National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

FAC-M5052

CONSTRUCTION SPECIFICATIONS

FOR

REPLACE ASBESTOS SIDING (BUILDINGS 4755/4619)

GEORGE C. MARSHALL SPACE FLIGHT CENTER

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

MARSHALL SPACE FLIGHT CENTER, AL

Approval: _____ **Date:** 11/12/13
Lead, Facilities Engineering Office

TABLE OF CONTENTS

DIVISION 1 – GENERAL REQUIREMENTS

00001 TABLE OF CONTENTS
01001 SCOPE AND DESCRIPTION
01059 SPECIAL CONDITIONS
01061 GENERAL SAFETY AND ENVIRONMENTAL HEALTH REQUIREMENTS
01065 ENVIRONMENTAL COMPLIANCE
01070 CONTRACTOR QUALITY ASSURANCE/QUALITY CONTROL
01320 CONSTRUCTION PROGRESS DOCUMENTATION
01330 SUBMITTAL PROCEDURES
01420 REFERENCES
01600 PRODUCT REQUIREMENTS
01700 PROJECT MEETINGS
01731 CUTTING AND PATCHING
01732 SELECTIVE DEMOLITION
01770 CLOSEOUT PROCEDURES

DIVISION 2 – SITE WORK

02050 DEMOLITION
02080 ASBESTOS ABATEMENT PROCEDURES

DIVISION 5: METALS

05120 STRUCTURAL STEEL
05400 COLD-FORMED METAL FRAMING

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07412 INSULATED METAL WALL PANELS
07413 METAL ROOF PANELS
07620 SHEET METAL FLASHING AND TRIM
07920 JOINT SEALANTS

DIVISION 8 – DOORS AND WINDOWS

08950 INSULATED TRANSLUCENT FIBERGLASS SANDWICH PANEL UNIT SYSTEM

DIVISION 9: FINISHES

09912 PAINTING (PROFESSIONAL LINE PRODUCTS)

DIVISION 10: SPECIALTIES

10200 LOUVERS AND VENTS

DIVISION 15: MECHANICAL

15050 BASIC MECHANICAL MATERIALS AND METHODS

15060 HANGERS AND SUPPORTS

DIVISION 16: ELECTRICAL

16050 BASIC ELECTRICAL MATERIALS AND METHODS

END OF SECTION

SECTION 01001 – SCOPE AND DESCRIPTION

PART 1 - GENERAL

1.1 SCOPE

A. The work to be performed under this project consists of providing the labor, equipment, and materials to replace the existing siding, and other exterior improvements, to Buildings 4755 and 4619.

1.2 DESCRIPTION

A. The work consists of architectural, mechanical, structural and electrical construction as indicated in the Contract Documents including the Drawings and this Project Manual.

B. Alternates:

The Work of this project involves a Base Bid and four Additive Alternates.

Base Bid: The Work Base Bid includes all work for Building 4755.

Alternate No. 1: If the work of this Alternate is accepted, the Work on Building 4619 indicated as being the work of Alternate No. 1 will be added to the Contract of the Work.

Alternate No. 2: If the work of this Alternate is accepted, the Work on Building 4619 indicated as being the work of Alternate No. 2 will be added to the Contract of the Work.

Alternate No. 3: If the work of this Alternate is accepted, the Work on Building 4619 indicated as being the work of Alternate No. 3 will be added to the Contract of the Work.

Alternate No. 4: If the work of this Alternate is accepted, the Work on Building 4619 indicated as being the work of Alternate No. 4 will be added to the Contract of the Work.

1.3 APPLICABLE DOCUMENTS

A. The publications of the issues of referenced documents in effect on the date of issuance of invitation for bids form a part of this specification and, where referred to herein by basic designation only, are applicable to the extent indicated by the references thereto. In the event of difference between this specification or its accompanying drawings and the referenced document, this specification and its accompanying drawings shall govern to the extent of such difference.

1.4 CONTRACT DRAWINGS

A. The following drawings accompany this specification and are a part thereof. The Contractor shall check all drawings and specifications for construction interferences, detail

misdescriptions, dimensional errors, and other conflicts and shall promptly notify the Contracting Officer of any discrepancies utilizing a "Request for Information." The Contracting Officer shall make a written interpretation.

LIST OF DRAWINGS:

BUILDING 4755 / REPLACE SIDING (BUILDINGS 4755/4619)

FAC–CY-X1	TITLE SHEET
FAC–CY-X2	ABBREVIATIONS, SYMBOLS, AERIAL PHOTO AND NOTES
FAC–CY-D1	DEMOLITION PHOTOS AND RECORD DRAWINGS KEY PLANS
FAC–CY-D2	DEMOLITION NOTES
FAC–CY-D3	DEMOLITION: NORTH ELEVATION PHOTOGRAPHS
FAC–CY-D4	DEMOLITION: SOUTH ELEVATION PHOTOGRAPHS
FAC–CY-D5	DEMOLITION: WEST ELEVATION PHOTOGRAPHS
FAC–CY-D6	ARCHITECTURAL: EAST ELEVATION PHOTOGRAPHS
FAC–CY-D7	DEMOLITION: MISCELLANEOUS ELEVATION PHOTOGRAPHS
FAC–CY-A1	ARCHITECTURAL: FLOOR PLAN/EAST ENTRY ROOF PLAN/NOTES
FAC–CY-A2	ARCHITECTURAL: NORTH AND SOUTH ELEVATIONS
FAC–CY-A3	ARCHITECTURAL: WEST AND EAST ELEVATIONS
FAC-CY-A4	ARCHITECTURAL: MISCELLANEOUS ELEVATION PHOTOGRAPHS
FAC-CY-A5	ARCHITECTURAL: WALL SECTIONS
FAC–CY-A6	ARCHITECTURAL: WALL SECTIONS
FAC–CY-A7	ARCHITECTURAL: DETAILS
FAC–CY-A8	ARCHITECTURAL: DETAILS
FAC–CY-A9	ARCHITECTURAL: DETAILS
FAC–CY-A10	ARCHITECTURAL: DETAILS
FAC–CY-ME1	MECH/ELEC DEMOLITION: PLAN AND NOTES
FAC–CY-ME2	MECH/ELEC DEMOLITION: NORTH ELEVATION PHOTOGRAPHS
FAC–CY-ME3	MECH/ELEC DEMOLITION: SOUTH ELEVATION PHOTOGRAPHS
FAC–CY-ME4	MECH/ELEC DEMOLITION: WEST ELEVATION PHOTOGRAPHS
FAC–CY-ME5	MECH/ELEC DEMOLITION: EAST ELEVATION PHOTOGRAPHS
FAC–CY-ME6	MECH/ELEC DEMOLITION: MISCELLANEOUS ELEVATION PHOTOGRAPHS

