEARL 934
PT2 PAINT: SHERWIN WILLIAMS: REPOSE GRAY SW 7015 SEMI-GLOSS FINISH
RM3 TRANSITION STRIP: TARKETT; SLIMLINE COLOR: CHARCOAL; USE WITH MCT1

2.4.6 Interior Miscellaneous

PL1 PLASTIC LAMINATE: FORMICA; MATTE FINISH; COLOR: GREEN SLATE 8793-58
SS1 SOLID SURFACE: WILSONART COLOR: KIMBERLITE 8215CE
SS2 SOLID SURFACE: WILSONART COLOR: DESIGNER WHITE D354SL
TP1 TOILET PARTITIONS: HADRIAN; SOLID PLASTIC COLOR: BONE 213
WD WOOD DOORS: MASONITE ARCHITECTURAL; PLAIN SLICED WALNUT;
SS1 STAIN GROUP #400
WS WINDOW SHADES: MECHOSHADES: SOHO COLLECTION;
1900 SERIES 5% OPENNESS;
COLOR: 1901 CROSBY

2.4.7 Interior Signage

FACE MATERIAL: BRUSHED ALUMINUM
RAISED COPY: BLACK
INSERT TEXT: BLACK ON WHITE CARDSTOCK
METAL ACCENT BAR: BLACK
INSERT FACE: CLEAR
TEXT STYLE: HELVETICA

BASIS OF DESIGN: TAKEFORM - FUSION 01

2.4.8 General Notes

1. REFER TO REFLECTED CEILING PLAN SHEET A-150 FOR CEILING HEIGHTS.
2. REFER TO SHEET I-101 FOR EXTENT OF FLOOR FINISHES.
3. ALL INTERIOR HOLLOW METAL DOORS AND FRAMES SHALL BE PAINTED PT2.
4. ALL ELECTRICAL SWITCHES, RECEPTACLES, VOICE AND DATA PLATES SHALL BE WHITE.
5. ALL PLUMBING FIXTURES SHALL BE WHITE.
6. INSTALL MARBLE THRESHOLD AT JUNCTURE OF DISSIMILAR MATERIALS; I.E. LUXURY VINYL PLANK AND PORCELAIN TILE.
7. ALL EXPOSED STRUCTURE SHALL BE PAINTED PT3.
8. CORNER GUARDS SHALL EXTEND FROM TOP OF WALL BASE TO HEIGHT OF 8'-0" A.F.F.. PROVIDE CORNER GUARDS AT ALL OUTSIDE CORNERS IN CORRIDORS. PROVIDE ALL CORNER GUARD TRIM PIECES.
9. WINDOW SILLS SHALL BE SS2 SOLID SURFACE FINISH.
10. PROVIDE WINDOW ROLLER SHADES AT ALL EXTERIOR WINDOWS EXCEPT STOREFRONT IN ACCORDANCE WITH SPECIFICATION 12 24 13.

2.4.9 FINISH REMARKS

1. CLEAN AND PREP ALL EXISTING SURFACES FOR NEW FINISH.
2. ALL HORIZONTAL SURFACES SHALL RECEIVE SS1. ALL BASE CABINETS SHALL RECEIVE PL1.
3. PROVIDE FULL HEIGHT CERAMIC TILE AT SHOWER ENCLOSURES INCLUDING PRIVACY SCREENS.
4. PROVIDE ALL BULLNOSE, INSIDE AND OUTSIDE CORNER TRIM. MIRRORS ARE INDIVIDUALLY PLACED. WALLS WHERE MIRRORS ARE SHOWN SHALL BE FLOOR TO CEILING TILE.
5. PROVIDE FRP PANELS TO HEIGHT OF 48" ON 2 SIDES SURROUNDING JANITOR SINK. PROVIDE TOP AND SIDE TRIM PIECES.
6. PROVIDE PORCELAIN TILE TO HEIGHT OF 4'-0" A.F.F WITH PAINT ABOVE ON ALL WALLS INDICATED.

2.5 INTERIOR FINISHES (PMEL)

2.5.1 Interior Floor Finishes

GR1 GROUT: CUSTOM BUILDING PRODUCTS
COLOR: NATURAL GRAY #09

LVP1 LUXURY VINYL PLANK: INTERFACE;
LEVEL SET COLLECTION: TEXTURED WOODGRAINS A004;
COLOR: GREYWOOD A00429
SIZE: 25cm X 1m

MCT1 MODULAR CARPET TILE: MILLIKEN;
LANDMARK COLLECTION: VESTIGE;
COLOR: BAST VES23
BACKING: PVC-FREE WELLBAC COMFORT CUSHION;
SIZE: 1m X 1m;
INSTALLATION METHOD: MONOLITHIC
PROVIDE RM3 TRIM AT ALL TRANSITIONS

PA1 PORCELAIN TILE: CROSSVILLE: NOTORIOUS
COLOR: LEADING MAN UPS NTR05;
SIZE: 12" X 12"
INSTALLATION METHOD: TCNA F113A-19 WITH UNCOUPLING MEMBRANE;
USE WITH GR1

RM2 RESILIENT MATERIAL: NORA; NORAPLAN ENVIRONCARE ED

COLOR: BASEBALL GAME 7031; ART. 1390 SHEET GOOD
SIZE: 49' X 48" X .08"
SC SEALED CONCRETE
SDVT1 STATIC DISSIPATIVE VINYL TILE: AMERICAN BILTRITE;
TEXAS GRANITE;
COLOR: WHITE/GREY VTG-130;
SIZE: 12" X 12"
WM2 WALK-OFF MAT: MILLIKEN; OBEX CUT; PATTERN: FIZZ;
COLOR: DARK GREEN FZC27-23; SIZE: 20" x 20"

2.5.2 Interior Base Finishes

RM1 RESILIENT MATERIALS: TARKETT; RUBBER 4" WALL BASE
COLOR: CHARCOAL 20
PAB1 PORCELAIN TILE BASE: CROSSVILLE; NOTORIOUS;
COVE BASE SIZE 6" X 12"; COLOR: LEADING MAN UPS

2.5.3 Interior Wall Finishes

CBB CEMENTITIOUS BACKER BOARD
FRP1 FIBERGLASS REINFORCED PANEL: CRANE COMPOSITES;
VARIETEX; SANDSTONE TEXTURE; .09" THICKNESS
COLOR: PEPPER DUST 8044
GWB GYPSUM WALL BOARD
GR2 GROUT: CUSTOM BUILDING PRODUCTS
COLOR: NATURAL GRAY #09
PA2 PORCELAIN TILE: CROSSVILLE: NOTORIOUS
COLOR: LEADING MAN;
SIZE: 12" X 12" VERTICAL STACKED BOND;
INSTALLATION METHOD: TCNA W243-19 USE WITH GR2
PT1 PAINT: SHERWIN WILLIAMS: DRIFT OF MIST SW 9166
SATIN FINISH; FOR USE ON GWB
PT4 PAINT: SHERWIN WILLIAMS: DRIFT OF MIST SW 9166
SEMI-GLOSS FINISH; FOR USE ON CMU WALLS

2.5.4 Interior Ceiling Finishes

ACT1 ACOUSTICAL CEILING TILE: ARMSTRONG; ULTIMA; 1942 HRC
BEVELED TEGULAR; 24"x24"x3/4"; WHITE. GRID: 9/16" WHITE
EXP EXPOSED STRUCTURE, PAINTED PT3
PT3 PAINT: SHERWIN WILLIAMS: SW 7007 CEILING BRIGHT WHITE;
SEMI-GLOSS FINISH

2.5.5 Interior Trim

CG1 CORNER GUARDS: COLOR: STAINLESS STEEL
CG2 CORNER GUARDS: CS ACROVYN; COLOR: PEARL 934
PT2 PAINT: SHERWIN WILLIAMS: REPOSE GRAY SW 7015
SEMI-GLOSS FINISH
RM3 TRANSITION STRIP: TARKETT; SLIMLINE
COLOR: CHARCOAL; USE WITH MCT1

2.5.6 Interior Miscellaneous

PL1 PLASTIC LAMINATE: FORMICA; MATTE FINISH;
COLOR: GREEN SLATE 8793-58
SS1 SOLID SURFACE: WILSONART COLOR: KIMBERLITE 8215CE
SS2 SOLID SURFACE: WILSONART COLOR: DESIGNER WHITE D354SL
TP1 TOILET PARTITIONS: HADRIAN; SOLID PLASTIC COLOR: BONE 213

WD WOOD DOORS: MASONITE ARCHITECTURAL; PLAIN SLICED WALNIT; SS1 STAIN GROUP #400

2.5.7 Interior Signage

FACE MATERIAL:	BRUSHED ALUMINUM
RAISED COPY:	BLACK
INSERT TEXT:	BLACK ON WHITE CARDSTOCK
METAL ACCENT BAR:	BLACK
INSERT FACE:	CLEAR
TEXT STYLE:	HELVETICA
BASIS OF DESIGN:	TAKEFORM - FUSION 01

2.5.8 General Notes

1. REFER TO REFLECTED CEILING PLAN SHEET(S) A-150 AND A-151 FOR CEILING HEIGHTS.
2. REFER TO SHEET I-101 AND I-102 FOR EXTENT OF FLOOR FINISHES.
3. ALL INTERIOR HOLLOW METAL DOORS AND FRAMES SHALL BE PAINTED PT2.
4. ALL ELECTRICAL SWITCHES, RECEPTACLES, VOICE AND DATA PLATES SHALL WHITE.
5. ALL PLUMBING FIXTURES SHALL BE WHITE.
6. INSTALL MARBLE THRESHOLD AT JUNCTURE OF DISSIMILAR MATERIALS; I.E. PORCELAIN PAVER AND LUXURY VINYL PLANK.
7. INSTALL RM3 AT JUNCTURE OF DISSIMILAR MATERIALS; I.E. MODULAR CARPET TILE AND RESILIENT MATERIAL RM2.
8. ALL EXPOSED STRUCTURE SHALL BE PAINTED PT3.
9. WINDOW SILLS SHALL BE SS2 SOLID SURFACE FINISH.

2.5.9 Finish Remarks

1. EXISTING FINISH SHALL REMAIN.
2. PATCH AND REPAIR ADJACENT WALLS WHERE NEW WALL IS INSTALLED. PAINT SHALL MATCH EXISTING.
3. ALL HORIZONTAL SURFACES SHALL RECEIVE SS1. FOR BREAK / TRAINING AREA, ALL UPPER AND BASE CABINETS SHALL RECEIVE PL1.
4. PROVIDE FRP PANELS TO HEIGHT OF 48" ON 2 SIDES SURROUNDING JANITOR SINK. PROVIDE TOP AND SIDE PIECES.
5. PROVIDE PORCELAIN TILE TO HEIGHT OF 4'-0" A.F.F. WITH PAINT ABOVE ON ALL WALLS INDICATED.

PART 3 EXECUTION

Not Used

-- End of Section --

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SECTION 09 22 00

SUPPORTS FOR PLASTER AND GYPSUM BOARD
02/10

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A463/A463M	(2010) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C645	(2013) Nonstructural Steel Framing Members
ASTM C754	(2011) Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
ASTM C841	(2003; R 2013) Installation of Interior Lathing and Furring
ASTM C847	(2014) Standard Specification for Metal Lath

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM EMLA 920	(2009) Guide Specifications for Metal Lathing and Furring

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Metal support systems

Submit for the erection of metal framing, furring, and ceiling suspension systems. Indicate materials, sizes, thicknesses, and fastenings.

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 A653/A653M, G-60; aluminum coating ASTM A463/A463M, T1-25; or a 55-percent aluminum-zinc coating.

2.1.1 Materials for Attachment of Lath

2.1.1.1 Suspended and Furred Ceiling Systems and Wall Furring

ASTM C841, and ASTM C847.

2.1.1.2 Non-loadbearing Wall Framing

NAAMM EMLA 920.

2.1.2 Materials for Attachment of Gypsum Wallboard

2.1.2.1 Suspended and Furred Ceiling Systems

ASTM C645.

2.1.2.2 Nonload-Bearing Wall Framing and Furring

ASTM C645, but not thinner than 0.0329 inch thickness. Framing for designated security walls shall be 16 gage thickness (0.0635 inch). The ASTM certified third party testing statement for equivalent thicknesses shall not apply.

2.1.2.3 Z-Furring Channels with Wall Insulation

Not lighter than 24 gage galvanized steel, Z-shaped, with 1-1/4 inch and 3/4 inch flanges and depth as required by the insulation thickness provided.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Systems for Attachment of Lath

3.1.1.1 Suspended and Furred Ceiling Systems and Wall Furring

ASTM C841, except as indicated otherwise.

3.1.1.2 Non-loadbearing Wall Framing

NAAMM EMLA 920, except provide framing members 16 inches o.c. unless indicated otherwise.

3.1.2 Systems for Attachment of Gypsum Wallboard

3.1.2.1 Suspended and Furred Ceiling Systems

ASTM C754, except provide framing members 16 inches o.c. unless indicated otherwise.

3.1.2.2 Non-loadbearing Wall Framing and Furring

ASTM C754, except as indicated otherwise.

3.2 ERECTION TOLERANCES

Provide framing members which will be covered by finish materials such as wallboard, plaster, or ceramic tile set in a mortar setting bed, 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.

Provide framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive 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.

-- End of Section --

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SECTION 09 29 00

GYPSUM BOARD
08/16

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108.11	(1992; Reaffirmed 2005) Specifications for Interior Installation of Cementitious Backer Units

ASTM INTERNATIONAL (ASTM)

ASTM C475/C475M	(2017) Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C840	(2019b) Standard Specification for Application and Finishing of Gypsum Board
ASTM C954	(2018) Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM C1002	(2018) Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
ASTM C1047	(2019) Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
ASTM C1177/C1177M	(2017) Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C1178/C1178M	(2013) Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel
ASTM C1396/C1396M	(2017) Standard Specification for Gypsum Board
ASTM D226/D226M	(2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D412	(2016) Standard Test Methods for

	Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D624	(2000; R 2020) Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D1149	(2007; R 2012) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber
ASTM E336	(2019a) Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

FM GLOBAL (FM)

FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/

GREEN SEAL (GS)

GS-36	(2013) Adhesives for Commercial Use

GYPSUM ASSOCIATION (GA)

GA 214	(2010) Recommended Levels of Gypsum Board Finish
GA 216	(2010) Application and Finishing of Gypsum Panel Products
GA 253	(2012) Application of Gypsum Sheathing

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings
UL Fire Resistance	(2014) Fire Resistance Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Cementitious Backer Units

Glass Mat Water-Resistant Gypsum Tile Backing Board

Water-Resistant Gypsum Backing Board

Accessories

Submit for each type of gypsum board and for cementitious backer units.

Gypsum Board

SD-07 Certificates

Asbestos Free Materials; G

Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos.

Indoor Air Quality for Gypsum Board; G

SD-08 Manufacturer's Instructions

Safety Data Sheets

SD-10 Operation and Maintenance Data

Manufacturer Maintenance Instructions

1.3 CERTIFICATIONS

1.3.1 Indoor Air Quality Certifications

Submit required indoor air quality certifications in one submittal package.

1.3.1.1 Ceiling and Wall Systems

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party program that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

1.3.1.2 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by

UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party program that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 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.

1.4.2 Storage

Keep materials dry by storing inside a sheltered building. Where necessary to store gypsum board and cementitious backer units 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.

Do not store gypsum wallboard 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. Do not use materials that have visible moisture or biological growth.

1.4.3 Handling

Neatly stack gypsum board and cementitious backer units flat to prevent sagging or damage to the edges, ends, and surfaces.

1.5 QUALIFICATIONS

Furnish type of gypsum board work specialized by the installer with a minimum of 3 years of documented successful experience.

1.6 SCHEDULING

The gypsum wallboard must be taped, finished and primed before the installation of the highly-emitting materials. The gypsum wallboard must be installed after the installation and ventilation period of the highly-emitting materials.

Commence application only after the area scheduled for gypsum board work is completely weathertight. The heating, ventilating, and air-conditioning systems must be complete and in operation prior to application of the gypsum board. If the mechanical system cannot be activated before gypsum board is begun, the gypsum board work may proceed in accordance with an approved plan to maintain the environmental conditions specified below. Apply gypsum board prior to the installation of finish flooring and acoustic ceiling.

1.7 ENVIRONMENTAL REQUIREMENTS

Do not expose the gypsum board to excessive sunlight prior to gypsum board application. Maintain a continuous uniform temperature of not less than 50

degrees F and not more than 80 degrees F for at least one week prior to the application of gypsum board work, while the gypsum board application is being done, and for at least one week after the gypsum board is set. Shield air supply and distribution devices to prevent any uneven flow of air across the plastered surfaces. Provide ventilation to exhaust moist air to the outside during gypsum board application, set, and until gypsum board jointing is dry. In glazed areas, keep windows open top and bottom or side to side 3 to 4 inches. Reduce openings in cold weather to prevent freezing of joint compound when applied. For enclosed areas lacking natural ventilation, provide temporary mechanical means for ventilation. In unglazed areas subjected to hot, dry winds or temperature differentials from day to night of 20 degrees F or more, screen openings with cheesecloth or similar materials. Avoid rapid drying. During periods of low indoor humidity, provide minimum air circulation following gypsum boarding and until gypsum board jointing complete and is dry.

1.8 FIRE RESISTIVE CONSTRUCTION

Comply with specified fire-rated assemblies for design numbers indicated per UL Fire Resistance or FM APP GUIDE.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to specifications, standards and requirements specified. Provide gypsum board types, gypsum backing board types, cementitious backing units, and joint treating materials manufactured from asbestos free materials only. Submit Safety Data Sheets and manufacturer maintenance instructions for gypsum materials including adhesives.

2.1.1 Gypsum Board

ASTM C1396/C1396M. Gypsum board must contain a minimum of 10 percent post-consumer recycled content, or a minimum of 40 percent post-industrial recycled content. Provide data identifying percentage of recycled content for gypsum board. Paper facings must contain a minimum of 100 percent recycled paper content. Gypsum cores must contain a minimum of 95 percent post-industrial recycled gypsum content. Provide data identifying percentage of recycled content for paper facing and gypsum cores. Provide certification or validation of indoor air quality for gypsum board.

2.1.1.1 Regular

48 inch wide, 5/8 inch thick, tapered edges.

2.1.1.2 Type X (Special Fire-Resistant)

48 inch wide, 5/8 inch thick, tapered edges.

2.1.2 Gypsum Backing Board

ASTM C1396/C1396M, gypsum backing board must be used as a base in a multilayer system.

2.1.2.1 Regular

48 inch wide, 5/8 inch thick, square edges.

2.1.2.2 Type X (Special Fire-Resistant)

48 inch wide, 5/8 inch thick, square edges.

2.1.3 Regular Water-Resistant Gypsum Backing Board

ASTM C1396/C1396M

2.1.3.1 Regular

48 inch wide, 5/8 inch thick, tapered edges.

2.1.3.2 Type X (Special Fire-Resistant)

48 inch wide, 5/8 inch thick, tapered edges.

2.1.4 Glass Mat Water-Resistant Gypsum Tile Backing Board

ASTM C1178/C1178M

2.1.4.1 Regular

48 inch wide, 5/8 inch thick, square edges.

2.1.4.2 Type X (Special Fire-Resistant)

48 inch wide, 5/8 inch thick, square edges.

2.1.5 Glass Mat Covered or Reinforced Gypsum Sheathing (Exterior Sheathing)

Exceeds physical properties of ASTM C1396/C1396M and ASTM C1177/C1177M. Provide 1/2 inch, gypsum sheathing. Provide gypsum board of with a noncombustible water-resistant core, with glass mat surfaces embedded to the gypsum core or reinforcing embedded throughout the gypsum core. Warrant gypsum sheathing board for at least twelve months against delamination due to direct weather exposure. Provide continuous, asphalt impregnated, building felt to cover exterior face of sheathing. Seal all joints, seams, and penetrations with compatible sealant.

2.1.5.1 Glass Mat Covered or Reinforced Gypsum Sheathing Sealant

Provide sealant compatible with glass mat covered or reinforced gypsum sheathing, rubber washers for masonry veneer anchors, and other associated cavity wall components such as anchors and through wall flashing. Provide sealants for glass mat covered or reinforced gypsum sheathing board edge seams and veneer anchor penetrations recommended by the glass mat covered or reinforced gypsum sheathing manufacturer and have the following performance requirements:

a. ASTM D412: Tensile Strength, 80 psi
b. ASTM D412: Ultimate Tensile Strength (maximum elongation), 170 psi
c. ASTM D624: Tear Strength, dieB, 27 ppi
d. ASTM D1149: Joint Movement Capability after 14 Days cure, plus or minus 50 percent.

2.1.6 Joint Treatment Materials

ASTM C475/C475M. Product must be low emitting VOC types with VOC limits not exceeding 50 g/L. Provide data identifying VOC content of joint

compound. Use all purpose joint and texturing compound containing inert fillers and natural binders, including lime compound. Pre-mixed compounds must be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.

2.1.6.1 Embedding Compound

Specifically formulated and manufactured for use in embedding tape at gypsum board joints and compatible with tape, substrate and fasteners.

2.1.6.2 Finishing or Topping Compound

Specifically formulated and manufactured for use as a finishing compound.

2.1.6.3 All-Purpose Compound

Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape, substrate and fasteners.

2.1.6.4 Setting or Hardening Type Compound

Specifically formulated and manufactured for use with fiber glass mesh tape.

2.1.6.5 Joint Tape

Use cross-laminated, tapered edge, reinforced paper, or fiber glass mesh tape recommended by the manufacturer.

2.1.7 Fasteners

2.1.7.1 Screws

ASTM C1002, Type "G", Type "S" or Type "W" steel drill screws for fastening gypsum board to gypsum board, wood framing members and steel framing members less than 0.033 inch thick. ASTM C954 steel drill screws for fastening gypsum board to steel framing members 0.033 to 0.112 inch thick. Provide cementitious backer unit screws with a polymer coating.

2.1.8 Adhesives

Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of GS-36. Provide certification or validation of indoor air quality for non-aerosol adhesives applied on the interior of the building (inside of the weatherproofing system). Provide certification or validation of indoor air quality for aerosol adhesives used on the interior of the building (inside of the weatherproofing system).

2.1.8.1 Adhesive for Fastening Gypsum Board to Metal Framing

Not permitted.

2.1.8.2 Adhesive for Laminating

Not permitted.

2.1.9 Gypsum Studs

Provide one inch minimum thickness and 6 inch minimum width. Studs may be of one inch thick gypsum board or multilayers fastened to required thickness. Conform to ASTM C1396/C1396M for material and GA 216 for installation.

2.1.10 Shaftwall Liner Panel

ASTM C1396/C1396M. Conform to the UL Fire Resistance for the Design Numbers(s) indicated for shaftwall liner panels. Manufacture liner panel for cavity shaftwall system, with water-resistant paper faces, bevel edges, single lengths to fit required conditions, 1 inch thick, by 24inch wide.

2.1.11 Accessories

ASTM C1047. Fabricate from corrosion protected steel or plastic designed for intended use. Accessories manufactured with paper flanges are not acceptable. Flanges must be free of dirt, grease, and other materials that may adversely affect bond of joint treatment. Provide prefinished or job decorated materials.

2.1.12 Asphalt Impregnated Building Felt

Provide a 15 lb asphalt moisture barrier over glass mat covered or reinforced gypsum sheathing. Conforming to ASTM D226/D226M Type 1 (No. 15) for asphalt impregnated building felt.

2.1.13 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 and cementitious backer units. Verify that all blocking, headers and supports are in place to support plumbing fixtures and to receive soap dishes, grab bars, towel racks, and similar items. Do not proceed with work until framing and furring are acceptable for application of gypsum board and cementitious backer units.

3.1.2 Gypsum Board

Verify that surfaces of gypsum board to be bonded with an adhesive are free of dust, dirt, grease, and any other foreign matter. Do not proceed with work until surfaces are acceptable for application of gypsum board with adhesive.

3.1.3 Masonryand Concrete Walls

Verify that surfaces of masonry and concrete walls to receive gypsum board applied with adhesive are dry, free of dust, oil, form release agents, protrusions and voids, and any other foreign matter. Do not proceed with work until surfaces are acceptable for application of gypsum board with adhesive.

3.1.4 Building Construction Materials

Do not install building construction materials that show visual evidence of biological growth.

3.2 APPLICATION OF GYPSUM BOARD

Apply gypsum board to framing and furring members in accordance with ASTM C840 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, except where prohibited by fire rating(s). Treat edges of cutouts for plumbing pipes, screwheads, and joints with water-resistant compound as recommended by the gypsum board manufacturer. Minimize framing by floating corners with single studs and drywall clips. Install 5/8 inch gypsum or 1/2 inch ceiling board over framing at 24 inch on center. Provide type of gypsum board for use in each system specified herein as indicated.

3.2.1 Application of Single-Ply Gypsum Board to Wood Framing

Apply in accordance with ASTM C840, System I or GA 216.

3.2.2 Application of Two-Ply Gypsum Board to Wood Framing

Apply in accordance with ASTM C840, System II or GA 216.

3.2.3 Adhesive Nail-On Application to Wood Framing

Apply in accordance with ASTM C840, System III or GA 216. This method may be used in lieu of ASTM C840, System I at the option of the Contractor.

3.2.4 Semi-Solid Gypsum Board Partitions

Provide in accordance with ASTM C840, System IV or GA 216 .

3.2.5 Solid Gypsum Board Partitions

Provide in accordance with ASTM C840, System V or GA 216.

3.2.6 Adhesive Application to Interior Masonry or Concrete Walls

Apply in accordance with ASTM C840, System VI or GA 216.

3.2.7 Application of Gypsum Board to Steel Framing and Furring

Apply in accordance with ASTM C840, System VIII or GA 216.

3.2.8 Arches and Bending Radii

Apply gypsum board in accordance with ASTM C840, System IX or GA 216.

3.2.9 Gypsum Board for Wall Tile or Tile Base Applied with Adhesive

In dry areas (areas other than tubs, shower enclosures, saunas, steam rooms, gang shower rooms), apply glass mat water-resistant gypsum tile backing board or water-resistant gypsum backing board in accordance with ASTM C840, System X or GA 216.

3.2.10 Exterior Application

Apply exterior gypsum board (such as at soffits) in accordance with ASTM C840, System XI or GA 216.

3.2.11 Glass Mat Covered or Fiber Reinforced Gypsum Sheathing

Apply glass mat covered or fiber reinforced gypsum sheathing in accordance to gypsum association publications GA 253. Follow gypsum sheathing manufacturer's requirements of design details for joints and fasteners and be properly installed to protect the substrate from moisture intrusion. Do not leave exposed surfaces of the glass mat covered or fiber reinforced gypsum sheathing beyond the manufacturer's recommendation without a weather barrier cladding. Provide continuous asphalt impregnated building felt over sheathing surface in shingle fashion with edges and ends lapped a minimum of 6 inch. Properly flash the openings. Seal all joints, seams, and penetrations with a compatible silicone sealant.

3.2.12 Floating Interior Angles

Minimize framing by floating corners with single studs and drywall clips. Locate the attachment fasteners adjacent to ceiling and wall intersections in accordance with ASTM C840, System XII or GA 216, for single-ply and two-ply applications of gypsum board to wood framing.

3.2.13 Control Joints

Install expansion and contraction joints in ceilings and walls in accordance with ASTM C840, System XIII or GA 216. Fill control joints between studs in fire-rated construction with firesafing insulation to match the fire-rating of construction.

3.3 APPLICATION OF CEMENTITIOUS BACKER UNITS

3.3.1 Application

In wet areas (tubs, shower enclosures, saunas, steam rooms, gang shower rooms), apply cementitious backer units in accordance with ANSI A108.11. Place a 15 lb asphalt impregnated, continuous felt paper membrane behind cementitious backer units, between backer units and studs or base layer of gypsum board. Place membrane with a minimum 6 inch overlap of sheets laid shingle style.

3.3.2 Joint Treatment

ANSI A108.11.

3.4 FINISHING OF GYPSUM BOARD

Tape and finish gypsum board in accordance with ASTM C840, GA 214 and GA 216. Finish plenum areas above ceilings to Level 1 in accordance with GA 214. Finish water resistant gypsum backing board, ASTM C1396/C1396M, to receive ceramic tile to Level 2 in accordance with GA 214. Finish walls and ceilings to receive a heavy-grade wall covering or heave textured finish before painting to Level 4 in accordance with GA 214. Finish walls and ceilings without critical lighting to receive flat paints, light textures, or wall coverings to Level 4 in accordance with GA 214. Unless otherwise specified, finish all gypsum board walls, partitions and ceilings to Level 5 in accordance with GA 214. Provide joint, fastener depression, and corner treatment. Tool joints as smoothly as possible to minimize sanding and dust. Do not use self-adhering fiber glass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only. Provide treatment for water-resistant gypsum board as recommended by the gypsum board manufacturer. Protect workers, building occupants, and HVAC systems from gypsum dust.

3.4.1 Uniform Surface

Wherever gypsum board is to receive eggshell, semigloss or gloss paint finish, or where severe, up or down lighting conditions occur, finish gypsum wall surface in accordance to GA 214 Level 5. In accordance with GA 214 Level 5, apply a thin skim coat of joint compound to the entire gypsum board surface, after the two-coat joint and fastener treatment is complete and dry.

3.5 SEALING

Seal openings around pipes, fixtures, and other items projecting through gypsum board and cementitious backer units as specified in Section 07 92 00 JOINT SEALANTS. Apply material with exposed surface flush with gypsum board or cementitious backer units.

3.6 FIRE-RESISTANT ASSEMBLIES

Wherever fire-rated construction is indicated, provide materials and application methods, including types and spacing of fasteners, wall and ceiling framing in accordance with the specifications contained in UL Fire Resistance for the Design Number(s) indicated, . Joints of fire-rated gypsum board enclosures must be closed and sealed in accordance with UL test requirements or GA requirements. Seal penetrations through rated partitions and ceilings tight in accordance with tested systems.

3.7 SOUND RATED ASSEMBLIES

When sound rated assemblies are required, provide materials and application methods, including panels, insulation, types and spacing of fasteners, wall and ceiling framing in accordance with the contract document and the description of the assembly in the ASTM E90 Factory Test Report. Seal partitions continuously with acoustical foam or sealant (both sides) and finished to match wall wherever it abuts another element such as the floor, ceiling, wall, column, mullion, or another system or assembly.

3.8 PATCHING

Patch surface defects in gypsum board to a smooth, uniform appearance, ready to receive finishes.

3.9 SHAFTWALL FRAMING

Install the shaftwall system in accordance with the system manufacturer's published instructions. Coordinate bucks, anchors, blocking and other items placed in or behind shaftwall framing with electrical and mechanical work. Patch or replace fireproofing materials which are damaged or removed during shaftwall construction.

3.10 SOUND RATED ASSEMBLY FIELD TESTING

Provide third party testing of sound rated assemblies tested in accordance with ASTM E336. Provide the ASTM E336 Field Test Report verifying that the installed assemblies perform no less than five ASTC rating points below the ASTM E90 Factory Test Report. Examine, modify adjust, and retest any installation not meeting the STC Rating until compliance is obtained.

-- End of Section --

SECTION 09 30 10

CERAMIC, QUARRY, AND GLASS TILING
08/17

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A137.1	(2012) American National Standards Specifications for Ceramic Tile
ANSI A137.2	(2012) American National Standards Specifications for Glass Tile

ASTM INTERNATIONAL (ASTM)

ASTM A1064/A1064M	(2017) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C33/C33M	(2018) Standard Specification for Concrete Aggregates
ASTM C144	(2018) Standard Specification for Aggregate for Masonry Mortar
ASTM C150/C150M	(2020) Standard Specification for Portland Cement
ASTM C206	(2014) Standard Specification for Finishing Hydrated Lime
ASTM C207	(2018) Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C241/C241M	(2015) Standard Specification for Abrasion Resistance of Stone Subjected to Foot Traffic
ASTM C373	(2018)Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products
ASTM C648	(2004; R 2009) Breaking Strength of Ceramic Tile

ASTM C1026	(2013; R 2018) Standard Test Method for Measuring the Resistance of Ceramic and Glass Tile to Freeze-Thaw Cycling
ASTM C1027	(2009; R 2017) Standard Test Method for Determining Visible Abrasion Resistance of Glazed Ceramic Tile
ASTM D226/D226M	(2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D2103	(2015) Standard Specification for Polyethylene Film and Sheeting

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

MARBLE INSTITUTE OF AMERICA (MIA)

MIA Design Manual	(2016) Dimension Stone Design Manual

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

TILE COUNCIL OF NORTH AMERICA (TCNA)

TCNA Hdbk	(2017) Handbook for Ceramic, Glass, and Stone Tile Installation

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings; G

SD-03 Product Data

Porcelain Tile; G

Recycled Content for Porcelain Tile; S

Setting-Bed; G

Mortar, Grout, and Adhesive; G

Reinforcing Wire Fabric

Uncoupling Membrane

SD-04 Samples

Tile; G

Accessories; G

Transition Strips; G

Grout; G

SD-07 Certificates

Indoor Air Quality for Sealants; S

SD-08 Manufacturer's Instructions

Maintenance Instructions

SD-10 Operation and Maintenance Data

Installation; G

1.3 CERTIFICATIONS

1.3.1 Indoor Air Quality Certifications

1.3.1.1 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body.When product does not have certification, provide validation that product meets the indoor air quality product requirments cited in this Section.

1.4 QUALITY ASSURANCE

Provide installers having a minimum of two years experience with a company

specializing in performing the type of work described. Each type and color of tile to be provided from a single source. Each type and color of mortar, adhesive, and grout to be provided from the same source.

1.5 DELIVERY, STORAGE, AND HANDLING

Ship tiles in sealed packages and clearly marked with the grade, type of tile, producer identification, and country of origin. 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 store them under cover in accordance with manufacturer's printed instructions.

1.6 ENVIRONMENTAL REQUIREMENTS

Do not perform ceramic tile work unless the substrate and ambient temperature is at least 50 degrees F and rising. Maintain temperature above 50 degrees F while the work is being performed and for at least 7 days after completion of the work. When temporary heaters are used, ventilate the area to the outside to avoid carbon dioxide damage to new tilework.

1.7 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a 1-year period.

PART 2 PRODUCTS

2.1 TILE

Provide tiles that comply with ANSI A137.1 and are standard grade tiles, the exception is glass tile. Furnish glass tiles that comply with ANSI A137.2. Provide a minimum breaking strength of 125 lbs. for wall tile and 250 lbs. for floor tile in accordance with ASTM C648. Provide exterior building tile for cold climate projects that is approved by the manufacturer for exterior use when tested in accordance with ASTM C1026. Provide floor tiles with a wet dynamic coefficient of friction (DCOF) value of 0.50-0.60 or greater when tested in accordance with ANSI A137.1 requirements. Provide glazed floor tile with a Class Heavy Commercial classification as rated by the manufacturer when tested in accordance with ASTM C1027 for visible abrasion resistance as related to foot traffic. For materials like tile, accessories, and transition strips submit samples of sufficient size to show color range, pattern, type and joints. Submit manufacturer's catalog data.

2.1.1 Porcelain Tile

Provide unglazed rectified porcelain tile, cove base and trim pieces with color extending uniformly through the body of the tile. Provide tile with a V2 aesthetic classification. Blend tiles in factory and in a packages to have same color range and continuous blend for installation. Provide nominal tile size(s) of 12 by 12 inch and 10.5 mm thick. Provide a 0.20 percent maximum water absorption in accordance with ASTM C373.

Provide Porcelain Tiling Materials that contain a minimum of 4 percent recycled content. Provide data identifying percentage of recycled content for porcelain tile.

2.2 SETTING-BED

Submit manufacturer's catalog data. Compose the setting-bed of the following materials:

2.2.1 Aggregate for Concrete Fill

Conform to ASTM C33/C33M for aggregate fill. Do not exceed one-half the thickness of concrete fill for maximum size of coarse aggregate.

2.2.2 Portland Cement

Conform to ASTM C150/C150M for cement, Type I, white for wall mortar and gray for other uses.

2.2.3 Sand

Conform to ASTM C144 for sand.

2.2.4 Hydrated Lime

Conform to ASTM C206 for hydrated lime, Type S or ASTM C207, Type S.

2.2.5 Uncouping Membrane

Provide polyethylene uncoupling membrane with grid structures of square cutback cavities and an anchoring fleece laminated to the underside.

2.2.6 Reinforcing Wire Fabric

Conform to ASTM A1064/A1064M for wire fabric. Provide 2 by 2 inch mesh, 16/16 wire or 1-1/2 by 2 inch mesh, 16/13 wire.

2.3 WATER

Provide potable water.

2.4 MORTAR AND GROUT

2.4.1 Dry-Set Portland Cement Mortar

TCNA Hdbk.

2.4.2 Latex-Portland Cement Mortar

TCNA Hdbk.

2.4.3 Ceramic Tile Grout

TCNA Hdbk; petroleum-free and plastic-free sand portland cement grout dry-set grout latex-portland cement grout commercial portland cement grout.

2.4.4 Sealants

Comply with applicable regulations regarding toxic and hazardous materials and as specified. Grout sealant must not change the color or alter the appearance of the grout. Refer to Section 07 92 00 JOINT SEALANTS.

Provide sealants used on the interior of the building (defined as inside of

the weatherproofing system) meeting either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) and VOC content requirements of SCAQMD Rule 1168.Provide certification or validation of indoor air quality for sealants.

2.5 SUBSTRATES

2.5.1 Cementitious Backer Board

Provide cementitious backer units, for use as tile substrate over wood sub-floors, in accordance with TCNA Hdbk. Furnish 1/2 inch thick cementitious backer units.

2.6 TRANSITION STRIPS

Provide anodized aluminum transitions between tile and carpet or resilient flooring. Provide types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified marble transitions appropriate for conditions. Categorize marble Group A as classified by MIA Design Manual. Provide a fine sand-rubbed finish marble, gray in color, color as specified in Section 09 06 00 SCHEDULES FOR FINISHES. Provide minimum 12.0 marble abrasion when tested in accordance with ASTM C241/C241M solid surface transitions appropriate for conditions. Reference SECTION 06 61 16 SOLID SURFACING FABRICATIONS for specifications. Provide transition strips that comply with 36 CFR 1191requirements.

2.7 MEMBRANE MATERIALS

Conform to ASTM D226/D226M, Type 1 for 15 pound waterproofing membrane, asphalt-saturated building felt. Conform to ASTM D2103 4 mil for polyethylene film.

2.8 COLOR, TEXTURE, AND PATTERN

Provide color, pattern and texture in accordance with Section 09 06 00 SCHEDULES FOR FINISHES. Color listed is not intended to limit the selection of equal colors from other manufacturers. Provide floor patterns as specified on the drawings.

PART 3 EXECUTION

3.1 PREPARATORY WORK AND WORKMANSHIP

Inspect surface to receive tile in conformance to the requirements of TCNA Hdbk for surface conditions for the type setting bed specified and for workmanship. Provide variations of tiled surfaces that fall within maximum values shown below:

TYPE	WALLS	FLOORS
Dry-Set Mortar	1/8 inch in 8 ft.	1/8 inch in 10 ft.
Organic Adhesives	1/8 inch in 8 ft.	1/16 inch in 3 ft.
Latex Portland Cement Mortar	1/8 inch in 8 ft.	1/8 inch in 10 ft.