BUILDING 4619 / REPLACE SIDING (BUILDINGS 4755/4619)

FAC-GJ-4619 - X1	TITLE SHEET: DRAWING INDEX, VICINITY MAP
FAC-GJ-4619 - X2	TITLE SHEET: DRAWING INDEX, AERIAL VIEW - SITE PLAN
FAC-GJ-4619 - X3	APPREVIATIONS, SYMBOLS, NOTES, KEY PLANS
FAC-GJ-4619 - AG1	ARCHITECTURAL: FLOOR PLAN - WEST
FAC-GJ-4619 - AG2	ARCHITECTURAL: FLOOR PLAN - EAST
FAC-GJ-4619 - A1.1	DEMOLITION: PHOTOGRAPHS, NOTES
FAC-GJ-4619 - A1.2	ARCHITECTURAL: ELEVATIONS, NOTES
FAC-GJ-4619 - A1.3	ARCHITECTURAL: ELEVATIONS
FAC-GJ-4619 - A1.4	ARCHITECTURAL: TRANSLUCENT PANEL, LOUVER DETAILS
FAC-GJ-4619 - A1.5	ARCHITECTURAL: LOUVER, SLIDING DOOR DETAILS
FAC-GJ-4619 - A1.6	ARCHITECTURAL: DETAILS
FAC-GJ-4619 - A1.7	ARCHITECTURAL: WINDOW ELEVATIONS, DETAILS
FAC-GJ-4619 - ME1.1	DEMOLITION: PHOTOGRAPHS, NOTES
FAC-GJ-4619 - A2.1	DEMOLITION: PHOTOGRAHS, NOTES
FAC-GJ-4619 - A2.2	ARCHITECTURAL: ELEVATIONS,NOTES
FAC-GJ-4619 - A2.3	ARCHITECTURAL: ELEVATIONS, NOTES
FAC-GJ-4619 - A2.4	TRANSLUCENT PANEL DETAILS
FAC-GJ-4619 - A2.5	ARCHITECTURAL: WALL PANEL, LOUVER, DOOR DETAILS
FAC-GJ-4619 - A2.6	ARCHITECTURAL: SLIDING DOOR DETAILS
FAC-GJ-4619 - ME2.1	DEMOLITION: PHOTOGRAPHS, NOTES
FAC-GJ-4619 - A3.1	DEMOLITION: PHOTOGRAPHS, NOTES
FAC-GJ-4619 - A3.2	DEMOLITION: PHOTOGRAPHS, NOTES
FAC-GJ-4619 - A3.3	ARCHITECTURAL: ELEVATIONS
FAC-GJ-4619 - A3.4	ARCHITECTURAL: ELEVATIONS
FAC-GJ-4619 - A3.5	ARCHITECTURAL: TRANSLUCENT PANEL DETAILS
FAC-GJ-4619 - A3.6	ARCHITECTURAL: DETAILS
FAC-GJ-4619 - A3.7	ARCHITECTURAL: ROOF DETAILS
FAC-GJ-4619 - ME3.1	DEMOLITION: PHOTOGRAPHS, NOTES
FAC-GJ-4619 - ME3.2	DEMOLITION: PHOTOGRAPHS, NOTES

FAC-GJ-4619 - A4.1	ARCHITECTURAL: PHOTOGRAPHS, NOTES
FAC-GJ-4619 - A4.2	ARCHITECTURAL: PHOTOGRAPHS, NOTES
FAC-GJ-4619 - A4.3	ARCHITECTURAL: PHOTOGRAPHS, NOTES

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01059 – SPECIAL CONDITIONS

PART 1 - GENERAL

1.1 SUBMITTALS

A. The following shall be submitted in accordance with Section 01330, "Submittal Procedures," in sufficient detail to show full compliance with the specification.

1. Plan for maintaining roof and wall watertight integrity.
2. Contractor's e-mail address and emergency contact information, including cell phone numbers, home phone numbers and pager numbers for all key personnel and the business owner.
3. Photographs of temporary structures to be brought on Center by the Contractor.
4. Notices for work above Federal Aviation Administration height limits.

1.2 CONTRACTOR'S WORKING DRAWINGS

A. It shall be the Contractor's responsibility to develop all necessary working drawings for installation of piping, ductwork, conduit, fixtures, and equipment. Design drawings are not intended to eliminate all dimensional conflicts in routing or location of piping, ductwork, conduit, fixtures, equipment, etc. but shall show only the general arrangement. Use of design drawings for working drawings will be at the Contractor's risk, and changes required in installed work due to failure of Contractor to develop working drawings shall be accomplished at no additional cost to the Government. Prefabricated items shall have working dimensions to accommodate the actual field dimension of earlier-installed items. The Contractor shall carefully investigate all structural, mechanical, electrical, architectural, and finish conditions affecting all his work and shall coordinate and resolve all dimensional conflicts.

1.3 COOPERATION WITH OTHERS

A. During the life of this contract it is anticipated that other contractors will be performing operations in the general area where work under this contract is being performed. The Contractor shall cooperate in all respects wherever necessary for the better prosecution of the work.

1.4 SECURITY

A. The Contractor shall conform to security procedures as directed by the Contracting Officer. Additional information will be provided at the preconstruction meeting and as changes occur during the contract period. Status of Center access is available by calling (256)544-HELP.