TYPE	WALLS	FLOORS
Epoxy	1/8 inch in 8 ft.	1/8 inch in 10 ft.

3.2 GENERAL INSTALLATION REQUIREMENTS

Do not start tile work until roughing in for mechanical and electrical work has been completed and tested, and built-in items requiring membrane waterproofing have been installed and tested. Close space, in which tile is being set, to traffic and other work. Keep closed until tile is firmly set. Do not start floor tile installation in spaces requiring wall tile until after wall tile has been installed. 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. Do not walk or work on newly tiled floors without using kneeling boards or equivalent protection of the tiled surface. Keep traffic off horizontal portland cement mortar installations for at least 72 hours. Keep all traffic off epoxy installed floors for at least 40 hours after grouting, and heavy traffic off for at least 7 days, unless otherwise specifically authorized by manufacturer. Dimension and draw detail drawings at a minimum scale of 1/4 inch = 1 foot. Include drawings of pattern at inside corners, outside corners, termination points and location of all equipment items such as thermostats, switch plates, mirrors and toilet accessories mounted on surface. Submit drawings showing ceramic tile pattern elevations and floor plans. Submit manufacturer's preprinted installation instructions.

Do not install building construction materials that show visual evidence of biological growth.

3.3 INSTALLATION OF WALL TILE

Install wall tile in accordance with the TCNA Hdbk, method W 244-C and with grout joints as recommended by the manufacturer for the type of tile of 3mm inch. Install thinner wall tile flush with thicker wall tile applied on same wall and provide installation materials as recommended by the tile and setting materials manufacturer's to achieve flush installation.

3.3.1 Workable or Cured Mortar Bed

Install tile over workable mortar bed or a cured mortar bed at the option of the Contractor. Install a 4 mil polyethylene membrane, metal lath, and scratch coat. Conform to TCNA Hdbk for workable mortar bed, materials, and installation of tile. Conform to TCNA Hdbk for cured mortar bed and materials.

3.3.2 Dry-Set Mortar and Latex-Portland Cement Mortar

Use Latex-Portland Cement to install tile in accordance with TCNA Hdbk. Use Latex Portland Cement when installing porcelain ceramic tile.

3.3.3 Ceramic Tile Grout

Prepare and install ceramic tile grout in accordance with TCNA Hdbk.

Provide and apply manufacturer's standard sealant product for sealing grout joints in accordance with manufacturer's recommendations.

3.4 INSTALLATION OF FLOOR TILE

Above Ground Installation:

Install floor tile in accordance with TCNA Hdbk method F-125-FULL-19 and with grout joints as recommended by the manufacturer for the type of tile of 3mm. On Ground Installation (Young Concrete): Install floor tile TCNA method:

On Ground Installation (Young Concrete):

F-128-19 with grout joints of 3mm as recommended by manufacturer.

3.4.1 Dry-Set and Latex-Portland Cement

Use Latex-Portland cement mortar to install tile directly over properly cured, plane, clean concrete slabs in accordance with TCNA Hdbk. Use Latex Portland cement when installing porcelain ceramic tile.

3.4.2 Ceramic Tile Grout

Prepare and install ceramic tile grout in accordance with TCNA Hdbk.

3.4.3 Concrete Fill

Provide a 3500 psi concrete fill mix to dry as consistency as practicable. Compose concrete fill by volume of 1 part Portland cement to 3 parts fine aggregate to 4 parts coarse aggregate, and mix with water to as dry a consistency as practicable. Spread, tamp, and screed concrete fill to a true plane, and pitch to drains or levels as shown. Thoroughly damp concrete fill before applying setting-bed material. Reinforce concrete fill with one layer of reinforcement, with the uncut edges lapped the width of one mesh and the cut ends and edges lapped a minimum 2 inch. Tie laps together with 18 gauge wire every 10 inch along the finished edges and every 6 inch along the cut ends and edges. Provide reinforcement with support and secure in the centers of concrete fills. Provide a continuous mesh; except where expansion joints occur, cut mesh and discontinue across such joints. Provide reinforced concrete fill under the setting-bed where the distance between the under-floor surface and the finished tiles floor surface is a minimum of 2 inches, and of the same thickness that the mortar setting-bed over the concrete fill with the thickness required in the specified TCNA Hdbk method.

3.5 INSTALLATION OF TRANSITION STRIPS

Install transition strips where indicated, in a manner similar to that of the ceramic tile floor and as recommended by the manufacturer. Provide thresholds full width of the opening. Install head joints at ends not exceeding 1/4 inch in width and grouted full.

3.6 EXPANSION JOINTS

Form and seal joints as specified in Section 07 92 00 JOINT SEALANTS.

3.6.1 Walls

Provide expansion joints at control joints in backing material. Wherever backing material changes, install an expansion joint to separate the different materials.

3.6.2 Floors

Provide expansion joints over construction joints, control joints, and expansion joints in concrete slabs. Provide expansion joints where tile abuts restraining surfaces such as perimeter walls, curbs and columns and at intervals of 24 to 36 feet each way in large interior floor areas and 12 to 16 feet each way in large exterior areas or areas exposed to direct sunlight or moisture. Extend expansion joints through setting-beds and fill.

3.7 CLEANING AND PROTECTING

Upon completion, thoroughly clean tile surfaces in accordance with manufacturer's approved cleaning instructions. After the grout has set, provide a protective coat of a noncorrosive soap or other approved method of protection for tile wall surfaces. Cover tiled floor areas with building paper before foot traffic is permitted over the finished tile floors. Provide board walkways on tiled floors that are to be continuously used as passageways by workmen. Replace damaged or defective tiles. Submit copy of manufacturer's printed maintenance instructions.

-- End of Section --

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SECTION 09 51 00

ACOUSTICAL CEILINGS
08/17

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A489	(2018; E 2018) Standard Specification for Carbon Steel Eyebolts
ASTM A641/A641M	(2019) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A1008/A1008M	(2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM B633	(2019) Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C635/C635M	(2017) Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
ASTM C636/C636M	(2013) Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM C834	(2017) Standard Specification for Latex Sealants
ASTM E580/E580M	(2017) Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions
ASTM E795	(2016) Standard Practices for Mounting Test Specimens During Sound Absorption Tests

ASTM E1264	(2019) Acoustical Ceiling Products
ASTM E1477	(1998a; R 2017; E 2018) Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2019) Structural Engineering

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings; G

SD-03 Product Data

Acoustical Ceiling Systems; G

Recycled Content for Type XII Ceiling Tiles; S

Recycled Content for Suspension Systems; S

SD-04 Samples

Acoustical Units; G

Acoustical Ceiling Tiles; G

SD-06 Test Reports

Ceiling Attenuation Class and Test; G

SD-07 Certificates

Indoor Air Quality for Type XII Ceiling Tiles; S

Indoor Air Quality for Impact/Abrasion Resistant Ceiling Tiles; S

Indoor Air Quality for Humidity Resistant Ceiling Tiles; S

Indoor Air Quality for Adhesives; S

Indoor Air Quality for Sealants; S

1.3 CERTIFICATIONS

1.3.1 Indoor Air Quality Certifications

1.3.1.1 Ceiling Tiles

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification by other third-party programs. Provide current product certification documentation from certification body.

1.3.1.2 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirments cited in this Section.

1.4 DELIVERY, STORAGE. AND HANDLING

Deliver materials to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Carefully handle and store materials in dry, watertight enclosures. Immediately before installation, store acoustical units for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed in order to assure proper temperature and moisture acclimation.

1.5 ENVIRONMENTAL REQUIREMENTS

Maintain a uniform temperature of not less than 60 degrees F nor more than 85 degrees F and a relative humidity of not more than 70 percent for 24 hours before, during, and 24 hours after installation of acoustical units.

1.6 SCHEDULING

Complete and dry interior finish work such as plastering, concrete and terrazzo work before ceiling installation. Complete mechanical, electrical, and other work above the ceiling line; install and start operating heating, ventilating, and air conditioning systems in order to maintain temperature and humidity requirements.

1.7 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a one year period. Include an agreement to repair or replace acoustical panels that fail within the warranty period in the standard performance guarantee or warranty. Failures include, but are not limited to, sagging and warping of panels; rusting and manufacturers defects of grid system.

1.8 EXTRA MATERIALS

Furnish spare tiles, from the same lot as those installed, of each color at the rate of 5 tiles for each 1000 tiles installed.

1.9 OTHER SUBMITTAL REQUIREMENTS

Submit the following:

a. Manufacturer's catalog showing UL classification of fire-rated ceilings giving materials, construction details, types of floor and roof constructions to be protected, and UL design number and fire protection time rating for each required floor or roof construction and acoustic ceiling assembly.

b. Reports by an independent testing laboratory attesting that acoustical ceiling systems meet specified sound transmission requirements. Data attesting to conformance of the proposed system to Underwriters Laboratories requirements for the fire endurance rating listed in UL Fire Resistance may be submitted in lieu of test reports.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide sound controlling units mechanically mounted on a ceiling suspension system for acoustical treatment. The unit size, texture, finish, and color must be as specified. The Contractor has the option to substitute inch-pound (I-P) Recessed Light Fixtures (RLF) for metric RLF. If the Contractor opts to furnish I-P RLF, other ceiling elements like acoustical ceiling tiles, air diffusers, air registers and grills, must also be I-P products. Coordinate the whole ceiling system with other details, like the location of access panels and ceiling penetrations, etc., shown on the drawings. The Contractor is responsible for all associated labor and materials and for the final assembly and performance of the specified work and products if I-P products are used. The location and extent of acoustical treatment must be as shown on the approved detail drawings. Submit drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan. Coordinate with paragraph RECLAMATION PROCEDURES for reclamation of mineral fiber acoustical ceiling panels to be removed from the job site.

2.1.1 Ceiling Attenuation Class and Test

Provide fixture attenuators over light fixtures and other ceiling penetrations, and provide acoustical blanket insulation adjacent to partitions, as required to achieve the specified CAC. Provide test ceiling continuous at the partition and assembled in the suspension system in the same manner that the ceiling will be installed on the project.

2.1.2 Ceiling Sound Absorption

Determine the Noise Reduction Coefficient (NRC) in accordance with ASTM C423 Test Method.

2.1.3 Light Reflectance

Determine light reflectance factor in accordance with ASTM E1477 Test Method.

2.2 ACOUSTICAL UNITS

Submit two samples of each type of acoustical unit and each type of suspension grid tee section showing texture, finish, and color. Conform acoustical units to ASTM E1264, Class A, and the following requirements:

2.2.1 Units for Exposed-Grid System A

2.2.1.1 Type

IV (non-asbestos mineral fiber with membrane-faced overlay). Provide Type IV Acoustical Ceiling Tiles containing a minimum of 60 percent recycled content. Provide data identifying percentage of recycled content for Type IV ceiling tiles. Provide certification of indoor air quality for Type IV Ceiling Tiles.

2.2.1.2 Flame Spread

Class A, 25 or less

2.2.1.3 Pattern

E; Form 2

2.2.1.4 Minimum NRC

0.80 when tested on mounting Type E-400 of ASTM E795.

2.2.1.5 Minimum Light Reflectance Coefficient
0.88

2.2.1.6 Nominal Size

24 by 24inch

2.2.1.7 Edge Detail

Reveal

2.2.1.8 Finish

Factory-applied standard finish; White.

2.2.1.9 Minimum CAC

35

2.2.1.10 Articulation Class 170

2.3 SUSPENSION SYSTEM

Provide standardexposed-grid standard width flange suspension system conforming to ASTM C635/C635M for heavy-duty systems. Provide surfaces exposed to view of with a factory-applied white baked-enamel finish. Provide wall molding having a flange of not less than 15/16 inch. Provide inside and outside corner caps mitered corners. Suspended ceiling framing system must have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. Provide a suspension system with a maximum deflection of 1/360 of the span length. Conform seismic details to the guidance in UFC 3-301-01 and ASTM E580/E580M.

Provide Suspension System containing a minimum of 15 percent recycled content. Provide data identifying percentage of recycled content for suspension systems.

2.4 HANGERS

Provide hangers and attachment capable of supporting a minimum 300 pound ultimate vertical load without failure of supporting material or attachment.

2.4.1 Wires

Conform wires to ASTM A641/A641M, Class 1, 0.08 inch (12 gauge) in diameter.

2.4.2 Straps

Provide straps of 1 by 3/16 inch galvanized steel conforming to ASTM A653/A653M, with a light commercial zinc coating or ASTM A1008/A1008M with an electrodeposited zinc coating conforming to ASTM B633, Type RS.

2.4.3 Rods

Provide 3/16 inch diameter threaded steel rods, zinc or cadmium coated.

2.4.4 Eyebolts

Provide eyebolts of weldless, forged-carbon-steel, with a straight-shank in accordance with ASTM A489. Eyebolt size must be a minimum 1/4 inch, zinc coated.

2.4.5 Anchorage Devices

Comply with ASTM C636/C636M for anchorage devices for eyebolts machine screws. Where aluminum is in contact with concrete, coat aluminum with bituminous paint or where exposed, with a chromatic primer and 2-coats of enamel paint.

2.5 ADHESIVE

Use adhesive as recommended by tile manufacturer. Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) that meet either emissions requirements of CDPH SECTION 01350 (use the office or classroom requirements, regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide certification or validation of indoor air quality for adhesives.

2.6 FINISHES

Use manufacturer's standard textures, patterns and finishes as specified for acoustical units and suspension system members. Treat ceiling suspension system components to inhibit corrosion.

2.7 COLORS AND PATTERNS

Use colors and patterns for acoustical units and suspension system components as specified in Section 09 06 00 SCHEDULES FOR FINISHES and the Room Finish Color Schedule Key.

2.8 ACOUSTICAL SEALANT

Conform acoustical sealant to ASTM C834, nonstaining. Provide sealants used on the interior of the building (defined as inside of the weatherproofing system) that meet either emissions requirements of CDPH SECTION 01350 (use the office or classoom requirements, regardless of space type) or VOC content requirements of SCAQMD Rule 1168.Provide certification of indoor air quality for Sealants.

PART 3 EXECUTION

3.1 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Examine surfaces to receive directly attached acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of the work. Rid areas, where acoustical units will be cemented, of oils, form residue, or other materials that reduce bonding capabilities of the adhesive. Complete and dry interior finish work such as plastering, concrete, and terrazzo work before installation. Complete and approve mechanical, electrical, and other work above the ceiling line prior to the start of acoustical ceiling installation. Provide acoustical work complete with necessary fastenings, clips, and other accessories required for a complete installation. Do not expose mechanical fastenings in the finished work. Lay out hangers for each individual room or space. Provide hangers to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Keep main runners and carrying channels clear of abutting walls and partitions. Provide at least two main runners for each ceiling span. Wherever required to bypass an object with the hanger wires, install a subsuspension system so that all hanger wires will be plumb.

3.1.1 Suspension System

Install suspension system in accordance with ASTM C636/C636M and as specified herein. Do not suspend hanger wires or other loads from underside of steel decking.

3.1.1.1 Plumb Hangers

Install hangers plumb and not pressing against insulation covering ducts and pipes. Where lighting fixtures are supported from the suspended ceiling system, provide hangers at a minimum of four hangers per fixture and located not more than 6 inch from each corner of each fixture.

3.1.1.2 Splayed Hangers

Where hangers must be splayed (sloped or slanted) around obstructions, offset the resulting horizontal force by bracing, countersplaying, or other acceptable means.

3.1.2 Wall Molding

Provide wall molding where ceilings abut vertical surfaces. Miter corners where wall moldings intersect or install corner caps. Secure wall molding not more than 3 inch from ends of each length and not more than 16 inch on centers between end fastenings. Provide wall molding springs at each acoustical unit in semi-exposed or concealed systems.

3.1.3 Acoustical Units

Install acoustical units in accordance with the approved installation instructions of the manufacturer. Ensure that edges of acoustical units are in close contact with metal supports, with each other, and in true alignment; i.e. cut tegular edge in for tiles that have to be cut as a result of room layout. Backpaint cut edges of acoustical units. Arrange acoustical units so that units less than one-half width are minimized. No units less than 6" Hold units in exposed-grid system in place with manufacturer's standard hold-down clips, if units weigh less than 1 psf or if required for fire resistance rating.

3.1.4 Caulking

Seal all joints around pipes, ducts or electrical outlets penetrating the ceiling. Apply a continuous ribbon of acoustical sealant on vertical web of wall or edge moldings.

3.1.5 Adhesive Application

Wipe back of tile to remove accumulated dust. Daub acoustical units on back side with four equal daubs of adhesive. Apply daubs near corners of tiles. Ensure that contact area of each daub is at least 2 inch diameter in final position. Press units into place, aligning joints and abutting units tight and uniform without differences in joint widths.

3.2 CEILING ACCESS PANELS

Locate ceiling access panels directly under the items which require access.

3.3 CLEANING

Following installation, clean dirty or discolored surfaces of acoustical units and leave them free from defects. Remove units that are damaged or improperly installed and provide new units as directed.

3.4 RECLAMATION PROCEDURES

Neatly stack ceiling tile, designated for recycling by the Contracting Officer, on 4 by 4 foot pallets not higher than 4 foot. Panels must be completely dry. Shrink wrap and symmetrically stack pallets on top of each other without falling over.

-- End of Section --

SECTION 09 65 00

RESILIENT FLOORING
08/10

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D4078	(2002; R 2015) Water Emulsion Floor Polish
ASTM E648	(2019a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM F710	(2019; E 2020) Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
ASTM F1066	(2004; R 2014; E 2014) Standard Specification for Vinyl Composition Floor Tile
ASTM F1482	(2015) Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
ASTM F1700	(2020) Standard Specification for Solid Vinyl Floor Tile
ASTM F1859	(2014; E 2016) Standard Specification for Rubber Sheet Floor Covering Without Backing
ASTM F1861	(2016) Standard Specification for Resilient Wall Base
ASTM F1869	(2016) Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
ASTM F2170	(2019a) Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Resilient Flooring and Accessories; G

SD-03 Product Data

Resilient Flooring and Accessories; G

Adhesives

Vinyl Composition Tile

Recycled content for Vinyl Composition Tile; S

Sheet Vinyl Flooring

Luxury Vinyl Tile

Recycled content for Luxury Vinyl Tile; S

Rubber Sheet Flooring

Static Dissipative Vinyl Tile

Wall Base

SD-04 Samples

Resilient Flooring and Accessories; G

SD-06 Test Reports

Moisture, Alkalinity and Bond Tests; G

SD-07 Certificates

Indoor Air Quality for Vinyl Composition Tile; S

Indoor Air Quality for Rubber Sheet Flooring; S

Indoor Air Quality for Luxury Vinyl Tile; S

Indoor Air Quality for Static Dissipative Vinyl Tile; S

Indoor Air Quality for Wall Base; S

Indoor Air Quality for Adhesives; S

SD-08 Manufacturer's Instructions

Surface Preparation; G

Installation; G

SD-10 Operation and Maintenance Data

Resilient Flooring and Accessories; G

1.3 CERTIFICATES

1.3.1 Indoor Air Quality

Submit required indoor air quality certifications and validations in one submittal package.

1.3.1.1 Floor Covering Materials

Provide Vinyl Composition TileRubber Sheet Flooring Luxury Vinyl Tile Static Dissipative Vinyl Tile, and wall base products certified to meet indoor air quality requirements by FLOORSCORE, UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification by other third-party programs. Provide current product certification documentation from certification body.

1.3.1.2 Adhesives, Caulking and Sealants

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the building site in original unopened containers bearing the manufacturer's name, style name, pattern color name and number, production run, project identification, and handling instructions. Store materials in a clean, dry, secure, and well-ventilated area free from strong contaminant sources and residues with ambient air temperature maintained above 68 degrees F and below 85 degrees F, stacked according to manufacturer's recommendations. Remove resilient flooring products from packaging to allow ventilation prior to installation. Protect materials from the direct flow of heat from hot-air registers, radiators and other heating fixtures and appliances. Observe ventilation and safety procedures specified in the MSDS. Do not store rubber surface products with materials

that have a high capacity to adsorb volatile organic compound (VOC) emissions, including MCT1 or ACT1. Do not store exposed rubber surface materials in occupied spaces. Do not store any finish products near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.5 ENVIRONMENTAL REQUIREMENTS

Maintain areas to receive resilient flooring at a temperature above 68 degrees F and below 85 degrees F for 3 days before application, during application and 2 days after application, unless otherwise directed by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of 55 degrees F thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

1.6 SCHEDULING

Schedule resilient flooring application after the completion of other work which would damage the finished surface of the flooring.

1.7 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a one year period.

1.8 EXTRA MATERIALS

Provide extra flooring material of each color and pattern at the rate of 5 tiles for each 1000 tiles and 5 square feet for each 1000 square feet of sheet flooring installed. Provide extra wall base material composed of 20 linear feet of each type, color and pattern. Package all extra materials in original properly marked containers bearing the manufacturer's name, brand name, pattern color name and number, production run, and handling instructions. Provide extra materials from the same lot as those installed. Leave extra stock at the site in location assigned by Contracting Officer.

PART 2 PRODUCTS

2.1 VINYL COMPOSITION TILE VCT1

Conform to ASTM F1066 Class 2, (through pattern tile), Composition 1, asbestos-free, 12 inch square and 1/8 inch thick. Provide color and pattern uniformly distributed throughout the thickness of the tile.

Provide Vinyl Composition Tile containing a minimum of 10 percent recycled content. Provide data identifying percentage of recycled content for Vinyl Composition Tile.

Provide certification of indoor air quality for Vinyl Composition Tile.

2.2 RUBBER SHEET FLOORING RM2

Conform to ASTM F1859 (flooring without backing), Type I homogeneous 48" wide. Provide smooth surface. Provide 0.080 inch overall thickness.

Provide certification of indoor air quality for Rubber Sheet Flooring.

2.3 LUXURY VINYL PLANK LVP1

Conform to ASTM F1700 Class III printed film with a minimum wear layer thickness 22 mil and minimum overall thickness of 4.5mm with non slip/skid backing, Type B (embossed). Provide tile with a factory protective finish that enhances cleanability and durability that is scratch resistant.

Provide Luxury Vinyl Tile containing a minimum of 35 percent recycled content. Provide data identifying percentage of recycled content for Luxury Vinyl Tile.

Provide certification of indoor air quality for Luxury Vinyl Tile.

2.4 STATIC DISSIPATIVE VINYL TILE SDVT 1

Conform to ASTM F1700 Class I monolithic (minimum wear layer thickness 0.125 inch and minimum overall thickness 0.125 inch, Type A (smooth). Provide 12 inch square tile.

Provide certification of indoor air quality for Solid Vinyl Tile.

Provide certification that product complies with ANSI-ESD 520.20 Dissipative = > 1.0 x 10E6 ohms to < 1.0 x 10E9 ohms

2.5 WALL BASE

Conform to ASTM F1861, Type TS (vulcanized thermoset rubber) or Type TP (thermoplastic rubber) Style B (coved - . Provide 4 inch high and a minimum 1/8 inch thick wall base. Provide job formed corners in matching height, shape, and color.

Provide certification of indoor air quality for Wall Base.

2.6 MOULDING

Provide tapered mouldings of rubber and types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified. Provide vertical lip on moulding of maximum 1/4 inch. Provide bevel change in level between 1/4 and 1/2 inch with a slope no greater than 1:2.

2.7 ADHESIVES

Provide adhesives for flooring, base and accessories as recommended by the manufacturer and comply with local indoor air quality standards. Submit manufacturer's descriptive data, documentation stating physical characteristics, and mildew and germicidal characteristics.

Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) that meet either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide certification or validation of indoor air quality for adhesives.

2.8 SURFACE PREPARATION MATERIALS

Provide surface preparation materials, such as panel type underlayment, lining felt, and floor crack fillers as recommended by the flooring

manufacturer for the subfloor conditions. Comply with ASTM F1482 for panel type underlayment products. Use one of the following substrates:

2.9 POLISH/FINISH

Provide polish finish as recommended by the manufacturer and conform to ASTM D4078 for polish.

2.10 CAULKING AND SEALANTS

Provide caulking and sealants in accordance with Section 07 92 00 JOINT SEALANTS.

2.11 MANUFACTURER'S COLOR, PATTERN AND TEXTURE

Provide color, pattern and texture for resilient flooring and accessories in accordance with Section 09 06 00 SCHEDULES FOR FINISHES as indicated on the room finish color schedule key. Color listed is not intended to limit the selection of equal colors from other manufacturers. Provide flooring in any one continuous area or replacement of damaged flooring in continuous area from same production run with same shade and pattern. Submit manufacturer's descriptive data and three samples of each indicated color and type of flooring, base, mouldings, and accessories sized a minimum 2-1/2 by 4 inch. Submit Data Package 1 in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

2.12 FIRE RESISTANCE TESTING REQUIREMENTS

Provide a minimum average critical radiant flux of 0.45 watts per square centimeter for flooring in corridors and exits when tested in accordance with ASTM E648.

PART 3 EXECUTION

3.1 EXAMINATION

Examine and verify that site conditions are in agreement with the design package. Report all conditions that will prevent a proper installation. Do not take any corrective action without written permission from the Government. Work will proceed only when conditions have been corrected and accepted by the installer. Submit manufacturer's printed installation instructions for all flooring materials and accessories, including preparation of substrate, seaming techniques, and recommended adhesives.

3.2 SURFACE PREPARATION

Provide a smooth, true, level plane for surface preparation of the flooring, except where indicated as sloped. Floor to be flat to within 3/16 inch in 10 feet. Prepare subfloor in accordance with flooring manufacturer's recommended instructions. Prepare the surfaces of lightweight concrete slabs (as defined by the flooring manufacturer) as recommended by the flooring manufacturer. Comply with ASTM F710 for concrete subfloor preparation. Floor fills or toppings may be required as recommended by the flooring manufacturer. Install underlayments, when required by the flooring manufacturer, in accordance with manufacturer's recommended printed installation instructions. Comply with ASTM F1482 for panel type underlayments. Before any work under this section is begun, correct all defects such as rough or scaling concrete, chalk and dust, cracks, low spots, high spots, and uneven surfaces. Repair all damaged

portions of concrete slabs as recommended by the flooring manufacturer. Remove concrete curing and sealer compounds from the slabs, other than the type that does not adversely affect adhesion. Remove paint, varnish, oils, release agents, sealers, waxes, and adhesives, as required by the flooring product in accordance with manufacturer's printed installation instructions.

3.3 MOISTURE, ALKALINITY AND BOND TESTS

Determine the suitability of the concrete subfloor for receiving the resilient flooring with regard to moisture content and pH level by moisture and alkalinity tests. Conduct moisture testing in accordance with ASTM F1869 or ASTM F2170, unless otherwise recommended by the flooring manufacturer. Conduct alkalinity testing as recommended by the flooring manufacturer. Determine the compatibility of the resilient flooring adhesives to the concrete floors by a bond test in accordance with the flooring manufacturer's recommendations. Submit copy of test reports for moisture and alkalinity content of concrete slab, and bond test stating date of test, person conducting the test, and the area tested.

3.4 GENERAL INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

3.5 PLACING VINYL COMPOSITION AND STATIC DISSIPATIVE VINYL TILES

Install tile flooring and accessories in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's directions. Keep tile lines and joints square, symmetrical, tight, and even. Keep each floor in true, level plane, except where slope is indicated. Vary edge width as necessary to maintain full-size tiles in the field, no edge tile to be less than one-half the field tile size, except where irregular shaped rooms make it impossible. Cut flooring to fit around all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Cut, fit, and scribe edge tile to walls and partitions after field flooring has been applied.

3.6 PLACING LUXURY VINYL PLANK

Install luxury vinyl plank flooring using glue down installation. Install flooring and accessories in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's directions for installation method specified. Keep plank lines and joints square, symmetrical, tight, and even. Keep each floor in true, level plane, except where slope is indicated. Vary edge width as necessary to maintain full-size planks in the field, no edge plank to be less than one-half the field plank size, except where irregular shaped rooms make it impossible. Cut flooring to fit around all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Cut, fit, and scribe edge tile to walls and partitions after field flooring has been applied.

3.7 PLACING RUBBER SHEET FLOORING

Install rubber sheet flooring and accessories in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Provide square, symmetrical, tight, and even flooring lines and joints. Keep each floor in true, level plane, except where slope is indicated. Cut seams by

overlapping or underscribing as recommended by the manufacturer. Lay out sheets to minimize waste. Cut flooring to fit around all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Cut, fit, and scribe flooring to walls and partitions after field flooring has been applied.

3.8 PLACING FEATURE STRIPS

Install feature strips in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions.

3.9 PLACING MOULDING

Provide moulding where flooring termination is higher than the adjacent finished flooring and at transitions between different flooring materials. When required, locate moulding under door centerline. Moulding is not required at doorways where thresholds are provided. Secure moulding with adhesive as recommended by the manufacturer. Prepare and apply adhesives in accordance with manufacturer's printed directions.

3.10 PLACING WALL BASE

Install wall base in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Tighten base joints and make even with adjacent resilient flooring. Fill voids along the top edge of base at masonry walls with caulk. Roll entire vertical surface of base with hand roller, and press toe of base with a straight piece of wood to ensure proper alignment. Avoid excess adhesive in corners.

3.11 CLEANING

Immediately upon completion of installation of flooring in a room or an area, dry and clean the flooring and adjacent surfaces to remove all surplus adhesive. Clean flooring as recommended in accordance with manufacturer's printed maintenance instructions and within the recommended time frame. As required by the manufacturer, apply the recommended number of coats and type of polish and finish in accordance with manufacturer's written instructions.

3.12 PROTECTION

From the time of installation until acceptance, protect flooring from damage as recommended by the flooring manufacturer. Remove and replace flooring which becomes damaged, loose, broken, or curled and wall base which is not tight to wall or securely adhered.

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SECTION 09 68 00

CARPETING
11/17

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC 16	(2004; E 2008; E 2010) Colorfastness to Light
AATCC 107	(2013) Colorfastness to Water
AATCC 134	(2016) Electrostatic Propensity of Carpets
AATCC 165	(2013) Colorfastness to Crocking: Textile Floor Coverings - Crockmeter Method
AATCC 174	(2016) Antimicrobial Activity Assessment of New Carpets

ASTM INTERNATIONAL (ASTM)

ASTM D1335	(2017; E 2018) Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings
ASTM D2859	(2016) Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
ASTM D3278	(1996; R 2011) Flash Point of Liquids by Small Scale Closed-Cup Apparatus
ASTM D5793	(2018) Standard Test Method for Binding Sites Per Unit Length or Width of Pile Yarn Floor Coverings
ASTM D5848	(2010; E 2010) Mass Per Unit Area of Pile Yarn Floor Coverings
ASTM D6859	(2011) Standard Test Method for Pile Thickness of Finished Level Pile Yarn Floor Coverings
ASTM D7330	(2015) Standard Test Method for Assessment of Surface Appearance Change in Pile Floor Coverings Using Standard Reference Scales
ASTM E648	(2019a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems

	Using a Radiant Heat Energy Source
CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)	
CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers
CARPET AND RUG INSTITUTE (CRI)	
CRI 104	(2015) Carpet Installation Standard for Comnmercial Carpet
CRI 105	(2015) Carpet Installation Standard for Residential Carpet
CRI GLP QM	(2017) Green Label Plus Quality Manual
CRI Test Method 103	(2015) Standard Test Method for the Evaluation of Texture Appearance Retention of Carpet Standards Program
GREEN SEAL (GS)	
GS-36	(2013) Adhesives for Commercial Use
INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)	
ISO 2551	(1981) Machine-made Textile Floor Coverings - Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions
SCIENTIFIC CERTIFICATION SYSTEMS (SCS)	
SCS	SCS Global Services (SCS) Indoor Advantage
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)	
SCAQMD Rule 1113	(2016) Architectural Coatings
SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications
U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)	
16 CFR 1630	Standard for the Surface Flammability of Carpets and Rugs (FF 1-70)
UNDERWRITERS LABORATORIES (UL)	
UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control

approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation Drawings; G

SD-03 Product Data

Carpet; G

Recycled Content for Carpeting; S

Moldings; G

Indoor Air Quality for Aerosol Adhesives; S

Indoor Air Quality for Non-Aerosol Adhesives; S

Indoor Air Quality for Concrete Primer; S

SD-04 Samples

Carpet; G

Moldings; G

Carpet Cushion; G

SD-06 Test Reports

Moisture and Alkalinity Tests; G

SD-07 Certificates

Indoor Air Quality for Carpet; S

SD-08 Manufacturer's Instructions

Surface Preparation

SD-10 Operation and Maintenance Data

Cleaning and Protection

Maintenance Service

SD-11 Closeout Submittals

Warranty

1.3 CERTIFICATIONS

1.3.1 Indoor Air Quality Certifications

1.3.1.1 Floor Covering Materials

Provide carpet and cushion products certified to meet indoor air quality requirements by UL 2818 (GreenGuard) Gold, SCS Global Services Indoor

Advantage Gold, CRI GLP QM or provide certification or validation by other third-party program that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the site in the manufacturer's original wrappings and packages clearly labeled with the manufacturer's name, brand name, size, dye lot number, and related information. Remove materials from packaging and store them in a clean, dry, well ventilated area (100 percent outside air supply, minimum of 1.5 air changes per hour, and no recirculation), protected from damage, soiling, and moisture, and strong contaminant sources and residues, and maintain at a temperature above 60 degrees F for 2 days prior to installation. Do not store carpet or carpet tiles with materials which have high emissions of volatile organic compounds (VOCs) or other contaminants, including paints and adhesives. Do not store carpet near materials that may off gas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.5 AMBIENT CONDITIONS

Maintain areas in which carpeting is to be installed at a temperature above 60 degrees F and below 90 degrees F for 2 days before installation, during installation, and for 2 days after installation. Provide temporary ventilation during work of this section. Maintain a minimum temperature of 55 degrees F thereafter for the duration of the contract.

1.6 WARRANTY

Provide manufacturer's standard performance guarantees or warranties including minimum ten year wear warranty, two year material and workmanship and ten year tuft bind and delamination.

PART 2 PRODUCTS

2.1 CARPET

Furnish first quality carpet that is free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains, and other physical and manufacturing defects. Provide carpet materials and treatments as reasonably nonallergenic and free of other recognized health hazards. Provide a static control construction on all grade carpets which gives adequate durability and performance. Submit manufacturer's catalog data and printed documentation stating physical characteristics, durability, resistance to fading, and flame resistance characteristics for each type of carpet material and installation accessory. Submit manufacturer's Product Data for 1) Carpet and 2) Moldings. Also, submit Samples of the following:

a. Carpet: Two "Production Quality" samples 18 by 18 inches of each carpet proposed for use, showing quality, pattern, and color specified

b. Moldings: Two samples of each type minimum 12 inches long

2.1.1 Recycled Content

Carpeting must contain a minimum of 20 percent recycled content. Provide

data identifying percentage of recycled content for carpeting. Provide certification of cradle to cradle for carpet.

Provide certification of indoor air quality for carpet.

2.1.2 Indoor Air Quality Requirements

Products must meet emissions requirements of CDPH SECTION 01350. Provide certification or validation of indoor air quality for carpet.

2.1.3 Physical Characteristics for Modular Tile Carpet

2.1.3.1 Carpet Construction

Tufted, textured loop.

2.1.3.2 Type

Modular tile 39.4 by 39.4 inch square with 0.15 percent growth/shrink rate in accordance with ISO 2551. Entrance 19.7 by 19.7 inch square.

2.1.3.3 Pile Type

Textured Loop.

2.1.3.4 Pile Fiber

Commercial 100 percent branded (federally registered trademark) nylon continuous filament.

2.1.3.5 Gauge or Pitch

Minimum 1/12 inch in accordance with ASTM D5793

2.1.3.6 Stitches or Rows/Wires

Minimum 9.8 per square inch

2.1.3.7 Surface Pile Weight

Minimum 15 ounces per square yard. This does not include weight of backings. Determine weight in accordance with ASTM D5848.

2.1.3.8 Pile Thickness

Minimum 0.08 inch in accordance with ASTM D6859

2.1.3.9 Pile Density

Minimum 6,541

2.1.3.10 Dye Method

Printworks Precision Dyeing

2.1.3.11 Backing Materials

Provide primary backing materials composed of PVC free comfort cushion. Provide secondary backing to suit project requirements of those customarily

used and accepted by the trade for each type of carpet.

2.2 PERFORMANCE REQUIREMENTS

2.2.1 Texture Appearance Retention Rating (TARR)

Provide carpet with a greater than or equal to 3.5 (Severe) TARR traffic level classification in accordance with ASTM D7330 or CRI Test Method 103.

2.2.2 Static Control

Provide static control to permanently regulate static buildup to less than 3.5 kV when tested at 20 percent relative humidity and 70 degrees F in accordance with AATCC 134.

2.2.3 Flammability and Critical Radiant Flux Requirements

Comply with 16 CFR 1630 or ASTM D2859. Provide carpet in corridors and exits with a minimum average critical radiant flux of 0.45 watts per square centimeter when tested in accordance with ASTM E648.

2.2.4 Tuft Bind

Comply with ASTM D1335 for tuft bind force required to pull a tuft or loop free from carpet backing with a minimum 8 pound average force for modular carpet tile.

2.2.5 Colorfastness to Crocking

Comply dry and wet crocking with AATCC 165 and with a Class 4 minimum rating on the AATCC Color Transference Chart for all colors.

2.2.6 Colorfastness to Light

Comply colorfastness to light with AATCC 16, Test Option E "Water-Cooled Xenon-Arc Lamp, Continuous Light" and with a minimum 4 grey scale rating after 40 hours.

2.2.7 Colorfastness to Water

Comply colorfastness to water with AATCC 107 and with a minimum 4.0 gray scale rating and a minimum 4.0 transfer scale rating.

2.2.8 Delamination Strength

Provide delamination strength for tufted carpet with a secondary back of minimum 2.5 lbs/inch.

2.2.9 Antimicrobial

Nontoxic antimicrobial treatment in accordance with AATCC 174 Part I (qualitative), guaranteed by the carpet manufacturer to last the life of the carpet.

2.3 Entrance Carpet

Provide surface mounted floor mat constructed with exposed hinge rail connections shall be extruded 6063-T6 aluminum complete with perforations for drainage. Tread rails shall be manufactured from high-impact Regrid

PET-G complete with co-extruded soft-durometer cushions. Overall depth is 7/16". Unit has tapered frame on three sides and butts up to door sill for surface mounted application. Tread insert shall be HD - MonoTuft high density carpet. Fibers shall include a minimum of 100, 12 mil monofilament fibers per square inch. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free lengths. Anti-static carpet fibers shall contain antimicrobial additive and be treated with Scotchgard® to reduce soiling. Carpet weight shall be 33-oz./yd^2.