B. Center Entry and Vehicles: Entry security at the Center is critical to effect a safe environment. All personnel, vehicles, equipment, and materials are subject to search, investigation, and authorization at each entry and while on Center. Construction vehicles and trucks delivering large equipment and materials, including concrete trucks, shall enter the Center via Gate 1 or 10

or as directed by the Contracting Officer. Significant entry delays should be expected, particularly at higher security levels, so the Contractor is responsible for keeping himself apprised of security conditions and entry requirements at the Center and notifying his contract personnel of changes in order to prosecute contract work in a timely manner without delay. All vehicles must have proof of valid registration and insurance residing in the vehicle at all times and shall show such proof to security personnel on demand and in order to obtain a vehicle pass or decal. All decals must be returned to Center security when access is no longer required and when the contract period ends.

C. Personnel Identification and Badging: All personnel shall be able to show proof of United States citizenship and have on their person a valid Government-issued picture identification such as a driver's license. All Contractor personnel, including subcontractor and visitor personnel, shall have and display on their person a badge issued by Center security at all times. Center security has the right to not issue, confiscate, or change any badge. The Contractor is responsible for assuring each individual working under this contract is immediately badged in the first instance, continually wears and displays a valid badge, has only the necessary access permissions, and returns the badge to Center security upon completion of their work just prior to leaving the Center. All personnel requiring access to the Center by the Contractor shall possess either a visitor's badge or picture badge issued by Center security at Building 4312. All Contractor personnel requiring access to the east or west test areas must receive test area access training provided by MSFC.

D. Any person on Center failing to have in their possession a valid badge or operating a vehicle without a valid pass or decal is ultimately subject to arrest and further legal action.

1.5 SPECIAL CONSIDERATIONS FOR SPECIAL HOURS OF WORK

A. Reference contract Section H attached to Standard Form 1442 – "Solicitation, Offer, and Award" – regarding "Hours of Work" therein. The following are clarifications and additional requirements necessary to perform work at the Marshall Space Flight Center (MSFC).

1. "Duty Hours" shall be considered to be 7:00 a.m. to 5:00 p.m., Monday through Friday, excluding Government holidays. All other times shall be considered "Non-Duty Hours."

2. The Contractor shall only schedule and plan contract performance during "Duty Hours," unless specific allowances are made elsewhere herein for specific activities that may be required to be performed during "Non-Duty Hours."

3. The Contractor must always request, except for emergency response, with 48 hours notice and receive approval from the Contracting Officer for any work activities during "Non-Duty Hours." These requests will typically be denied unless justifiable by outages, road crossings, hazardous operations, coordination with Government operations, and/or facility or subsystem need date.

4. All items above as well as all other Special Conditions of Section 01059 shall be factored into the Contractor's scheduling of work to meet the contract's performance period at no additional cost to the Government after contract award.

1.6 TEMPORARY UTILITIES

A. Contractor shall provide temporary utilities required for construction. Materials may be new or used, shall be adequate for the required usage, shall not create unsafe conditions, and shall not violate applicable codes and standards.

B. Water: All reasonably required amounts of water will be available to the Contractor by the Government from such existing water systems, outlets, and supplies, without cost to the Contractor for the water he consumes. The Contractor shall be responsible for approved disposal of wastewater. The Contractor shall install and maintain at his own expense any necessary supply connections, safety measures, and facilities in a workmanlike manner as approved by the Contracting Officer. All water shall be carefully conserved. Before final acceptance, temporary connections and piping installed by the Contractor shall be removed in a manner satisfactory to the Contracting Officer.

C. Electricity: Electric power will be made available to the Contractor by the Government in the form of single phase 208V/120V or 240V/120V, depending on availability, 60 hz, 100A service without cost to the Contractor for temporary power purposes. Other electrical service may be provided, if available and accessible to the construction site, upon request by the Contractor and approved by the Contracting Officer. The Contractor shall install and maintain at his own expense any necessary supply connections, safety measures as required by 29 CFR 1926 Subpart K, 1926-402-408 or NEC ANSI/NFPA 70 plus formal interpretations and tentative interim amendments, and facilities in a workmanlike manner as approved by the Contracting Officer. All electricity shall be carefully conserved. When Government-provided temporary power is not available, is not of sufficient capacity, or is not of sufficient power quality, the Contractor is responsible for providing his own temporary power at his own expense. The Contractor is responsible for protecting his own electrical equipment and devices as necessary at his own expense from damage due to electrical events such as lightning, loss of power, power surges and sags, single phasing, and poor power quality.

D. Compressed Air: The Contractor is responsible for providing compressed air as needed at his own expense.

E. Breathing Air: The Contractor is responsible for providing breathing air as needed at his own expense.

F. Telephone Service: Contractor shall provide his own telephone service at his own expense.

G. Sanitary Facilities: Contractor shall provide temporary sanitary facilities in accordance with 29 CFR 1926.51 and shall service, clean, and maintain these facilities and enclosures. Temporary facilities shall be removed from the site at the completion of the work. No Contractor shall have use of existing sanitary facilities.

H. Aviation Lights: Contractor shall provide a minimum of 2 aviation red or high intensity white obstruction lights on temporary structures (including cranes) over 100 feet above ground level. 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.

I. Removal of Temporary Utilities: Before final project acceptance, temporary connections and facilities installed by the Contractor shall be removed and all removal locations painted, graded, etc. as necessary to match surrounding conditions in a workmanlike manner and hazard-free condition to the satisfaction of the Contracting Officer.

1.7 TRAFFIC PROVISIONS

A. Maintenance of Traffic: Contractor shall conduct his operations in a manner that will not close any thoroughfare or interfere in any way with traffic on roadways except with written permission of the Contracting Officer. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority have been met. Work shall be conducted so as to minimize obstruction of traffic, and traffic shall be maintained on at least half of the roadway width at all times. If the entire roadway width requires blocking, the Contractor shall submit a traffic control plan to the Contracting Officer's Technical Representative for approval prior to blocking the roadway. Approval shall be obtained from the Contracting Officer (COTR) prior to starting any activity that will obstruct traffic in any manner (one half of the roadway or the entire width of the roadway). Contractor shall provide, erect, and maintain, at his own expense, lights, barriers, signals, passageways, detours, etc., that may be required.

B. Rush Hour Restrictions: Contractor shall not interfere with the peak traffic flows preceding and during normal operations without notification to and approval by the Contracting Officer.

1.8 REDSTONE ARSENAL LANDFILL (RSAL)

A. Contractor shall comply with the following restrictions concerning use of the Government's Redstone Arsenal Landfill (RSAL):

1. No garbage is allowed to be mixed in with the construction rubble for disposal at the Redstone Arsenal Landfill (RSAL).

2. No liquids of any kind are to be disposed of at the RSAL.

3. No ammunition or explosive type material (including training devices) is to be disposed of at the RSAL.

4. No batteries are to be disposed of at the RSAL.

5. No hazardous wastes can be disposed of at the RSAL.

6. Large pieces of heavy metal, aluminum, copper, metal shavings, etc. will not be disposed of at the RSAL.

7. Asbestos will be segregated and disposed of in an area designated by the RSAL operators.

8. Cans of 1 gallon or larger that contain paint, solvent, or any other liquid will not be disposed of in the RSAL.

9. Empty drums in good condition from 5-gallon containers and up will not be disposed of in the RSAL.

10. Empty drums in poor condition must be flattened prior to delivery for disposal to the RSAL.

11. There will be no loitering or scrounging at the RSAL.

B. The Government will refuse any material or not allow dumping of any material at the site if it does not meet the above requirements. If this occurs, the Contractor is responsible to dispose of the waste material offsite at approved landfills at his own expense.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION OF FACILITIES, MATERIAL, AND WORK

A. The Contractor shall at all times protect and preserve all facilities, materials, supplies, and equipment of every description (including property which may be Government-furnished or owned) and all work performed. All reasonable requests of the Contracting Officer to enclose or especially protect such property shall be complied with. If, as determined by the Contracting Officer, material, equipment, supplies and work performed are not adequately protected by the Contractor such property may be protected by the Government and the cost thereof may be charged to the Contractor or deducted from any payments due him.

3.2 LAYOUT OF WORK

A. The Contractor shall lay out his work from the Government-established base lines and bench marks and shall be responsible for all measurements in connection therewith. The Contractor shall furnish, at his own expense, all stakes, templates, equipment, range markers, and labor as may be required in laying out any part of the work from the base lines and bench marks established by the Government. The Contractor will be held responsible for the execution of the work to such lines and grades as may be established or indicated by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through his negligence prior to their authorized removal, they may be replaced by the Contracting Officer at his discretion. The expense of replacement will be deducted from any amount due, or to become due, the Contractor.

3.3 TEMPORARY STRUCTURES

A. All temporary structures and equipment such as construction office trailers, storage trailers, boom trucks, dump trucks, backhoes, etc. are to be in good and fully operable condition, with no broken windows, rusted areas, boarded-up openings, loose insulation, bent doors, paint in poor condition, leaks, exposed wiring, code or safety violations, or other similar defects when brought on site and are to be maintained in good and fully operable condition while they are on site. Contractor shall submit photographs of all trailers, storage units, or other temporary structures and equipment for review and initial approval prior to bringing them on Center. Regardless, trailers and equipment are to be inspected for final approval for laydown by the Government when they are brought on site prior to detaching them from the truck that delivers them so they can be immediately removed if they are found to be in unacceptable condition. At least 7 days prior to arrival, the Contractor shall request the need for and extent of an all-

inclusive laydown area for temporary structures, equipment, material, vehicle parking, and the like for the duration of the work. The laydown area shall be as approved by the Government. Once approved, all office trailers shall be installed per the Standard Building Code, the Alabama Manufactured Housing Commission, and NASA safety requirements, whichever is most stringent. Any type of structure used in whole or part as office space or otherwise occupied on a regular basis shall be tied down. Utility connections shall be installed according to applicable codes/standards and in a neat and acceptable manner. Housekeeping in the structures and about the laydown area shall be kept impeccable on a daily basis and the grass, etc. shall be kept below 6 inches in height at all times. Open storage of material both singularly and collectively shall be kept to a minimum, orderly, secured, and in a manner continuously acceptable to the Government. Only equipment and material necessary for the work shall be kept on site, and equipment shall not be repaired on site without prior approval from the Government for more than minor repairs. All structures and equipment requiring certification, licensure, etc. shall be kept current at all times or immediately removed from the Center. Any changes to the laydown area use, arrangement, boundaries, or egress must be pre-approved by the Government.

3.4 SIGNS

A. Construction Identification Sign: Within 30 days after Notice to Proceed, the Contractor shall install the Government-furnished construction identification sign at the location designated by the Contracting Officer. This sign shall be securely installed in an acceptable manner approved by the Contracting Officer and shall be maintained in good condition and returned to the Government at project completion.

B. Other Signs and Advertisements: Only signs necessary to expedite deliveries, maintain traffic flow, promote safety (e.g. caution, danger, blasting, hardhat area), and prevent interference with Government operations shall be erected.

3.5 NASA MISSION NON-INTERFERENCE

A. The Center conducts special tests and experiments, as well as unique operations that cannot be interrupted. Certain operations have predetermined periods of non-interference where the Contractor can plan ahead with little or no impact to the project Schedule. During such times, a Dig Moratorium will be issued where the Contractor cannot dig more than 6 inches below the surface.

B. Other non-interferences are utility related and require extensive coordination and precise planning and timing.

C. Non-interference periods shall be shown on the project Schedule, to the extent they potentially impact the project Schedule.

3.6 INTERRUPTION OF UTILITIES

A. Interruption to utility services, such as (but not limited to) water, sanitary sewer, steam, electricity, communications, air, high-pressure systems, heating, and air conditioning systems, shall occur at such times as permitted by the Contracting Officer so that interruption of such

services will not interfere with the operation of the Center. Generally, such outages to utility services shall be scheduled in advance and caused by the Contractor on Saturdays, Sundays, or other nonwork days or periods at no additional cost to the Government. The existing steam distribution system shall not be altered nor service to existing buildings be interrupted without prior written approval of the Contracting Officer. Such interruption to the steam distribution system insofar as is practicable shall be accomplished in the summer season. All interruptions shall be held to the minimum practicable. Interruption to high-pressure systems must be pre-planned 90 days in advance, with date certain and duration certain.

B. Notice of Interruptions: The Contractor shall submit each and every request for each individual utility outage in writing seven calendar days in advance of the actual need date for approval by the Contracting Officer. Each required interruption anticipated by the Contractor shall be indicated on the project Schedule for pre-planning purposes by the Government to support the work; lack of such indication, or lack of date accuracy where the date changes from the previously approved project Schedule, may result in delays and any such delay will be at the sole expense of the Contractor.