2.4 ADHESIVES AND CONCRETE PRIMER

Comply with applicable regulations regarding toxic and hazardous materials. Provide water resistant, mildew resistant, nonflammable, and nonstaining adhesives and concrete primers for carpet installation as required by the carpet manufacturer. Provide release adhesive for modular tile carpet as recommended by the carpet manufacturer. Provide adhesives flashpoint of minimum 140 degrees F in accordance with ASTM D3278. Non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) must meet either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) must meet either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of GS-36. Provide validation of indoor air quality for aerosol adhesives. Provide validation of indoor air quality for non-aerosol adhesives. Concrete primer products used on the interior of the building (defined as inside of the weatherproofing system) must meet either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1113. Provide validation of indoor air quality for concrete primer.

2.5 MOLDINGS

Provide carpet moldings where floor covering material changes or carpet edge does not abut a vertical surface. Provide a heavy-duty rubber molding designed for the type of carpet being installed. Provide floor flange of a minimum 1 1/2 inches wide. Provide color to match resilient base.

2.6 TAPE

Provide tape for seams as recommended by the carpet manufacturer for the type of seam used in broadloom installation. Seam sealant must have a maximum VOC content of no more than 50 grams/liter. Do not use sealants that contain 1,1,1-trichloroethane or toluene.

2.7 COLOR, TEXTURE, AND PATTERN

Provide color, texture, and pattern in accordance with Section 09 06 00 SCHEDULES FOR FINISHES and the room finish color schedule key.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Do not install carpet on surfaces that are unsuitable and will prevent a proper installation. Prepare subfloor in accordance with flooring manufacturer's recommended instructions. Repair holes, cracks, depressions, or rough areas using material recommended by the carpet or adhesive manufacturer. Free floor of any foreign materials and sweep clean. Before beginning work, test subfloor with glue and carpet to determine "open time" and bond. Submit three copies of the manufacturer's printed Installation instructions for the carpet, including Surface Preparation, seaming techniques, and recommended adhesives and tapes.

3.2 MOISTURE AND ALKALINITY TESTS

Test concrete slab for moisture content and excessive alkalinity in accordance with CRI 104/CRI 105. Submit three copies of reports of Moisture and Alkalinity Tests including content of concrete slab stating date of test, person conducting the test, and the area tested.

3.3 PREPARATION OF CONCRETE SUBFLOOR

Do not commence installation of the carpeting until concrete substrate is at least 90 days old. Prepare the concrete surfaces in accordance with the carpet manufacturer's instructions. Match carpet, when required, and adhesives to prevent off-gassing to a type of curing compounds, leveling agents, and concrete sealer.

3.4 INSTALLATION

Isolate area of installation from rest of building. Perform all work by manufacturer's approved installers. Conduct installation in accordance with the manufacturer's printed instructions and CRI 104/CRI 105. Protect edges of carpet meeting hard surface flooring with molding and install in accordance with the molding manufacturer's printed instructions. Follow ventilation, personal protection, and other safety precautions recommended by the adhesive manufacturer. Continue ventilation during installation and for at least 72 hours following installation. Do not permit traffic or movement of furniture or equipment in carpeted area for 24 hours after installation. Complete other work which would damage the carpet prior to installation of carpet. Submit three copies of Installation Drawings for Carpet and Moldings indicating areas receiving carpet, carpet types, patterns, direction of pile, location of seams, and locations of edge molding.

Do not install building construction materials that show visual evidence of biological growth.

3.4.1 Modular Tile Installation

Install modular tiles with manufacturer approved adhesive tab system. Use monolithic installation method. Comply with manufacturer installation instructions for required drying time of releasable adhesive so it sets up properly. Provide accessibility to the subfloor where required. Carpet tile on stairs and sloped surfaces must be installed with a more permanent installation method in accordance with the manufacturer's instructions and with manufacturer recommended adhesives for this application.

3.4.2 Entrance Carpet Installation

Install in accordance with manufacturer's recommendations.

3.5 CLEANING AND PROTECTION

Submit three copies of carpet manufacturer's maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods, and cleaning cycles.

3.5.1 Cleaning

As specified in Section 01 78 00 CLOSEOUT SUBMITTALS. After installation of the carpet, remove debris, scraps, and other foreign matter. Remove soiled spots and adhesive from the face of the carpet with appropriate spot remover. Cut off and remove protruding face yarn. Vacuum carpet clean with a high-efficiency particulate air (HEPA) filtration vacuum.

3.5.2 Protection

Protect the installed carpet from soiling and damage with heavy, reinforced, nonstaining kraft paper, plywood, or hardboard sheets. Lap and secure edges of kraft paper protection to provide a continuous cover. Restrict traffic for at least 48 hours. Remove protective covering when directed by the Contracting Officer.

3.6 REMNANTS

Manage waste as specified in the Waste Management Plan. Provide remnants remaining from the installation, consisting of scrap pieces more than 2 feet in dimension with more than 6 square feet total to the Government. Set aside and return non-retained scraps to manufacturer for recycling into new product.

3.7 MAINTENANCE

3.7.1 Extra Materials

Provide extra material from same dye lot consisting of uncut carpet tiles for future maintenance. Provide a minimum of three percent of total square yards of each carpet type, pattern, and color. Furnish percent extra of total adhesive tabs.

3.7.2 Maintenance Service

Service must reclaim materials for recycling and/or reuse. Service must not landfill or burn reclaimed materials. When such a service is not available, seek local recyclers to reclaim the materials. Submit documentation of manufacturer's take-back program for carpet. Include contact information, summary of procedures, and the limitations and conditions applicable to the project. Indicate manufacturer's commitment to reclaim materials for recycling and reuse.

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SECTION 09 90 00

PAINTS AND COATINGS
05/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100	(2015; Suppl 2002-2016) Documentation of the Threshold Limit Values and Biological Exposure Indices

ASTM INTERNATIONAL (ASTM)

ASTM D235	(2002; R 2012) Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)
ASTM D4263	(1983; R 2018) Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4444	(2013; R 2018) Standard Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters
ASTM D523	(2014; R 2018) Standard Test Method for Specular Gloss
ASTM D6386	(2016) Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
ASTM F1869	(2016) Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

MASTER PAINTERS INSTITUTE (MPI)

MPI 101	(2012) Primer, Epoxy, Anti-Corrosive, for Metal
MPI 107	(2012) Primer, Rust-Inhibitive, Water Based
MPI 11	(2012) Latex, Exterior Semi-Gloss, MPI Gloss Level 5
MPI 134	(2012) Primer, Galvanized, Water Based
MPI 141	(2012) Latex, Interior, High Performance Architectural, Semi-Gloss (MPI Gloss Level

	5)
MPI 145	(2012) Latex, Interior, Institutional Low Odor/VOC, (MPI Gloss Level 3)
MPI 147	(May 2016) Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (MPI Gloss Level 5)
MPI 153	(2012) Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)
MPI 163	(2012) Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5)
MPI 2	(2012) Aluminum Heat Resistant Enamel (up to 427 C and 800 F
MPI 21	(2012) Heat Resistant Coating, (Up to 205°C/402°F), MPI Gloss Level 6
MPI 23	(2012) Primer, Metal, Surface Tolerant
MPI 39	(2012) Primer, Latex, for Interior Wood
MPI 50	(2012) Primer Sealer, Latex, Interior
MPI 7	(Oct 2009) Exterior Oil Wood Primer
MPI 77	(2012) Epoxy, Gloss
MPI 79	(2012) Primer, Alkyd, Anti-Corrosive for Metal
MPI 9	(2012) Alkyd, Exterior Gloss (MPI Gloss Level 6)
MPI 94	(2012) Alkyd, Exterior, Semi-Gloss (MPI Gloss Level 5)
MPI 95	(2012) Primer, Quick Dry, for Aluminum
SCIENTIFIC CERTIFICATION SYSTEMS (SCS)	
SCS	SCS Global Services (SCS) Indoor Advantage
SOCIETY FOR PROTECTIVE COATINGS (SSPC)	
SSPC 7/NACE No.4	(2007; E 2004) Brush-Off Blast Cleaning
SSPC PA 1	(2016) Shop, Field, and Maintenance Coating of Metals
SSPC PA Guide 3	(1982; E 1995) A Guide to Safety in Paint Application
SSPC SP 1	(2015) Solvent Cleaning
SSPC SP 10/NACE No. 2	(2007) Near-White Blast Cleaning

SSPC SP 12/NACE No.5	(2002) Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating
SSPC SP 2	(1982; E 2000; E 2004) Hand Tool Cleaning
SSPC SP 3	(1982; E 2004) Power Tool Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning
SSPC VIS 1	(2002; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
SSPC VIS 3	(2004) Guide and Reference Photographs for Steel Surfaces Prepared by Hand and Power Tool Cleaning
SSPC VIS 4/NACE VIS 7	(1998; E 2000; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-101	(2014; Rev C) Color Code for Pipelines and for Compressed Gas Cylinders

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA Method 24	(2000) Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313	(2014; Rev E) 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

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation;

submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. Provide all coats on a particular substrate from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

SD-02 Shop Drawings

Piping Identification

SD-03 Product Data

Coating

Sealant

SD-04 Samples

Color; G

SD-07 Certificates

Qualification Testing laboratory for coatings; G

Indoor Air Quality for Paints and Primers

SD-08 Manufacturer's Instructions

Application Instructions

Mixing

Manufacturer's Safety Data Sheets

SD-10 Operation and Maintenance Data

Coatings; G

1.3 CERTIFICATES

1.3.1 Indoor Air Quality

Submit required indoor air quality certifications in one submittal package.

1.3.1.1 Paints and Coatings

Provide paint and coating products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification by other third-party programs.

Provide current product certification documentation from certification body.

1.4 QUALITY ASSURANCE

1.4.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph SAMPLING PROCEDURES. Test each chosen product as specified in the paragraph TESTING PROCEDURE. Remove products from the job site which do not conform, and replace with new products that conform to the referenced specification. Test replacement products that failed initial testing at no cost to the Government.

1.4.1.1 Sampling Procedure

The Contracting Officer will select paint at random from the products that have been delivered to the job site for sample testing. The Contractor will provide one quart samples of the selected paint materials. Take samples in the presence of the Contracting Officer, and label, and identify each sample. Provide labels in accordance with the paragraph PACKAGING, LABELING, AND STORAGE of this specification.

1.4.1.2 Testing Procedure

Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality Conformance Testing, the Contractor may provide Qualification Testing for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the paragraph "Qualification Testing" laboratory for coatings. Include the backup data and summary of the test results within the qualification testing lab report. Provide a summary listing of all the reference specification requirements and the result of each test. Clearly indicate in the summary whether the tested paint meets each test requirement. Note that Qualification Testing may take 4 to 6 weeks to perform, due to the extent of testing required.

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing testing are qualified. If MPI is chosen to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

1.5 REGULATORY REQUIREMENTS

1.5.1 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.

1.5.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.5.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.5.4 Asbestos Content

Provide asbestos-free materials.

1.5.5 Mercury Content

Provide materials free of mercury or mercury compounds.

1.5.6 Silica

Provide abrasive blast media containing no free crystalline silica.

1.5.7 Human Carcinogens

Provide materials that do not contain ACGIH 0100 confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.6 PACKAGING, LABELING, AND STORAGE

Provide paints 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. Furnish pigmented paints in containers not larger than 5 gallons. Store paints and thinners 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, polyurethane, varnish, or wood stain products with materials that have a high capacity to adsorb VOC emissions. Do not store paint, polyurethane, varnish, or wood stain products in occupied spaces.

1.7 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01 35 26 GOVERNMENT SAFETY REQUIREMENTS and in Appendix A of EM 385-1-1. Include in the Activity Hazard Analysis the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.7.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC PA Guide 3.

1.7.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

a. The applicable manufacturer's Safety Data Sheets (SDS) or local regulation.

b. 29 CFR 1910.1000.

c. ACGIH 0100, threshold limit values.

Submit manufacturer's Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

1.8 ENVIRONMENTAL CONDITIONS

Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation. Isolate area of application from rest of building when applying high-emission paints or coatings.

1.8.1 Coatings

Do not apply coating when air or substrate conditions are:

a. Less than 5 degrees F above dew point;

b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Do not, under any circumstances, violate the manufacturer's application recommendations.

1.8.2 Post-Application

Vacate space for as long as possible after application. Wait a minimum of 48 hours before occupying freshly painted rooms. Maintain one of the following ventilation conditions during the curing period, or for 72 hours after application:

a. Supply 100 percent outside air 24 hours a day.

b. 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.

c. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

1.9 SCHEDULING

Allow paint and polyurethane installations to cure prior to the installation of materials that adsorb VOCs.

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. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.

b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.

c. Existing coated surfaces that are damaged during performance of the work.

1.10.1.1 Exterior Painting

Includes new surfaces of the building and appurtenances. Also included are existing coated surfaces made bare by cleaning operations.

1.10.1.2 Interior Painting

Includes new surfaces of the building and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

a. Exposed columns, girders, beams, joists, and metal deck; and

b. Other contiguous surfaces.

1.10.2 Painting Excluded

Do not paint the following unless indicated otherwise.

a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.

b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.

c. Steel to be embedded in concrete.

d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.

e. Hardware, fittings, and other factory finished items.

1.10.3 Mechanical and Electrical Painting

Includes field coating of interior and exterior new surfaces.

a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.

(1) Exposed piping, conduit, and ductwork;

(2) Supports, hangers, air grilles, and registers;

(3) Miscellaneous metalwork and insulation coverings.

b. Do not paint the following, unless indicated otherwise:

(1) New zinc-coated, aluminum, and copper surfaces under insulation

(2) New aluminum jacket on piping

(3) New interior ferrous piping under insulation.

1.10.3.1 Fire Extinguishing Sprinkler Systems

Clean, pretreat, prime, and paint new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one coat primer per schedules. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with the following:

a. Piping in Unfinished Areas: Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.

b. Piping in Finished Areas: Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil. Provide piping with 2 inch wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20 foot intervals throughout the piping systems.

1.10.4 Exterior Painting of Site Work Items

Field coat the following items:

New Surfaces

a. Fire Hydrant

b. PIV

c. Basic Control Signs and Signposts

1.10.5 Definitions and Abbreviations

1.10.5.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

1.10.5.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product

specification. This testing must be accomplished by an MPI testing lab.

1.10.5.3 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (such as metals, plastics, wood, paper, leather, cloth). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendaring, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

1.10.5.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.10.5.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

1.10.5.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

1.10.5.7 EXT

MPI short term designation for an exterior coating system.

1.10.5.8 INT

MPI short term designation for an interior coating system.

1.10.5.9 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

1.10.5.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

1.10.5.11 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

1.10.5.12 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, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units at 60 degrees	Units at 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

Gloss is tested in accordance with ASTM D523. Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

1.10.5.13 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 exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

1.10.5.14 Paint

See Coating definition.

1.10.5.15 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

1.10.5.16 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 product data sheets for specified coatings and solvents. Provide preprinted cleaning and maintenance instructions for all coating systems.

Submit Manufacturer's Instructions on Mixing: Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Provide certification of Indoor Air Quality for paints and primers.

Provide certification of Indoor Air Quality for consolidated latex paints.

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, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, reinstall removed items by workmen skilled in the trades. 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 or surface treatments. Remove oil and grease prior to mechanical cleaning. Schedule cleaning so that dust and other contaminants will not fall on wet, newly painted surfaces. Spot-prime exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.3 PREPARATION OF METAL SURFACES

3.3.1 New Ferrous Surfaces

a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2, SSPC SP 3, SSPC SP 6/NACE No.3, or SSPC SP 10/NACE No. 2. Brush-off blast remaining surface in accordance with SSPC 7/NACE No.4; Water jetting to SSPC SP 12/NACE No.5 WJ-4 may be used to remove loose coating and other loose materials. Use inhibitor as recommended by coating manufacturer to prevent premature rusting. Protect shop-coated ferrous surfaces from corrosion by treating and touching up corroded areas immediately upon detection.

b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with SSPC SP 6/NACE No.3 /SSPC SP 12/NACE No.5 WJ-3SSPC SP 10/NACE No. 2/SSPC SP 12/NACE No.5 WJ-2.

3.3.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. Use as a visual reference, photographs in SSPC VIS 3 for the appearance of cleaned surfaces.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC 7/NACE No.4, SSPC SP 6/NACE No.3, and SSPC SP 10/NACE No. 2. Use as a visual reference, photographs in SSPC VIS 1 for the appearance of cleaned surfaces.

For waterjet cleaned surfaces, the requirements are stated in SSPC SP 12/NACE No.5. Use as a visual reference, photographs in SSPC VIS 4/NACE VIS 7 for the appearance of cleaned surfaces.

3.3.3 Galvanized Surfaces

a. New Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, steam, or non-alkaline detergent solution in

accordance with SSPC SP 1. Completely remove coating by brush-off abrasive blast if the galvanized metal has been passivated or stabilized. Do not "passivate" or "stabilize" new galvanized steel to be coated. If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D6386, Appendix X2, and remove by one of the methods described therein.

b. Galvanized with Slight Coating Deterioration or with Little or No Rusting: Water jetting to SSPC SP 12/NACE No.5 WJ3 to remove loose coating from surfaces with less than 20 percent coating deterioration and no blistering, peeling, or cracking. Use inhibitor as recommended by the coating manufacturer to prevent rusting.

c. Galvanized With Severe Deteriorated Coating or Severe Rusting: Water jet to SSPC SP 12/NACE No.5 WJ3 degree of cleanliness. Spot abrasive blast rusted areas as described for steel in SSPC SP 6/NACE No.3, and waterjet to SSPC SP 12/NACE No.5, WJ3 to remove existing coating.

3.3.4 Non-Ferrous Metallic Surfaces

Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces.

Surface Cleaning: Solvent clean in accordance with SSPC SP 1 and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants.

3.3.5 Terne-Coated Metal Surfaces

Solvent clean surfaces with mineral spirits, ASTM D235. Wipe dry with clean, dry cloths.

3.3.6 Existing Surfaces with a Bituminous or Mastic-Type Coating

Remove chalk, mildew, and other loose material by washing with a solution of 1/2 cup trisodium phosphate, 1/4 cup household detergent, one quart 5 percent sodium hypochlorite solution and 3 quarts of warm water.

3.4 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

3.4.1 Concrete and Masonry

a. Curing: Allow concrete, stucco and masonry surfaces to cure at least 30 days before painting, and concrete slab on grade to cure at least 90 days before painting.

b. Surface Cleaning: Remove the following deleterious substances.

(1) Dirt, Chalking, Grease, and Oil: Wash new surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, and 4 quarts of warm water. Then rinse thoroughly with fresh water. For large areas, water blasting may be used.

(2) Fungus and Mold: Wash new surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.

(3) Paint and Loose Particles: Remove by wire brushing.

(4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.

c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.

d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F1869. In all cases follow manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

3.4.2 Gypsum Board, Plaster, and Stucco

a. Surface Cleaning: Verify that plaster and stucco surfaces are free from loose matter and that gypsum board is 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. Do not apply epoxies to damp surfaces as determined by ASTM D4263. Verify that new plaster to be coated has a maximum moisture content of 8 percent, when measured in accordance with ASTM D4444, Method A, unless otherwise authorized. In addition to moisture content requirements, allow new plaster to age a minimum of 30 days before preparation for painting.

3.5 PREPARATION OF WOOD AND PLYWOOD SURFACES

3.5.1 New Plywood and Wood Surfaces, Except Floors:

a. Clean wood surfaces of foreign matter.

Surface Cleaning: Verify that surfaces are free from dust and other deleterious substances and in a condition approved by the Contracting Officer prior to receiving paint or other finish. Do not use water to clean uncoated wood.

b. Removal of Fungus and Mold: Wash existing coated surfaces with a solution composed of 3 ounces (2/3 cup) trisodium phosphate, 1 ounce (1/3 cup) household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.

c. Do not exceed 12 percent moisture content of the wood as measured by a moisture meter in accordance with ASTM D4444, Method A, unless otherwise authorized.

d. Prime or touch up wood surfaces adjacent to surfaces to receive water-thinned paints before applying water-thinned paints.

e. Cracks and Nailheads: Set and putty stop nailheads and putty cracks after the prime coat has dried.

f. Cosmetic Repair of Minor Defects:

(1) Knots and Resinous Wood: Prior to application of coating, cover knots and stains with two or more coats of 3-pound-cut shellac varnish, plasticized with 5 ounces of castor oil per gallon. Scrape away existing coatings from knotty areas, and sand before treating. Prime before applying any putty over shellacked area.