3.7 LEAKAGE PREVENTION

A. Capping of Piping Systems: All piping installed by the Contractor that is connected to a pressurized piping system, and not connected immediately to equipment, shall be terminated with a properly rated cap, blind flange, or capped valve and not left open-ended when Contractor personnel are not at the jobsite.

B. Construction Surveillance: At such time when new or modified piping systems are activated, the Contractor shall provide adequate personnel to monitor the initial start-up and operation of that system to insure that no damaging leak occurs. A monitor shall be present at each separate site of piping installation or modification at the instant of system activation. These Contractor personnel shall be authorized to immediately deactivate the system and qualified to make emergency repairs in the event of system failures. The Contractor shall notify Contracting Officer's Representative a minimum of 2 days prior to activation.

3.8 EXPLOSIVES

A. With the exception of powder activated tools, the use of explosives will not be permitted.

3.9 GOVERNMENT FURNISHED PROPERTY

A. The Government will furnish to the Contractor property, if identified on the drawings or herein, to be incorporated or installed in the work, or used in its performance. Salvage property to be removed and reused that is in the general work area shall be handled as a Contractor Service and is not identified as "Government Furnished Property".

B. Property, when identified on the drawings or herein, shall be furnished on the ground at a location within the MSFC boundaries as designated by the Contracting Officer. The Contractor shall be responsible for paying any demurrage or detention charges incurred, loading, unloading, and transporting the property to the job site at his own expense.

C. All such property shall be installed or incorporated into the work at the expense of the Contractor, unless otherwise indicated herein.

D. The Contractor in conjunction with an authorized Government representative shall verify the quantity and condition of such Government-furnished property when delivered to him, acknowledge receipt thereof in writing to the Contracting Officer, and in case of damage to or shortage/overage of such property, he shall within 24 hours report in writing such damage or shortage/overage to the Contracting Officer.

E. Quantities of Government-furnished items, if indicated on the drawings or herein will be provided to the Contractor. The Contractor shall be required to furnish any additional quantities that may be required.

3.10 SALVAGE MATERIALS AND EQUIPMENT

A. The Contractor shall maintain adequate property control records for all materials or equipment specified to be salvaged. These records may be in accordance with the Contractor's system of property control, if approved by the Contracting Officer. The Contractor shall be responsible for the adequate storage and protection of all salvaged materials and equipment and shall replace, at no cost to the Government, all salvage materials and equipment broken or damaged during salvage operations as the result of his negligence, or while in his care. Any salvaged materials and equipment that are excess upon the completion of the work shall remain the property of the Government. All such excess material and equipment shall be loaded, transported, and unloaded by the Contractor in a location specified by the Contracting Officer within the boundaries of the Marshall Space Flight Center.

3.11 CONSTRUCTION PROCEDURES

A. The Contractor shall use the following procedures and methods. Only the most current Government approved forms shall be used.

B. Request for Information (RFI) S.O.P. 7321.6: The purpose of this procedure establishes the system for initiating, dispositioning the clarification of technical or quality assurance requirements specified in the contract documents, and engineering direction to the Contractor for no-cost changes to the specifications or drawings.

C. Design Change Requests (DCR's) S.O.P. 7321.1: The purpose of this procedure establishes the system for documenting and approving changes to the contract documents if on-site work must be performed prior to the contract modifications.

D. Construction Deficiency Reports (CDR's) S.O.P. 7321.3: The purpose of this procedure establishes the system for initiating, processing, distributing, and controlling any item, condition, or material which deviates from engineering drawings, specifications, or procedures which require a disposition from NASA Engineering to resolve.

E. Quality Verification System (QVS) S.O.P. 7321.2: The purpose of this procedure is to plan and perform inspections, tests, and reviews to determine compliance with engineering and quality requirements or procedural methods for data gathering. It provides for planning of activities,

establishment of hold points, and documentation of the performance and results of the verification.

F. Preparation, Review, Approval & Control of Submittals S.O.P. 7321.8: The purpose of this procedure establishes the system for initiating, approving, and controlling submittal documents.

G. Field Drawing Changes (FDC) S.O.P. 7321.5: The purpose of this procedure is to establish a method of resolving and documenting same-day, no-cost field adjustments by the COTR.

3.12 ELECTRONIC CAPABILITY

A. The Contractor shall have in-house computer capability to perform daily electronic mail, word processing, Internet connectivity, virus protection, and project scheduling.

B. Contractor management and administration personnel shall be competent in the electronic capability and able to create, print, save, and electronically transfer documents, files, and messages.

C. The Contractor's site superintendent shall have an active cell phone in his possession at all times for emergency and Government representative communication.

D. The Contractor shall submit his e-mail address and emergency contact information, including cell phone numbers, home phone numbers, and pager numbers, for all key personnel as well as the business owner.

3.13 COMMUNICATION RADIOS

A. To insure safety to Government personnel on nearby test stands and to prevent dangerous radio interference from damaging space vehicle test programs underway near site, the Contractor shall not use any radio communication on or near site without coordinating same with Contracting Officer. Radio use is also restricted in certain laboratories, operation centers, and communication and computer rooms as directed by signage and the Contracting Officer. All frequencies used must be submitted for approval by the Contracting Officer prior to use.

3.14 HOUSEKEEPING

A. The Contractor shall comply with the requirements of 29 CFR 1926.25 and assure cleanliness of facilities, equipment, and protection against damage before, during, and after installation. Generally, all working and storage areas will be cleaned regularly. The Contractor shall maintain such conditions insofar as good working practices will permit. It is essential to the proper conduct of the work and to the safety of workers and others that good housekeeping be practiced at all times. Equipment shall be kept clean and shall be protected against damage before, during, and after installation. All working and storage areas shall be cleaned regularly and all scrap materials and refuse properly and promptly disposed of. Accumulations of such materials and, in particular, accumulations of flammable crates, packing, plastic coverings, and other scrap materials in working or storage areas will not be tolerated. All areas shall be left neat, clean, and free from obstructions and hazards at the end of each working day or shift.

3.15 WEATHERTIGHT INTEGRITY OF BUILDING DURING CONSTRUCTION PERIOD

A. The weathertight integrity of the entire building shall be maintained. Contractor shall not remove or penetrate any portion of the roof or exterior walls that he cannot replace with the specified wall or roofing system by the end of the workday or protect by other approved methods in the event of rain or other inclement weather that might occur during the workday. The connection of the installed specified roofing system to an existing roofing system shall be made watertight at the end of each workday and/or in the event of inclement weather that might occur during the workday. The details for said connection and the manner that the Contractor plans to maintain a watertight roof throughout the entire period of performance shall be submitted for review and approval by the Contracting Officer's Technical Representative; this shall be approved before work can commence. For 24 hours a day, 7 days per week, throughout the period of the contract, the Contractor will be responsible for keeping moisture outside of the building interior.

B. In the event that there is water penetration, the Contractor shall take immediate action to provide all materials, equipment, and labor to capture the moisture, dispose of the moisture, and protect all contents of the building.

C. The Contractor shall make repairs to stop any water penetration in a timely manner. The Contracting Officer reserves the right to stop the work when he determines the Contractor is not executing the work in a responsible manner and is causing any water penetration of the building. Work will resume once the Contractor has shown evidence that he has prepared an adequate plan for the remainder of the work; said plan shall include preventive measures to assure watertight conditions throughout the remainder of the contract.

D. When the Contractor fails to respond in time to prevent damage from occurring, MSFC maintenance personnel will respond to clean up and protect as best possible until Contractor personnel arrive. Costs incurred by the Government and maintenance operations associated with such response shall be deducted from any of the Contractor's pay requests and the contract value reduced accordingly by the Contracting Officer.

E. When the Contractor fails to adequately protect equipment and materials, the Contractor shall pay all expenses to replace or repair any and all damages and in a manner acceptable to the Contracting Officer. Such payments shall be made within 30 days of invoice date, and proof of such payments shall be submitted to the Contracting Officer within 15 days of payment date.

3.16 CONSTRUCTION SITE DUST AND MUD CONTROL

A. The Contractor is responsible for establishing effective and mandatory controls to prevent dust and mud from leaving the construction site boundary. These controls shall be communicated to all personnel and enforced at all times. All resulting additional environmental controls required shall be in place, functional, and inspected daily.

B. The Contractor is responsible for preventing wind-blown dust from going outside the construction site boundary including civil works during normal business hours and during other hours the Contractor is present on the site.

C. The Contractor is responsible for preventing vehicles from tracking and depositing mud and other similar debris and materials outside the construction site boundary. Any such tracking or

depositing on roadways, parking lots, sidewalks, equipment, building walls, and any other man-made surface shall be cleaned up immediately without delays to the satisfaction of the Contracting Officer. Rainfall is not an acceptable method.

D. The Contractor shall provide at his expense all the necessary labor, equipment, and material.

3.17 CONSERVATION

A. All energy consumption and resources shall be conserved to the greatest extent possible by the Contractor. The Contractor is responsible for communicating this requirement to all his personnel and for compliance.

B. Recyclable materials (e.g. aluminum cans, white paper, cardboard, etc.) shall be diverted from the waste stream and delivered to the appropriate off-site, off-Center recycle center by the Contractor as indicated.

C. All cardboard materials shall be flattened, consolidated, and delivered to the Center's cardboard recycling location at least weekly.

3.18 JOBSITE TRAILER (FOR GOVERNMENT)

A. Contractor shall provide an approximately 500 square foot trailer at the jobsite for use solely by the Government and government representatives. Contractor shall provide the original and four copies of the keys to the trailer; no one else shall have a key to this trailer. Trailer shall be heated/cooled and custodial services shall be provided at least once per week. Trailer is to be located adjacent to the superintendent's trailer. A refrigerator with at least 14 cubic feet and potable water shall be provided for sole use by the Government. Trailer shall be divided into four (4) rooms: an office at each end, a restroom equipped with sanitary sewer services including running water, and a common area in the middle for drawings, files, and small meetings. Submit layout drawing for COTR's review and approval.

3.19 FEDERAL AVIATION ADMINISTRATION (FAA) REQUIREMENTS

A. The Contractor shall comply with all applicable FAA regulations, particularly FAA AC 70/7460-1.

B. The Contractor shall provide all notices to the COTR in writing in order for the Government to assist the Contractor in meeting the applicable FAA regulations. The FAA requires multiple notifications and submission of forms then approval for any work including cranes above the ground over a certain height from ground level at the construction site (height limit). The Contractor shall know the current regulations and provide the notifications to meet these regulations using the 100 to 1 slope from the Redstone Army Airfield. The Contractor shall determine the requirements and any potential project impacts (both schedule and cost) prior to bidding. The Contractor shall assist the Government in completing all required forms and provide all the necessary information for accurate form completion.

C. The Contractor shall notify the COTR in writing as follows to facilitate timely form completion and submission:

1. 35 calendar days prior to anticipated breach of height limit;
2. 72 hours prior to actual breach of height limit;
3. The same day when the construction or alteration of the structure reaches its greatest height;
4. Any supplemental notices required by the FAA or the Contracting Officer.

END OF SECTION

SECTION 01061 — GENERAL SAFETY AND ENVIRONMENTAL HEALTH REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. The requirements of this section apply to, and are a component part of, each section of the specifications.