(2) Open Joints and Other Openings: Fill with whiting putty, linseed oil putty. Sand smooth after putty has dried.

(3) Checking: Where checking of the wood is present, sand the surface, wipe and apply a coat of pigmented orange shellac. Allow to dry before paint is applied.

3.5.2 Interior Wood Surfaces, Stain Finish

Sand interior wood surfaces to receive stain. Fill oak and other open-grain wood to receive stain with a coat of wood filler not less than 8 hours before the application of stain; remove excess filler and sand the surface smooth.

3.6 APPLICATION

3.6.1 Coating Application

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 must show no signs of deterioration. Maintain uniform suspension of pigments 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. Use rollers for applying paints and enamels 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.

Only apply paints, except water-thinned types to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Pay special attention to ensure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Apply each coat of paint so that dry film is of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Completely hide all

blemishes.

Touch up damaged coatings before applying subsequent coats. Broom clean and clear dust from interior areas before and during the application of coating material.

Apply paint to new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metal work, and accessories. Shield sprinkler heads with protective coverings while painting is in progress. Remove sprinkler heads which have been painted and replace with new sprinkler heads. For piping in unfinished spaces, provide primed surfaces with one coat of red alkyd gloss enamel to a minimum dry film thickness of 1.0 mil. Unfinished spaces include attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and space where walls or ceiling are not painted or not constructed of a prefinished material. For piping in finished areas, provide prime surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel. Upon completion of painting, remove protective covering from sprinkler heads.

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. Cover each preceding coat or surface completely by ensuring visually perceptible difference in shades of successive coats.

c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

d. Thermosetting Paints: Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended by the manufacturer.

e. Floors: For nonslip surfacing on level floors, as the intermediate coat is applied, cover wet surface completely with almandite garnet, Grit No. 36, with maximum passing U.S. Standard Sieve No. 40 less than 0.5 percent. When the coating is dry, use a soft bristle broom to sweep up excess grit, which may be reused, and vacuum up remaining residue before application of the topcoat. For nonslip surfacing on ramps, provide MPI 77 with non-skid additive, applied by roller in accordance with manufacturer's instructions.

3.6.2 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 Contracting Officer to use thinners. Verify that the written permission includes quantities and types of thinners to use.

When thinning is allowed, thin paints immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner does not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning cannot cause the paint to exceed limits on volatile organic compounds. Do not mix paints of different manufacturers.

3.6.3 Two-Component Systems

Mix two-component systems in accordance with manufacturer's instructions. Follow recommendation by the manufacturer for any thinning of the first coat to ensure proper penetration and sealing for each type of substrate.

3.6.4 Coating Systems

a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table

Division 3. Exterior Concrete Paint Table
Division 4. Exterior Concrete Masonry Units Paint Table
Division 5. Exterior Metal, Ferrous and Non-Ferrous Paint Table
Division 6. Exterior Wood; Dressed Lumber, Paneling, Decking, Shingles Paint Table
Division 9: Exterior Stucco Paint Table
Division 10. Exterior Cloth Coverings and Bituminous Coated Surfaces Paint Table

Division 3. Interior Concrete Paint Table
Division 4. Interior Concrete Masonry Units Paint Table
Division 5. Interior Metal, Ferrous and Non-Ferrous Paint Table
Division 6. Interior Wood Paint Table
Division 9: Interior Plaster, Gypsum Board, Textured Surfaces Paint Table

b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, 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.

3.7 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and 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. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.

e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat. Overcoat these items with the specified ferrous-metal primer prior to application of finish coats.

f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

3.8 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

Apply coatings of Tables in Division 3, 4 and 9 for Exterior and Interior.

3.9 COATING SYSTEMS FOR WOOD AND PLYWOOD

a. Apply coatings of Tables in Division 6 for Exterior and Interior.

b. Prior to erection, apply two coats of specified primer to treat and prime wood and plywood surfaces which will be inaccessible after erection.

c. Apply stains in accordance with manufacturer's printed instructions.

3.10 PIPING IDENTIFICATION

Piping Identification, Including Surfaces In Concealed Spaces: Provide in accordance with MIL-STD-101. Place stenciling in clearly visible locations. On piping not covered by MIL-STD-101, stencil approved names or code letters, in letters a minimum of 1/2 inch high for piping and a minimum of 2 inches high elsewhere. Stencil arrow-shaped markings on piping to indicate direction of flow using black stencil paint.

3.11 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

3.12 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. Coordinate with manufacturer for take-back program. Set aside scrap to be returned to manufacturer for recycling into new product. When such a service is not available, contact local recyclers to reclaim the materials. Set aside extra paint for future color matches or reuse by the Government. Where local options exist for leftover paint recycling, collect all waste paint by type and provide for delivery to recycling or collection facility for reuse by local organizations.

3.13 PAINT TABLES

All DFT's are minimum values. Use only materials with a GPS green check mark having a minimum MPI "Environmentally Friendly" E2 rating based on VOC (EPA Method 24) content levels. Acceptable products are listed in the MPI Green Approved Products List, available at http://www.specifygreen.com/APL/ProductIdxByMPInum.asp.

3.13.1 Exterior Paint Tables

DIVISION 3: EXTERIOR CONCRETE PAINT TABLE

A. New concrete;
vertical surfaces, including undersides of balconies and soffits but excluding tops of slabs:

1. Latex

New; MPI EXT 3.1A-G5 (Semigloss) / Existing; MPI EXT 3.1A-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 11	MPI 11	MPI 11

System DFT: 3.5 mils

DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

STEEL / FERROUS SURFACES

A. New Steel that has been hand or power tool cleaned to SSPC SP 2 or SSPC SP 3

1. Alkyd

New; MPI EXT 5.1Q-G5 (Semigloss) Existing; MPI REX 5.1D-G5

Primer:	Intermediate:	Topcoat:
MPI 23	MPI 94	MPI 94

System DFT: 5.25 mils

New; MPI EXT 5.1Q-G6 (Gloss) / Existing; MPI REX 5.1D-G6

Primer:	Intermediate:	Topcoat:
MPI 23	MPI 9	MPI 9

System DFT: 5.25 mils

B. New Steel that has been blast-cleaned to SSPC SP 6/NACE No.3:

STEEL / FERROUS SURFACES

2. Alkyd

New; MPI EXT 5.1D-G5 (Semigloss) / Existing; MPI REX 5.1D-G5

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 94	MPI 94

System DFT: 5.25 mils

New; MPI EXT 5.1D-G6 (Gloss) / Existing; MPI REX 5.1D-G6

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 9	MPI 9

System DFT: 5.25 mils

EXTERIOR GALVANIZED SURFACES

F. New Galvanized surfaces:

1. Epoxy Primer / Waterborne Light Industrial Coating

MPI EXT 5.3K-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 101	MPI 163	MPI 163

System DFT: 5 mils

G. Galvanized surfaces with slight coating deterioration; little or no rusting:

1. Waterborne Light Industrial Coating

MPI REX 5.3J-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 134	N/A	MPI 163

System DFT: 4.5 mils

EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)

I. Aluminum, aluminum alloy and other miscellaneous non-ferrous metal items not otherwise specified except hot metal surfaces, roof surfaces, and new prefinished equipment. Match surrounding finish:

1. Waterborne Light Industrial Coating

MPI EXT 5.4G-G5(Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 163	MPI 163

System DFT: 5 mils

J. Surfaces adjacent to painted surfaces; Mechanical, Electrical, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports, exposed copper piping, and miscellaneous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish:

2. Waterborne Light Industrial Coating

MPI EXT 5.1C-G5(Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 163	MPI 163

System DFT: 5 mils

DIVISION 6: EXTERIOR WOOD; DRESSED LUMBER, PANELING, DECKING, SHINGLES PAINT TABLE

A. New Dressed lumber, Wood and plywood, trim, including top, bottom and edges of doors not otherwise specified:

1. Alkyd
   MPI EXT 6.3B-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 7	MPI 94	MPI 94

   System DFT: 5 mils

DIVISION 10: EXTERIOR CLOTH COVERINGS AND BITUMINOUS COATED SURFACES PAINT TABLE

A. Insulation and surfaces of insulation coverings (canvas, cloth, paper): (Interior and Exterior Applications)

1. Latex

   MPI EXT 10.1A-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
N/A	MPI 11	MPI 11

   System DFT: 3.2 mils

   Topcoat: Coating to match adjacent surfaces.

3.13.2 Interior Paint Tables

DIVISION 3: INTERIOR CONCRETE PAINT TABLE

A. New Concrete, vertical surfaces, not specified otherwise:

1. Institutional Low Odor / Low VOC Latex

   New; MPI INT 3.1M-G5 (Semigloss) / Existing; MPI RIN 3.1L-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 147	MPI 147

   System DFT: 4 mils

B. New concrete floors in following areas logistics 110; Recycle Room 110A; Comsec 111; Avionics Test Lab 136; Atl Storage 137; Cyber/EW Labe 139:

1. Epoxy
   New; MPI INT 3.2C-G6 (Gloss) / Existing; MPI RIN 3.2C-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 77	MPI 77	MPI 77

   System DFT: 5 mils

   Note: Primer may be reduced for penetration per manufacturer's instructions.

DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

INTERIOR STEEL / FERROUS SURFACES

A. Metal, Mechanical, Electrical, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports, Surfaces adjacent to

INTERIOR STEEL / FERROUS SURFACES
painted surfaces (Match surrounding finish), exposed copper piping, and miscellaneous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment:

1. High Performance Architectural Latex

MPI INT 5.1R-G5 (Semigloss)
Primer: Intermediate: Topcoat:
MPI 79 MPI 141 MPI 141
System DFT: 5 mils

B. Hot metal surfaces subject to temperatures up to 400 degrees F:

1. Heat Resistant Enamel
MPI INT 5.2A
Primer: Intermediate: Topcoat:
MPI 21 Surface preparation and number of coats per manufacturer's instructions.
System DFT: Per Manufacturer

C. Ferrous metal subject to high temperature, up to 750 degrees F:

1. Heat Resistant Aluminum Paint
MPI INT 5.2B (Aluminum Finish)
Primer: Intermediate: Topcoat:
MPI 2 Surface preparation and number of coats per manufacturer's instructions.
System DFT: Per Manufacturer

DIVISION 6: INTERIOR WOOD PAINT TABLE

A. New Wood and plywood not otherwise specified:

1. High Performance Architectural Latex

MPI INT 6.4S-G5 (Semigloss)
Primer: Intermediate: Topcoat:
MPI 39 MPI 141 MPI 141
System DFT: 4.5 mils

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE

A. New Wallboard not otherwise specified:

1. Institutional Low Odor / Low VOC Latex

New; MPI INT 9.2M-G3 (Eggshell)
Primer: Intermediate: Topcoat:
MPI 50 MPI 145 MPI 145
System DFT: 4 mils

B. New Wallboard in toilets, shower areas, and other high humidity areas not otherwise specified.:

1. Waterborne Light Industrial Coating

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE
New; MPI INT 9.2L-G5(Semigloss) / Existing; MPI RIN 9.2L-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 153	MPI 153

System DFT: 4 mils

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SECTION 10 14 00.10

EXTERIOR SIGNAGE
08/17

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN WELDING SOCIETY (AWS)

AWS C1.1M/C1.1	(2012) Recommended Practices for Resistance Welding
AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel
AWS D1.2/D1.2M	(2014) Structural Welding Code - Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A924/A924M	(2020) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM A1011/A1011M	(2018a) Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
ASTM B26/B26M	(2014; E 2015) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B108/B108M	(2019) Standard Specification for Aluminum-Alloy Permanent Mold Castings

ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 500	(2006) Metal Finishes Manual

1.2 GENERAL REQUIREMENTS

All exterior signage must be provided by a single manufacturer. Exterior signage must be of the design, detail, sizes, types, and message content shown on the drawings, must conform to the requirements specified, and must be provided at the locations indicated. Submit exterior signage schedule in electronic media with spread sheet format. Spread sheet must include sign location, sign type, and message. Signs must be complete with lettering, framing as detailed, and related components for a complete installation. Each sample must consist of a complete sign panel with letters and symbols. Samples may be installed in the work, provided each sample is identified and location recorded. Submit three color samples for each material requiring color and 12 inch square sample of sign face color sample.

1.2.1 Wind Load Requirements

Exterior signage must be designed to withstand 165 mph windload. Submit design analysis and supporting calculations performed in support of specified signage.

1.2.2 Character Proportions and Heights

Letters and numbers on indicated signs for handicapped-accessible buildings must have a width-to-height ratio between 3:5 and 1:1 and a stroke-width-to-height ratio between 1:5 and 1:10. Characters and numbers on indicated signs must be sized according to the viewing distance from which they are to be read. The minimum height is measured using an upper case letter "X". Lower case characters are permitted.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings; G

SD-03 Product Data

Modular Exterior Signage System

Installation

Exterior Signage; G

Wind Load Requirements

SD-04 Samples

Exterior Signage; G

SD-10 Operation and Maintenance Data

Protection and Cleaning; G

1.4 QUALIFICATIONS

Signs, plaques, and dimensional letters must be the standard product of a manufacturer regularly engaged in the manufacture of the products. Items of equipment must essentially duplicate equipment that has been in satisfactory use at least 2 years prior to bid opening.

1.5 DELIVERY AND STORAGE

Materials must be wrapped for shipment and storage, delivered to the jobsite in manufacturer's original packaging, and stored in a clean, dry area in accordance with manufacturer's instructions.

1.6 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period must be provided.

1.7 EXTRA STOCK

Provide extra interchangeable message panels and extra stock of the following: message bars of each color and size for sign types, pressure-sensitive letters in each color and size for sign type changeable message strips for sign type.

PART 2 PRODUCTS

2.1 MODULAR EXTERIOR SIGNAGE SYSTEM

2.1.1 Panel And Post/Panel Type Signs

2.1.1.1 Posts

One-piece aluminum or galvanized steel posts must be provided with minimum 0.125 inch wall thickness. Posts must be designed to accept panel framing system described. The post must be designed to permit attachment of panel framing system without exposed fasteners. Caps must be provided for each

post.

2.1.1.2 Panel Framing System

Panel framing consisting of aluminum sections and interlocking track components must be designed to interlock with posts with concealed fasteners.

2.1.1.3 Panels

Modular message panels must be provided in sizes shown on drawings. Panels must be fabricated a minimum of 0.125 inch aluminum. Panels with metal return sheeting must have welded corners, ground smooth. Panels must be heliarc welded to framing system. Face panels must be removable to provide access to electrical components.

2.1.1.4 Finishes

Post finish must be semi-gloss baked enamel or two-component acrylic polyurethane. Metal panel system finish must be baked enamel or two-component acrylic polyurethane.

2.1.1.5 Mounting

Provide permanent mounting by embedding posts in concrete foundation as indicated.

2.2 GRAPHICS FOR EXTERIOR SIGNAGE SYSTEMS

2.2.1 Graphics

Signage graphics must conform to the following:

a. Pressure sensitive precision cut vinyl letters with reflecting surface must be provided.

2.2.2 Messages

See drawings for message content. Typeface: Helvetica medium. Type size as indicated.

2.3 METAL PLAQUES

2.4 DIMENSIONAL BUILDING LETTERS

2.4.1 Fabrication

Letters must be fabricated from cast aluminum. Letters must be cleaned by chemical etching or cleaned ultrasonically in a special degreasing bath. Letters must be packaged for protection until installation.

2.4.2 Typeface

Typeface must be helvetica medium.

2.4.3 Size

Letter size must be as indicated.

2.4.4 Finish

Anodized aluminum, Baked enamel or two-component acrylic polyurethane finish must be provided.

2.4.5 Mounting

Threaded studs of number and size as recommended by manufacturer, must be used for concealed anchorage. Letters which project from the building line must have stud spacer sleeves. Letters, studs, and sleeves must be of the same material. Supply templates for mounting.

2.5 ALUMINUM ALLOY PRODUCTS

Aluminum alloy products must conform to ASTM B209 for sheet or plate, ASTM B221 for extrusions and ASTM B26/B26M or ASTM B108/B108M for castings. Aluminum extrusions must be provided at least 1/8 inch thick and aluminum plate or sheet at least 16 gauge thick. Welding for aluminum products must conform to AWS C1.1M/C1.1.

2.6 ANODIC COATING

Anodized finish must conform to AA DAF45 as follows:

Integrated color anodized designation AA-M10-C22-A32, Architectural Class 0.4 to 0.7 mil.

2.7 ORGANIC COATING

Clean, prime and give surfaces a semi-gloss baked enameltwo-component acrylic polyurethane finish in accordance with NAAMM AMP 500, AMP 505, with total dry film thickness not less than 1.2 mils.

2.8 STEEL PRODUCTS

Structural steel products must conform to ASTM A36/A36M. Sheet and strip steel products must conform to ASTM A1011/A1011M. Welding for steel products must conform to AWS D1.2/D1.2M.

2.9 VINYL SHEETING FOR GRAPHICS

Vinyl sheeting must be 5 to 7 year premium type and must be in accordance with the flammability requirements of ASTM E84 and must be a minimum 0.003 inch film thickness. Film must include a precoated pressure sensitive adhesive backing, Class 1, or positionable pressure sensitive adhesive backing, Class 3.

2.10 ANCHORS AND FASTENERS

Exposed anchor and fastener materials must be compatible with metal to which applied and must match in color and finish and must be non-rusting, non-corroding, and non-staining. Exposed fasteners must be tamper-proof.

2.11 SHOP FABRICATION AND MANUFACTURE

2.11.1 Factory Workmanship

Work must be assembled in the shop, as far as practical, ready for installation at the site. Work that cannot be shop assembled must be given

a trial fit in the shop to ensure proper field assembly. Holes for bolts and screws must be drilled or punched. Drilling and punching must produce clean, true lines and surfaces. Welding to or on structural steel must be in accordance with AWS D1.1/D1.1M. Welding must be continuous along the entire area of contact. Exposed welds must be ground smooth. Exposed surfaces of work must have a smooth finish and exposed riveting must be flush. Fastenings must be concealed where practical. Items specified to be galvanized must be by hot-dip process after fabrication if practical. Galvanization must be in accordance with ASTM A123/A123M and ASTM A653/A653M, as applicable. Other metallic coatings of steel sheet must be in accordance with ASTM A924/A924M. Joints exposed to the weather must be formed to exclude water. Drainage and weep holes must be included as required to prevent condensation buildup.

2.11.2 Dissimilar Materials

Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces must be protected with a coat of asphalt varnish or a coat of zinc-molybdate primer to prevent galvanic or corrosive action.

2.11.3 Shop Painting

Surfaces of miscellaneous metal work, except nonferrous metal, corrosion resisting steel, and zinc-coated work, must be given one coat of zinc-molybdate primer or an approved rust-resisting treatment and metallic primer in accordance with manufacturer's standard practice. Surfaces of items to be embedded in concrete must not be painted. Upon completion of work, damaged surfaces must be recoated.

2.12 COLOR, FINISH, AND CONTRAST

Color must be in accordance with Section 09 06 00 SCHEDULES FOR FINISHES selected from manufacturers standard colors. Color listed is not intended to limit the selection of equal colors from other manufacturers. For buildings required to be handicapped-accessible, the characters and background of signs must be eggshell, matte, or other non-glare finish. Characters and symbols must contrast with their background - either light characters on a dark background or dark characters on a light background.