1.2 REFERENCES

A. The publications listed below form a part of this contract as required by law or as referenced:

B. CODE OF FEDERAL REGULATIONS (CFR)

1. Executive Order 13423 Strengthening Federal Environmental, Energy, and Transportation
2. 29 CFR 1910 Occupational Safety and Health Standards
3. 29 CFR 1926 Safety and Health Regulations for Construction
4. 40 CFR Parts 1 – 1068 Protection of the Environment

C. NASA/MSFC PUBLICATIONS

1. IMSC-PLAN 1040.3 “MSFC Emergency Plan”
2. NPR 3792.1 Plan for a Drug-Free Workplace
3. NPR 8715.1 NASA Occupational Safety and Health Programs
4. NPR 8715.3 NASA General Safety Program Requirements
5. NPR 8621.1 NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping
6. NPR 8820.2 Facility Project Requirements
7. NASA-STD-8719.11 Safety Standard for Fire Protection
8. MPR 1800.3 MSFC Sanitation Program
9. MWI 1800.1 MSFC Occupational Medicine
10. MPR 1840.4 MSFC Asbestos Program
11. MPR 1860.1 MSFC Radiation Safety Procedural Requirements
12. MPR 1860.2 Nonionizing Radiation Safety
13. MPD 1860.2 Radiation Safety Program
14. MPD 8500.1 MSFC Environmental Management Policy
15. AS20-OI-18 MSFC Energy and Water Management Program
16. MPR 8500.1 MSFC Environmental Engineering and Occupational Health Program
17. MPR 8500.2 MSFC Environmental Management System (EMS)
18. MWI 1810.1 Automated External Defibrillator (AED) Program
19. MWI 1840.1 Industrial Hygiene Programs
20. MWI 3410.1 Personnel Certification Program
21. MWI 8540.2 Green Purchasing Program
22. MWI 8550.1 Waste Management
23. MWI 8550.2 Storm Water Management

24. MWI 8550.3 Wastewater Compliance
25. MWI 8550.4 Air Emissions Compliance
26. MWI 8550.5 Hazardous Material Management
27. MWI 8621.1 Mishap and Close Call Reporting and Investigation Program
28. MPR 8715.1 Marshall Safety, Health, and Environmental (SHE) Program
29. MWI 8715.1 Electrical Safety Program
30. MWI 8715.2 Control of Hazardous Energy (Lockout/Tagout) Program
31. MWI 8715.10 Explosives, Propellant, and Pyrotechnics Program
32. MWI 8715.11 Fire Safety Program
33. MWI 8715.12 Safety, Health & Environmental Finding Tracking System (SHEtrak)
34. MWI 8715.13 Safety Concerns Reporting System (SCRS)
35. MWI 8715.15 Ground Operations Safety Assessment Program
36. MWI 8715.17 Hazardous Operations Readiness Review Program

D. Fire Protection - National Fire Protection Association

1. NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations
2. NASA FAR Supplement 1852.23-73 Safety and Health Plan

E. NOTE: These documents can be accessed through the Marshall Integrated Document Library (MIDL) located on MSFC "Inside Marshall" Webpage or by contacting the Facilities Management Office (FMO).

1.3 SUBMITTALS

A. The following shall be submitted in accordance with Section 01330 "Submittals," in sufficient detail to shown full compliance with the contract documents. Safety, Health and Environmental (SHE) Plan: The Contractor shall submit a Contractor SHE Plan that establishes the Contractor's approach for implementing an industrial safety, occupational health, and environmental program that provides a workplace that is incident and injury free by (1) preventing employee fatalities, (2) reducing the number and severity of employee injuries and illnesses, and (3) protecting the environment through the ongoing planning, implementation, and management control of these programs. The Contractor SHE Plan shall be written specific for the work being conducted during the course of this contracted effort at MSFC and shall be submitted to the Facilities Management Office (FMO) Contracting Officer (CO) for approval prior to the start of work. The Contractor's SHE Plan shall provide a clear description of the Contractor's approach to implementing their SHE Program at MSFC and their methods for ensuring their SHE Program is implemented and maintained compliant with the following five (5) MSFC SHE Core Program Requirements (CPR) and the applicable documents listed in 1.02 to the extent specified as applicable to this contracted effort.

1. The SHE Plan shall address each of the following MSFC SHE CPR elements and sub-elements in sufficient detail to indicate the Contractor has a full understanding of the requirements. The Contractor's SHE Plan shall be approved by the Government prior to the issuance of the Notice to Proceed with construction. Contractor format is acceptable, but it is recommended that the Contractor's SHE Plan follow the order of the MSFC SHE CPR elements and sub-elements as they are shown below or provide a matrix that clearly identifies where each MSFC SHE CPR sub-element is addressed in the Contractor's SHE Plan. The Contractor's SHE Plan shall be submitted in accordance with this specification

division. To assist the Contractor in the development and submittal of an acceptable SHE Plan, an Alternate SHE Plan has been developed which the Contractor can elect to use for the awarded contract. If the Contractor elects to use the Alternate SHE Plan it shall be updated to contain the required information specific to this contracted effort, approval signatures, and maintained up-to-date by the Contractor. **NOTE 1**: Contractor corporate SHE plans that are not written specific for the work being conducted at MSFC during the course of the contracted effort shall be prohibited from being submitted and not approved for use. **NOTE 2**: Documentation of any required training and/or supporting documentation can be requested by the Government prior to the start of any work for this contracted effort.

a. CPR 1 - Management Leadership and Employee Involvement:

- A description of the Contractor's safety, health and environmental policy and their management's commitment to (1) initiate a visible and proactive culture in the workplace that values the safety and health of their employees, (2) provide a safe and healthful workplace for their employees, customers, and public that is free from incidents and injuries, (3) evaluate the safety performance of subcontractors or teammates, when applicable, and (4) protect property and the environment over the duration of this contracted effort.
- A description of methods the Contractor will use to ensure compliance with EPA, OSHA, NASA, MPR 8715.1 and all MSFC SHE documents listed in 1.02B that contain requirements applicable to this contracted effort.
- A description of the methods the Contractor will use to ensure employees are encouraged and allowed to participate and be involved in their SHE Program (e.g., participate in safety committees, worksite inspections, accident investigations, the development of job hazard analysis, provide suggestion for improvements to their SHE program, and report hazardous working conditions).
- A description of the methods the Contractor will use to ensure managers and employees are (1) encouraged to take responsibility for their safety and health and that of other employees, (2) encouraged to make safety a priority in the performance of their work processes, (3) held accountable to perform their jobs/tasks in a safe and healthful manner while also protecting property and the environment, and (4) fully understand their roles and responsibilities in their SHE Program.
- A description of the methods the Contractor will use to ensure the accountabilities, roles and responsibilities listed above and required by their SHE Program are also flowed-down to subcontractors or teammates, when applicable.
- A description of the methods the Contractor will use to conduct and document monthly SHE meetings and awareness training for employees. (**NOTE**: Contractors shall document their monthly SHE awareness training/meetings and maintain a record of these meetings. This meeting can be included as part of a weekly pre-work meeting.)
- A description of the methods the Contractor will use to conduct and document self-evaluations of their SHE Program in order to determine its effectiveness. Provide the frequency of these self-evaluations.