PART 3 EXECUTION

3.1 INSTALLATION

Signs, plaques, or dimensional letters must be installed in accordance with approved manufacturer's instructions at locations shown on the approved detail drawings; submit drawings showing elevations of each type of sign; dimensions, details, and methods of mounting or anchoring; shape and thickness of materials; and details of construction. A schedule showing the location, each sign type, and message must be included. Circuits installed underground must conform to the requirements of Section 33 71 02 UNDERGROUND ELECTRICAL DISTRIBUTION. Steel conduits installed underground and illuminated signage mounted directly on buildings must be in conformance with the requirements of Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Signs must be installed plumb and true at mounting heights indicated, and by method shown or specified. Signs mounted on other surfaces must not be installed until finishes on such surfaces have been completed. Submit manufacturer's installation instructions and cleaning

instructions.

3.1.1 Anchorage

Anchorage and fastener materials must be in accordance with approved manufacturer's instructions for the indicated substrate. Anchorage not otherwise specified or indicated must include slotted inserts, expansion shields, and powder-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine carriage bolts for steel; lag bolts and screws for wood.

3.1.2 Protection and Cleaning

The work must be protected against damage during construction. Hardware and electrical equipment must be adjusted for proper operation. Glass, frames, and other sign surfaces must be cleaned in accordance with manufacturer's instructions. After signs are completed and inspected, cover all project identification, directional, and other signs which may mislead the public. Covering must be maintained until instructed to be removed by the Contracting Officer or until the facility is to be opened for business. Submit six copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides. The instructions must include simplified diagrams for the equipment as installed. Signs must be cleaned, as required, at time of cover removal.

3.2 FIELD PAINTED FINISH

Miscellaneous metals and frames must be field painted in accordance with Section 09 90 00 PAINTS AND COATINGS. Anodized metals, masonry, and glass must be protected from paint. Finish must be free of scratches or other blemishes.

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SECTION 10 14 02

INTERIOR SIGNAGE
02/09

PART 1 GENERAL

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 basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

1.2 SYSTEM DESCRIPTION

Submit samples of each of the following sign types showing typical quality, workmanship and color: Directional sign, Standard Room sign, and Exterior sign; submit interior signage samples of the design, detail, sizes, types, and message content shown on the detail drawings, attachments, signage placement schedule (as applicable), conforming to the requirements specified, and placed at the locations indicated. The samples may be installed in the work, provided each sample is identified and location recorded. Submit drawings showing elevations of each type of sign, dimensions, details and methods of mounting or anchoring, mounting height, shape and thickness of materials, and details of construction. A schedule showing the location, each sign type, and message shall be included. Signs shall be complete with lettering, framing as detailed, and related components for a complete installation. Signage shall be obtained from a single manufacturer with edges and corners of finished letterforms and graphics true and clean. Recyclable materials shall conform to EPA requirements in accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings; G
Sign Schedule; G

SD-03 Product Data

Installation

SD-04 Samples

Interior Signage

SD-10 Operation and Maintenance Data

Approved Manufacturer's Instructions
Protection and Cleaning

1.4 DELIVERY, STORAGE, AND HANDLING

Materials shall be packaged to prevent damage and deterioration during shipment, handling, storage and installation. Product shall be delivered to the jobsite in manufacturer's original packaging and stored in a clean, dry area in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 GENERAL DESCRIPTION

Signage shall be constructed with a front plastic laminate plate, fused to a plastic backer plate.

2.2 ARCHITECTURAL SIGNAGE SYSTEM

2.2.1 Typography

a. Type style: Helevetica Medium. Copy shall be a true, clean, accurate reproduction of typeface(s) specified. Copy shall be all upper case. Letter spacing shall be normal and interline spacing shall be set by manufacturer.

b. Arrows and symbols shall be black.

c. Grade II Braille utilizing perfectly round, clear raster beads.

2.2.2 Color and Finishes (Confirm with Sign Elevations)

a. Typography: Black.

b. Message Background: (Face material) Plastic Laminate Nevamar Silver Alu Metalx MXT003T.

c. Backer Plate: Espresso Pear LW 5489.

d. Finishes are to meet current Federal ADA and any State requirements.

e. Metal Accent Bar: Silver

2.2.3 Surface Applied Photopolymer

Integral graphics and braille achieved by photomechanical stratification processes. Photopolymer used for ADA compliant graphics shall be of the type that has a minimum durometer reading of 90. Tactile graphics shall be raised 1/32 inch from the first surface of plaque by photomechanical stratification process.

2.2.4 Character Proportions and Heights

Letters and numbers on signs conform to 36 CFR 1191.

2.2.5 Raised and Braille Characters and Pictorial Symbol Signs (Pictograms)

Raised letters and numbers on signs shall conform to 36 CFR 1191.

2.3 SIGNS

2.3.1 Architectural Signage System

The signage system shall utilize modular components and a decorative laminate face with applied graphics including all tactile requirements in adherence to ADA specifications.

All signs, including emergency evacuation plan and informational sign shall have a matching appearance and constructed utilizing the same manufacturing process to assure a consistent look throughout.

2.3.2 Materials

Sign face shall be made of .035 standard grade, high pressure surface laminate. A painted sign face shall not be acceptable.

The sign core shall be thermo-set composite polyester based resin, color impregnated of .25 thickness. The expansion co-efficient of the core and laminate shall be matched to prevent warping and delamination. An acrylic core shall not be acceptable.

Tactile lettering shall be precision machined, raised 1/32 inch, matte polycarbonate and (select subsurface colored for scratch resistance or foil stamped for a brushed metal appearance).

Signs shall incorporate a metal accent bar. Bars shall be dyed, brushed anodized (select aluminum, brass, bronze or black) .125 inch thick.

2.3.3 Standard Colors

Face/background color shall be as indicated on the drawings.

Standard tactile colors shall match manufacturer's ADA standard color selection.

Core/backer color shall be black and polished to a satin luster.

2.3.4 Construction

The signage system shall utilize standard, interchangeable components that can be used singly or in combination.

The signage system shall be capable of accepting paper or acetate inserts to allow changing and updating as required. Insert modules shall have a .080 thickness non-glare acrylic window and shall be inlayed flush to sign face for a smooth, seamless appearance.

The signage system shall be a uniform 8-1/2 inch width to accommodate inserts printed on standard width paper.

Manufacturer shall provide a Word template containing layout, font, color, artwork and trim lines to allow owner to produce inserts on an ink jet printer.

The signage system shall include modules allowing for inserts, notice holders, occupancy sliders, marker, magnetic, and cork pin boards. All modules shall be flush to sign face for a smooth, seamless appearance.

The signage system shall utilize an acrylic sphere for Grade II Braille inserted directly into a mark and scratch resistant, high pressure laminate sign face. Braille dots are to be pressure fit in high tolerance milled holes. Braille dots shall be half hemispherical domed and protruding a minimum .025 high in compliance with California State code.

Sign face shall be neoprene adhesive vulcanized to a composite core and precision machined together to a 90-degree angle. Edges shall be, smooth void of chips, burrs, sharp edges, marks and polished to a satin luster.

The signage system shall incorporate a shim plate. The shim shall raise the sign off the wall allowing for cleaning and/or painting without removal.

Sign contractor responsible for:

Site evaluation
Location plan
All graphics including evacuation plan

2.3.5 Evacuation Plan Sign

Indicate path of travel and building exits clearly.

PART 3 EXECUTION

3.1 INSTALLATION

Signs shall be installed plumb and true and in accordance with approved manufacturer's instructions at locations shown on the detail drawings. Submit six copies of operating instructions outlining the step-by-step procedures required for system operation. The instructions shall include simplified diagrams for the system as installed, the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features. Each set shall be permanently bound and shall have a hard cover. The following identification shall be inscribed on the covers: the words "OPERATING AND MAINTENANCE INSTRUCTIONS", name and location of the facility, name of the Contractor, and contract number. Mounting height and mounting location shall conform to 36 CFR 1191. Required blocking shall be installed. Signs on doors or other surfaces shall not be installed until finishes on such surfaces have been installed. Signs installed on glass surfaces shall be installed with matching blank back-up plates in accordance with manufacturer's instructions and requirements of Section 01 78 23 OPERATION AND MAINTENANCE DATA, package 1.

3.1.1 Anchorage

Anchorage shall be in accordance with approved manufacturer's instructions. Anchorage not otherwise specified or shown shall include slotted inserts, expansion shields, and powder-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine

carriage bolts for steel; lag bolts and screws for wood. Exposed anchor and fastener materials shall be compatible with metal to which applied and shall have matching color and finish. Foam tape pads and adhesives shall not be used. Signs mounted to painted gypsum board surfaces shall be removable for painting maintenance.

3.1.2 Protection and Cleaning

Protect the work against damage during construction. Hardware and electrical equipment shall be adjusted for proper operation. Glass, frames, and other sign surfaces shall be cleaned at completion of sign installation in accordance with the manufacturer's approved instructions and the requirements of Section 01 78 23 OPERATION AND MAINTENANCE DATA, Package 1. Submit six copies of maintenance instructions listing routine procedures, repairs, and guides.

-- End of Section --

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SECTION 10 21 13

TOILET COMPARTMENTS
01/07

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ALUMINUM ASSOCIATION (AA)

AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A167	(2011) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A336/A336M	(2010a) Standard Specification for Alloy Steel Forgings for Pressure and High-Temperature Parts
ASTM A385/A385M	(2011) Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B36/B36M	(2013) Standard Specification for Brass Plate, Sheet, Strip, and Rolled Bar
ASTM B86	(2013) Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings
ASTM D1972	(1997; R 2005) Standard Practice for Generic Marking of Plastic Products
ASTM D6386	(2016) Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron

	and Steel Product and Hardware Surfaces for Painting
ASTM E2129	(2010) Standard Practice for Data Collection for Sustainability Assessment of Building Products

INTERNATIONAL CODE COUNCIL (ICC)

ICC A117.1	(2009) Accessible and Usable Buildings and Facilities

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-60003	(Basic) Partitions, Toilet, Complete

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

1.2 SYSTEM DESCRIPTION

Provide a complete and usable toilet partition system, including toilet enclosures, room entrance screens, urinal screens, system of panels, hardware, and support components. Comply with EPA requirements and Affirmative Procurement guidelines. Furnish the partition system from a single manufacturer, with a standard product as shown in the most recent catalog data. Submit Fabrication Drawings for metal toilet partitions and urinal screens consisting of fabrication and assembly details to be performed in the factory. Submit manufacturer's Cleaning and Maintenance Instructions with Fabrication Drawings for review.

1.2.1 Sustainable Design Requirements

1.2.1.1 Local/Regional Materials Documentation

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

1.2.1.2 Environmental Data

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. Submit Table 1 of ASTM E2129 for the following products: Adhesives

1.2.2 Plastic Identification

Verify that plastic products to be incorporated into the project are labeled in accordance with ASTM D1972. Where products are not labeled, provide product data indicating polymeric information in the Operation and Maintenance Manual.

Type 5	Polypropylene (PP)

1.3 SUSTAINABILITY REQUIREMENTS

Materials in this technical specification may contribute towards contract compliance with sustainability requirements.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication Drawings
Installation Drawings; G,

SD-03 Product Data

Cleaning and Maintenance Instructions
Colors And Finishes
Galvanized Steel Sheet
Sound-Deadening Cores
Anchoring Devices and Fasteners
Hardware and Fittings
Brackets
Door Hardware
Local/Regional Materials Documentation
Environmental Data
Toilet Enclosures
Urinal Screens
Pilaster Shoes

SD-04 Samples

Colors and Finishes; G
Hardware and Fittings
Anchoring Devices and Fasteners

SD-07 Certificates

Warranty

SD-10 Operation and Maintenance Data

Plastic Identification

SD-11 Closeout Submittals

LEED Documentation
Local/Regional Materials Documentation
Toilet Enclosures
Urinal Screens
Pilaster Shoes

1.5 REGULATORY REQUIREMENTS

Conform to ICC A117.1 code for access for the handicapped operation of toilet compartment door and hardware.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver materials in the manufacturer's original unopened packages with the brand, item identification, and project reference clearly marked. Store components in a dry location that is adequately ventilated; free from dust, water, other contaminants, and damage during delivery, storage, and construction.

1.7 WARRANTY

Provide certification or warranties that metal toilet partitions will be free of defects in materials, fabrication, finish, and installation and will remain so for a period of not less than 25 years after completion.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Galvanized Steel Sheet

Provide galvanized steel sheet cold-rolled, stretcher-level, commercial quality material, conforming to ASTM A653/A653M. Conform surface preparation of material for painting to ASTM D6386, Method A.

2.1.2 Sound-Deadening Cores

Provide sound deadening consisting of treated kraft paper honeycomb cores with a cell size of not more than 1 inch. Resin-material content shall weigh not less than 11 percent of the finished core weight. Expanded cores shall be faced on both sides with kraft paper.

2.1.3 Anchoring Devices and Fasteners

Provide steel anchoring devices and fasteners hot-dipped galvanized after fabrication, in conformance with ASTM A385/A385M and ASTM A123/A123M. Conceal all galvanized anchoring devices.

2.1.4 Brackets

Wall brackets shall be two-ear panel brackets, T-style, 1-inch stock. Provide stirrup style panel-to-pilaster brackets.

2.1.5 Hardware and Fittings

2.1.5.1 General Requirements

Conform hardware for the toilet partition system to CID A-A-60003 for the specified type and style of partitions. Provide hardware finish highly resistant to alkalis, urine, and other common toilet room acids. Comply latching devices and hinges for handicap compartments with 36 CFR 1191; provide stainless steel devices and hinges with door latches that operate without either tight grasping or twisting of the wrist of the operator. Submit three samples of each item, including anchoring devices and

fasteners. Approved hardware samples may be installed in the work if properly identified.

Material	Conformance Standard
Cold-rolled sheet steel	ASTM A336/A336M, commercial quality
Zinc-base alloy	ASTM B86, Alloy AC41-A
Brass	ASTM B36/B36M, Alloy C26800
Aluminum	ASTM B221
Corrosion-resistant steel	ASTM A167, Type 302

2.1.5.2 Finishes

a. Aluminum shall have a clear anodic coating confirming to AA DAF45.

b. Corrosion-resistant steel shall have a No. 4 finish.

c. Exposed fasteners shall match the hardware and fittings.

2.1.6 Door Hardware

2.1.6.1 Hinges

Hinges shall be adjustable to hold in-swinging doors open at any angle up to 90 degrees and outswinging doors to 10 degrees. Provide self-lubricating hinges with the indicated swing. Hinges shall be the surface-mounted type and have the following type of return movement:

a. Gravity return movement

2.1.6.2 Latch and Pull

Latch and pull shall be a combination rubber-faced door strike and keeper equipped with emergency access.

2.1.6.3 Coat Hooks

Coat hooks shall be combination units with hooks and rubber tipped pins.

2.2 PARTITION PANELS AND DOORS

Fabricate partition panels and doors not less than 1 inch thick with face sheets not less than 0.0396 inch thick.

2.2.1 Toilet Enclosures

Conform toilet enclosures to CID A-A-60003, Type I, Style A, floor supported, overhead braced. Furnish width, length, and height of toilet enclosures as shown, except height. Height shall extend from 6" A.F.F. to 84" A.F.F.. Finish surface of panels shall be solid polyethylene, Finish 5; water resistant; graffiti resistant; non-absorbent; with plastic face sheets permanently fused to plastic core; 1/4 inch radius beveled edges. Provide surface with hammered finish and mettalic color. Reinforce panels indicated to receive toilet paper holders or grab bars for mounting of the

items required. Provide grab bars to withstand a bending stress, shear stress, shear force, and a tensile force induced by 250 lbf. Grab bars shall not rotate within their fittings.

2.2.2 Urinal Screens

Conform urinal screens to CID A-A-60003, Type III, Style A, floor supportedC, overhead braced. Provide finish for surface of screens as solid polyethylene, Finish 5; water resistant; graffiti resistant; non-absorbent; with plastic face sheets permanently fused to plastic core; 1/4 inch radius beveled edges. This item may contain post-consumer or post-industrial recycled content. Furnish width of urinal screens as shown. Height shall extend from 6" A.F.F. to 84" A.F.F. Provide thickness of 1 inch. Secure wall hung urinal screens with 42 inch long, continuous flanges. Fabricate screens from the same types of panels and pilasters as the toilet partitions. Provide surface with hammered finish and mettalic color. Use corrosion-resistant steel fittings and fasteners.

2.3 FLOOR-ANCHORED PARTITIONS

Pilasters shall be not less than 1-1/4 inch thick with face sheets not less than 0.0635 inch thick. Provide anchoring device at the bottom of the pilaster consisting of a steel bar not less than 1/2 by 7/8 inch welded to the reinforced face sheets and having not less than two 3/8 inch round anchorage devices for securing to the floor slab. Provide anchorage devices complete with threaded rods, expansion shields, lock washers, and leveling-adjustment nuts. Trim piece at the floor shall be 3 inch high and fabricated from not less than 0.030 inch thick corrosion-resistant steel.

2.4 OVERHEAD-BRACED PARTITIONS

Pilasters shall be not less than 1-1/4 inch thick with face sheets not less than 0.0393 inch thick. Provide anchoring device at the bottom of the pilaster consisting of a channel-shaped floor stirrup fabricated from not less than 0.0635 inch thick material and a leveling bolt. Secure the stirrup to the pilaster with not less than a 3/16 inch bolt and nut after the pilaster is leveled. Secure the stirrup to the floor with not less than two lead expansion shields and sheetmetal screws. Fabricate overhead brace from a continuous extruded aluminum tube not less than 1 inch wide by 1-1/2 inch high, 0.125-inch wall thickness. Finish shall be AA-C22A31 in accordance with AA DAF45. Set and secure brace into the top of each pilaster. Fabricate 3 inch high trim piece at the floor from not less than 0.030 inch thick corrosion-resistant steel.

2.5 PILASTER SHOES

Provide shoes at pilasters to conceal floor-mounted anchorage. Pilaster shoes shall be aluminum. Height shall be 3 inches.

2.6 HARDWARE

Hardware for the toilet partition system shall conform to CID A-A-60003 for the specified type and style of partitions. Hardware shall be pre-drilled by manufacturer. Hardware finish shall be highly resistant to alkalis, urine, and other common toilet room acids. Latching devices and hinges for handicap compartments shall comply with 36 CFR 1191 and shall be black anodized door latches that operate without either tight grasping or twisting of the wrist of the operator. Provide door strike and keeper with rubber bumper and cast alloy chrome plated coat hook and bumper. Screws and

bolts shall be stainless steel, tamper proof type. Wall mounting brackets shall be continuous, full height, aluminum, in accordance with toilet compartment manufacturer's instructions. Floor-mounted anchorage shall consist of corrosion-resistant anchoring assemblies with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to floor.

2.7 COLORS AND FINISHES

2.7.1 Colors

Provide manufacturer's standard color charts for color of finishes for toilet partition system components. Submit three samples showing a finished edge on two adjacent sides and core construction, each not less than 12-inch square

2.7.2 Finish No. 5

Provide solid plastic fabricated of polymer resins (polyethylene) formed under high pressure rendering a single component section not less than one inch thick. Colors shall extend throughout the panel thickness. Provide exposed finish surfaces: smooth, waterproof, non-absorbent, and resistant to staining and marking with pens, pencils, or other writing devices. Solid plastic partitions shall not show any sign of deterioration when immersed in the following chemicals and maintained at a temperature of 80 degrees F for a minimum of 30 days:

Acetic Acid (80 percent)	Hydrochloric Acid (40 percent)
Acetone	Hydrogen Peroxide (30 percent)
Ammonia (liquid)	Isopropyl Alcohol
Ammonia Phosphate	Lactic Acid (25 percent)
Bleach (12 percent)	Lime Sulfur
Borax	Nicotine
Brine	Potassium Bromide
Caustic Soda	Soaps
Chlorine Water	Sodium Bicarbonate
Citric Acid	Trisodium Phosphate
Copper Chloride	Urea; Urine
Core Oils	Vinegar

PART 3 EXECUTION

3.1 PREPARATION

Take field measurements prior to the preparation of drawing and fabrication to ensure proper fits. Verify that field measurements, surfaces,

substrates and conditions are as required, and ready to receive work. Verify correct spacing of plumbing fixtures. Verify correct location of built in framing, anchorage, and bracing. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the work of this section. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

Install partitions rigid, straight, plumb, and level, with the panels centered between the fixtures. Provide a panel clearance of not more than 1/2 inch and secure the panels to walls and pilasters with not less than two wall brackets attached near the top and bottom of the panel. Locate wall brackets so that holes for wall bolts occur in masonry or tile joints. Secure Panels to pilasters with brackets matching the wall brackets. Provide for adjustment due to minor floor variations. Locate head rail joints at pilaster center lines. Install adjacent components for consistency of line and plane. Equip each door with hinges, one door latch, and one coat hook and bumper. Align hardware to uniform clearance at vertical edges of doors.

a. Secure panels to hollow plastered walls with toggle bolts using not less than 1/4-20 screws of the length required for the wall thickness. Toggle bolts shall have a load-carrying strength of not less than 600 pounds per anchor.

b. Secure panels to ceramic tile on hollow plastered walls or hollow concrete-masonry walls with toggle bolts using not less than 1/4-20 screws of the length required for the wall thickness. Toggle bolts shall have a load-carrying strength of not less than 600 pounds per anchor.

c. Secure panels to solid masonry or concrete with lead or brass expansion shields designed for use with not less than 1/4-20 screws, with a shield length of not less than 1-1/2 inch. Expansion shields shall have a load-carrying strength of not less than 600 pounds per anchor.

d. Submit Installation Drawings for metal toilet partitions and urinal screens showing plans, elevations, details of construction, hardware, reinforcing and blocking, fittings, mountings and escutcheons. Indicate on drawings the type of partition, location, mounting height, cutouts, and reinforcement required for toilet-room accessories.

3.3 FLOOR-ANCHORED PARTITIONS

Secure pilasters to the floor with the anchorage device specified. Make all leveling devices readily accessible for leveling, plumbing, and tightening the installation. Level tops of doors with tops of pilasters when doors are in a closed position. Expansion shields shall have a minimum 2-inch penetration into the concrete slab.

3.4 OVERHEAD-BRACED PARTITIONS

Secure pilasters to the floor with the anchorage device specified. Make all leveling devices readily accessible for leveling, plumbing, and tightening the installation. Secure overhead brace to the pilaster face with not less than two fasteners per face. Expansion shields shall have a minimum 2-inch penetration into the concrete slab. Make tops of doors parallel with the overhead brace when doors are in a closed position.

3.5 FINAL ADJUSTMENT

After completion of the installation, make final adjustments to the pilaster-leveling devices, door hardware, and other working parts of the partition assembly. Doors shall have a uniform vertical edge clearance of approximately 3/16 inch and shall rest open at approximately 30 degrees when unlatched.

3.6 CLEANING

Baked enamel finish shall be touched up with the same color of paint that was used for the finish. Clean all surfaces of the work, and adjacent surfaces soiled as a result of the work, in an approved manner compliant with the manufacturer's recommended cleaning and protection from damage procedures until accepted. Remove all equipment, tools, surplus materials, and work debris from the site.

-- End of Section --

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SECTION 10 28 13

TOILET ACCESSORIES
08/17

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C1036	(2016) Standard Specification for Flat Glass

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Finishes; G

Accessory Items; G

Recycled content for stainless steel toilet accessories; S

SD-04 Samples

Finishes; G

Accessory Items

SD-07 Certificates

Accessory Items

Baby Changing Stations

1.3 DELIVERY, STORAGE, AND HANDLING

Wrap toilet accessories for shipment and storage, then deliver to the jobsite in manufacturer's original packaging, and store in a clean, dry area protected from construction damage and vandalism.

1.4 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

Provide toilet accessories where indicated in accordance with paragraph SCHEDULE. Porcelain type, tile-wall accessories are specified in Section 09 30 10 CEMENT TILING, QUARRY TILING, AND PAVER TILING. Provide each accessory item complete with the necessary mounting plates of sturdy construction with corrosion resistant surface.

Provide stainless steel products listed herein manufactured from materials containing a minimum of 50 percent recycled content. Provide data identifying percentage of recycled content for stainless steel toilet accessories.

2.1.1 Anchors and Fasteners

Provide anchors and fasteners capable of developing a restraining force commensurate with the strength of the accessory to be mounted and suited for use with the supporting construction. Provide tamperproof design exposed fasteners with finish to match the accessory.

2.1.2 Finishes

Except where noted otherwise, provide the following finishes on metal:

Metal	Finish
Stainless steel	No. 4 satin finish
Carbon steel, copper alloy, and brass	Chromium plated, bright

2.2 ACCESSORY ITEMS

Conform to the requirements for accessory items specified below. Submit fasteners proposed for use for each type of wall construction, mounting, operation, and cleaning instructions and one sample of each other accessory proposed for use. Incorporate approved samples into the finished work, provided they are identified and their locations noted. Submit certificate for each type of accessory specified, attesting that the items meet the specified requirements.

2.2.1 Grab Bar (GB)

Provide an 18 gauge, 1-1/4 inch grab bar OD Type 304 stainless steel. Provide form and length for grab bar as indicated. Provide exposed mounting flange. Provide grab with peened non-slip surface. Furnish installed bars capable of withstanding a 500 pound vertical load without coming loose from the fastenings and without obvious permanent deformation. Allow 1-1/2 inch space between wall and grab bar.

2.2.2 Mirrors, Glass (MG)

Provide Type I transparent flat type, Class 1-clear glass for mirrors. Glazing Quality q1 1/4 inch thick conforming to ASTM C1036. Coat glass on one surface with silver coating, copper protective coating, and mirror backing paint. Provide highly adhesive pure silver coating of a thickness

which provides reflectivity of 83 percent or more of incident light when viewed through 1/4 inch thick glass, free of pinholes or other defects. Provide copper protective coating with pure bright reflective copper, homogeneous without sludge, pinholes or other defects, of proper thickness to prevent "adhesion pull" by mirror backing paint. Provide mirror backing paint with two coats of special scratch and abrasion-resistant paint and baked in uniform thickness to provide a protection for silver and copper coatings which will permit normal cutting and edge fabrication.

2.2.3 Paper Towel Dispenser (PTD)

Provide paper towel dispenser constructed of a minimum 0.03 inch Type 304 stainless steel, surface mounted. Provide a towel compartment for each dispenser. Furnish tumbler key lock locking mechanism.

2.2.4 Sanitary Napkin Disposer (SND)

Construct a Type 304 stainless steel sanitary napkin disposal with removable leak-proof receptacle for disposable liners. Provide fifty disposable liners of the type standard with the manufacturer. Retain receptacle in cabinet by tumbler lock. Provide disposer with a door for inserting disposed napkins, surface mounted.

2.2.5 Shower Curtain (SC)

Provide shower curtain, size to suit conditions. Provide anti-bacterial nylon/vinyl fabric curtain. Furnish light beige color.

2.2.6 Shower Curtain Rods (SCR)

Provide Type 304 stainless steel shower curtain rods 1-1/4 inch OD by 0.049 inch minimum straight to meet installation conditions.

2.2.7 Soap Dispenser (SD)

Provide soap dispenser surface mounted, liquid type consisting of a vertical Type 304 stainless steel tank with holding capacity of 40 fluid ounces with a corrosion-resistant all-purpose valve that dispenses liquid soaps, lotions, detergents and antiseptic soaps.

2.2.8 Soap Holder (SH)

Provide surface mounted Type 304 stainless steel soap holder. Provide stainless steel separate supports.

2.2.9 Towel Bar (TB)

Provide stainless steel towel bar with a minimum thickness of 0.015 inch. Provide minimum 3/4 inch diameter bar, or 5/8 inch square. Provide satin finish.

2.2.10 Wardrobe Hook (WH)

Provide towel hook with concealed wall fastenings, and a pin integral with or permanently fastened to wall flange with maximum projection of 4 inch. Provide satin finish.

2.2.11 Toilet Tissue Dispenser, Jumbo (TTDJ)

Provide surface mounted toilet tissue dispenser with 2 rolls of jumbo tissue. Fabricate cabinet of Type 304, 18 gauge stainless steel with Type 304, 20 gauge stainless steel door. Provide cover with key lock.

2.2.12 Folding Shower Seat (FSS)

Folding shower seat must have a frame constructed of type-304 satin finish stainless steel, 16-gauge, 1-1/4 inch square tubing, and 18-gauge, 1 inch diameter seamless tubing. Seat must be constructed of one-piece, 1/2 inch thick water-resistant, ivory colored solid phenolic with black edge. Clearance between back of shower seat and wall must be 1-1/2 inches to comply with ADA Accessibility Guidelines (ADAAG). Seat supports must not come into contact with the floor. Seat must be able to lock in upright position when not in use. Seat must be attached to wall by two 3 inch diameter mounting flanges constructed of type-304, 3/16 inch thick stainless steel with satin finish. Manufacturer's service and parts manual must be provided to building owner/manager upon completion of project.

2.2.13 Mop and Broom Holder (MH)

Stainless steel with grip jaw cam mechanism securing 3 mop or broom handles. Also includes hooks and storage shelf.

PART 3 EXECUTION

3.1 INSTALLATION

Do not install items that show visual evidence of biological growth. Provide the same finish for the surfaces of fastening devices exposed after installation as the attached accessory. Provide oval exposed screw heads. Install accessories at the location and height indicated. Protect exposed surfaces of accessories with strippable plastic or by other means until the installation is accepted. After acceptance of accessories, remove and dispose of strippable plastic protection. Coordinate accessory manufacturer's mounting details with other trades as their work progresses. Use sealants for brackets, plates, anchoring devices and similar items in showers (a silicone or polysulfide sealant) as they are set to provide a watertight installation. After installation, thoroughly clean exposed surfaces and restore damaged work to its original condition or replace with new work.

3.1.1 Recessed Accessories

Fasten accessories with wood screws to studs, blocking or rough frame in wood construction. Set anchors in mortar in masonry construction. Fasten to metal studs or framing with sheet metal screws in metal construction.

3.1.2 Surface Mounted Accessories

Mount on concealed backplates, unless specified otherwise. Conceal fasteners on accessories without backplates. Install accessories with sheet metal screws or wood screws in lead-lined braided jute, PTFE or neoprene sleeves, or lead expansion shields, or with toggle bolts or other approved fasteners as required by the construction. Install backplates in the same manner, or provide with lugs or anchors set in mortar, as required by the construction. Fasten accessories mounted on gypsum board and plaster walls without solid backing into the metal or wood studs or to

solid wood blocking secured between wood studs, or to metal backplates secured to metal studs.

3.2 CLEANING

Clean material in accordance with manufacturer's recommendations. Do not use alkaline or abrasive agents. Take precautions to avoid scratching or marring exposed surfaces.

3.3 SCHEDULE

Refer to drawings for accessory schedule.

-- End of Section --

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SECTION 10 44 16

FIRE EXTINGUISHERS
05/18

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E814	(2013a; R 2017) Standard Test Method for Fire Tests of Penetration Firestop Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1	(2018) Fire Code
NFPA 10	(2018; TIA 18-1) Standard for Portable Fire Extinguishers
NFPA 101	(2021) Life Safety Code

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.157	(2012) Portable Fire Extinguishers

UNDERWRITERS LABORATORIES (UL)

UL 299	(2012) Dry Chemical Fire Extinguishers

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval.. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Manufacturer's Data; G

SD-03 Product Data

Fire Extinguishers; G

Accessories; G

Cabinets; G

Wall Brackets; G

Replacement Parts List; G

SD-07 Certificates

Fire Extinguishers; G

Manufacturer's Warranty with Inspection Tag; G

1.3 DELIVERY, STORAGE, AND HANDLING

Protect materials from weather, soil, and damage during delivery, storage, and construction.

Deliver materials in their original packages, containers, or bundles bearing the brand name and the name and type of the material.

1.3.1 Samples

Provide the following samples: one full-sized sample of each type of cabinet being installed; one samples of wall brackets.

Use approved samples for installation, with proper identification and storage.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

2.1.1 Types

Submit certificates that show fire extinguishers comply with local codes and regulations.

Provide fire extinguishers conforming to NFPA 10. Provide quantity and placement in compliance with the applicable sections of NFPA 1, NFPA 101 and 29 CFR 1910.157.

Provide dry chemical type fire extinguishers compliant with UL 299.

Submit manufacturer's data for each type of Fire Extinguisher required, detailing all related Cabinet, Wall Mounting and Accessories information, complete with manufacturer's warranty with inspection tag.

2.1.2 Material

Provide enameled steel extinguisher shell.

2.1.3 Size

Dry chemical type fire extinguishers shall be rated 3A:80B:C (5 pound)

2.1.4 Accessories

Pressure gage

2.2 EQUIPMENT

2.2.1 Cabinets

2.2.1.1 Material

Provide aluminum cabinets.

2.2.1.2 Type

Provide semi-recessed type cabinets.

Provide a fire rated cabinet, listed and labeled to comply with ASTM E814 for fire resistance wall rating.

2.2.1.3 Size

Dimension cabinets to accommodate the specified fire extinguishers.

2.2.2 Wall Brackets

Provide wall-hook fire extinguisher wall brackets.

Provide wall bracket and accessories as approved.

PART 3 EXECUTION

3.1 INSTALLATION

Fire Extinguishers where indicated on the drawings. Verify exact locations prior to installation.

Provide extinguishers which are fully charged and ready for operation upon installation. Provide extinguishers complete with Manufacturer's Warranty with Inspection Tag attached.

Comply with the manufacturer's recommendations for all installations.

3.2 PROTECTION

3.2.1 Repairing

Remove and replace damaged and unacceptable portions of completed work with new work at no additional cost to the Government.

3.2.2 Cleaning

Clean all surfaces of the work, and adjacent surfaces which are soiled as a result of the work. Remove from the site all construction equipment, tools, surplus materials and rubbish resulting from the work.

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SECTION 12 24 13

ROLLER WINDOW SHADES
08/17

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

Provide roller window shades, complete with necessary brackets, fittings, and hardware as indicated. Mount and operate equipment in accordance with manufacturer's instructions. Windows to receive a shade must be completely covered.

a. Submit drawings showing plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work. Include the use of same room designations as indicated on the drawings.

b. Provide manufacturer's data composed of catalog cuts, brochures, product information, and operating and maintenance instructions on each product to be used. Include styles, profiles and features.

c. Furnish samples of each type and color of roller shade fabric and roller shade channel. Shade material shall be minimum6 by 6 inch in size. Mark face of material to indicate interior faces.

e. Submit fire resistance data, flame spread and smoke contribution data.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM G21	(2015) Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(2019) Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES

SD-02 Shop Drawings

Installation; G

SD-03 Product Data

Window Shades; G

SD-04 Samples

Window Shades; G

SD-06 Test Reports

Window Shades

SD-07 Certificates

Indoor Air Quality

SD-08 Manufacturer's Instructions

Window Shades

SD-10 Operation and Maintenance Data

Window Shades

SD-11 Closeout Submittals

Recycled Content for various fiber components; S

Indoor Air Quality for roller window shades; S

Warranty; G

1.4 CERTIFICATES

1.4.1 Indoor Air Quality Certifications

1.4.1.1 Roller Window Shades

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard), SCS Global Services Indoor Advantage Gold or provide validation by other third-party program that products meet the requirements of this paragraph. Provide current product certification documentation from certification body.

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

1.5.1.1 Installer's Qualifications

Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

1.5.2 Flammability Requirements

Passes in accordance with NFPA 701 small and large-scale vertical burn. Materials tested must be identical to products proposed for use.

1.5.3 Anti-Microbial Requirements

'No Growth' per ASTM G21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver components to the jobsite in the manufacturer's original packaging with the brand or company name, item identification, and project reference clearly marked. Store components in a dry location that is adequately ventilated and free from dust, water, or other contaminants and has easy access for inspection and handling. Store materials flat in a clean dry area with temperature maintained above 50 degrees F. Do not open containers until needed for installation unless verification inspection is required.

1.7 WARRANTY

Provide 10 year minimum limited warranty.

PART 2 PRODUCTS

2.1 WINDOW SHADES

Roller tube must operate smoothly and be of sufficient diameter and thickness to prevent excessive deflection. Provide brackets that are appropriate for inside mount. The shade cloth must meet the performance described in NFPA 701, small scale test. Treat steel features for corrosion resistance.

Provide Various Fiber Components with a minimum of 60 percent recycled content. Provide data identifying percentage of recycled content for various fiber components.

2.1.1 Light Filtering Shades

Provide light filtering window shades to conform with the following:

a. Roller tube must be extruded aluminum or steel. Diameter, wall thickness, and material to be selected by the manufacturer to accommodate the shade size. Provide roller idler assembly of molded nylon and zinc-plated steel pin. Sliding pin must allow easy installation and removal of roller. Fabric must be connected to the roller tube with double sided adhesive specifically developed to attach coated textiles to metal to eliminate horizontal impressions in fabric

or attached with a spline lock system.

b. Fascia must be L-shaped aluminum extrusion to conceal shade roller and hardware that snaps onto end caps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands.

c. End caps must be stamped steel with universal design suitable for mounting to window mullions. Provide size compatible with roller size. End cap covers must match fascia/headbox finish.

d. Provide hardware that allows for field adjustment or removal of shade roller tube and other operable hardware component without requiring removal of brackets and end or center supports. Provide shade hardware constructed of minimum 1/8 inch thick plated steel or heavier as required to support 150 percent of the full weight of each shade.

e. Manual Operated Chain Drive Hardware must provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset must be adjustable for future change. Provide positive mechanical engagement of drive mechanism to shade roller tube. The drive bracket must be fully integrated with all accessories. Drive chain must be #10 stainless steel chain rated to 90 lb. minimum breaking strength.

2.2 COLOR

Provide color, pattern and texture for metal and shade fabric as indicated. Color listed is not intended to limit the selection of equal colors from other manufacturers. Openness factor of shade fabric must be 3 percent.

PART 3 EXECUTION

3.1 FIELD MEASUREMENTS

After becoming familiar with details of the work, verify all dimensions in the field, and advise the Contracting Officer of any discrepancy before performing the work.

3.2 ROLLER WINDOW SHADE PLACEMENT SCHEDULE

Provide manual rollup window shade at all exterior windows.

3.3 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Perform installation in accordance with the approved detail drawings and manufacturer's installation instructions. Install units level, plumb, secure, and at proper height and location relative to window units. Provide and install supplementary or miscellaneous items in total, including clips, brackets, or anchorages incidental to or necessary for a sound, secure, and complete installation. Do not start installation until completion of room painting and finishing operations.

3.4 CLEAN-UP

Upon completion of the installation, clean window treatments and adjust them for form and appearance and proper operating condition. Repair or replace damaged units as directed by the Contracting Officer. Isolate metal parts from direct contact with concrete, mortar, or dissimilar metals. Ensure shades installed in recessed pockets can be removed without disturbing the pocket. The entire shade, when retracted, must be contained inside the pocket. For shades installed outside the jambs and mullions, overlap each jamb and mullion 0.75 inch or more when the jamb and mullion sizes permit. Include all hardware, brackets, anchors, fasteners, and accessories necessary for a complete, finished installation.

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