- A description of the methods the Contractor will use to obtain feedback from employees for their perception about the effectiveness of the Contractor's SHE Program. Provide the frequency of this feedback.
- A description of the methods the Contractor will use to ensure their SHE plan is maintained current with contract, NASA and MSFC requirements, and is reviewed and updated as necessary. Provide the frequency of this review.
- Provide the identification, by title, of the individual assigned by the Contractor to be responsible to implement the Contractor's SHE program elements and designated to serve as the day-to-day SHE Point of Contact (POC) for this contracted effort.

b. CPR 2- Worksite Analysis:

- A description of the methods the Contractor will use to identify and document concerns/hazards discovered in the work area that have the potential or probability to cause (1) injury/illness to or death to personnel or the public, (2) damage to or loss of facilities/equipment, (3) an undesired outcome that could result in a serious adverse impact on mission capability or operability, or (4) detrimental impact to the environment and the surrounding community and to evaluate these concerns/hazards in order to determine their probability of occurrence and potential severity so that adequate control measures can be recommended to eliminate or reduce these concerns/hazards to an acceptable safe working level. (**NOTE 1**: This also includes the identification, evaluation and control of health conditions in order to prevent an occupational disease.) (**NOTE 2**: Safety Checklists are provided on the SHE web page to assist in conducting this analysis.) (**NOTE 3**: Contractors shall maintain a record of this analysis and provide documentation of this evaluation to the Government, when requested.)
- A description of the methods the Contractor will use to reevaluate existing operations/processes when significant changes are made to that operation/process that can have the potential or probability to affect the existing control measures that were implemented as a result of a prior worksite analysis above.
- A description of the methods the Contractor will use to ensure each Contractor supervisor conducts and documents weekly worksite safety visits to ensure employees are performing their jobs/tasks/operations in a safe and healthful manner in accordance with MPR 8715.1. (**NOTE**: Weekly safety visits shall be performed once a week by the supervisor on construction sites.)
- A description of the methods the Contractor will use to ensure formal worksite inspections are conducted and documented to ensure (1) employees are provided with safe and healthful working environment and (2) unsafe and unhealthful conditions are corrected when they are discovered in accordance with MWI 8715.12. (**NOTE**: These worksite inspections can be conducted in conjunction with the worksite safety visits above. Provide the frequency these safety inspections if they are conducted other than on a weekly basis.)
- A description of the methods the Contractor will use to ensure employees (1) are encouraged to report any concern/condition that they feel has the potential or probability to cause (1) injury/illness to or death to personnel or the public, (2) damage to or loss of facilities/equipment, (3) an undesired outcome that could result in a serious adverse impact on mission capability or operability, or

(4) detrimental impact to the environment and the surrounding community without the fear of reprisal from management and how these reports are documented and receive a timely response from management to investigate and eliminate the concern/condition. (**NOTE**: Contractors can use the provisions of MWI 8715.13 as their employee safety concern reporting system. Construction workers can also call the Industrial Safety Branch at 544-HELP (4-4357) and select safety or the Safety Hotline at 544-0046)

- A description of the methods the Contractor will use to ensure all Contractor incidents/mishaps and close calls are reported, documented, and investigated to the extent necessary to determine the proximate or root cause(s) in accordance with MWI 8621.1. Contact the CO, FMO Project Manager, or MSFC Industrial Safety Branch for assistance if needed. (**NOTE**: If an accident occurs at the worksite, describe the process for securing the site of the accident so that it is not disturbed and remains secure until the arrival of a security officer and/or safety investigator. The site of the accident shall remain secured until released by the CO, FMO Project Manager, or MSFC Industrial Safety Branch.)
- A description of the Contractor's policy for conducting post-mishap drug and alcohol testing when the initial mishap investigation provides reason to believe an employee's actions or failure to perform a required action is reasonably suspected of having caused or contributed to causing the mishap in accordance with NPR 3792.1, "Plan for Drug-Free Workplace." (**NOTE**: In the event a mishap results in a fatality or serious injury requiring immediate hospitalization, or substantial damage to property estimated to exceed $10,000, post-mishap drug and alcohol testing can be required by the Government and the results of these tests shall be provided to the MSFC FMO.)

c. <u>CPR 3 - Hazard Prevention and Control</u>:

- A description of the methods the Contractor will use to (1) review, (2) approve, and (3) verify the effectiveness of the control measures that were recommended and implemented to eliminate, reduce or control the concerns/hazards identified in a worksite analysis required above by CPR 2. (**NOTE**: A concurrence from the MSFC Industrial Safety Branch is required if an operating procedure is developed as a method to control concerns/hazards onsite at MSFC. MSFC require these procedures to be reviewed annually and updated as necessary.)
- A description of the methods the Contractor will use to ensure they fully comply with the MSFC SHE documented programs listed in 1.02B that contain requirements that are applicable to this contracted effort while working onsite at MSFC (e.g., Personal Protective Equipment (PPE), Respiratory Protection, Hazard Communication, Confined Space Entry, Lockout/Tagout, Bloodborne Pathogens).
- A description of the methods the Contractor will use to ensure their disciplinary policy/program is (1) clearly communicated and understood by all employees, (2) equitably enforced to all employees when they are discovered to be violating the disciplinary policy/program requirements, and (3) flowed-down to subcontractors or teammates, when applicable.
- A description of the methods the Contractor will use to ensure (1) an emergency management program is implemented that will respond to all types

of emergencies that can occur at their worksite during this contracted effort (e.g., fire, chemical spill, accidents, natural disasters) and (2) all employees are informed and aware of what they are to do and who they are to contact in the event an emergency occurs. (**NOTE**: Contractors can use IMSC-PLAN-1040.3 as their emergency management program. Post a list of emergency phone numbers and points-of contacts at the worksite for employee reference.)

- A description of the methods the Contractor will use to ensure safety, health, and environmental services that are applicable to this contracted effort are provided (i.e., hazardous waste disposal, industrial hygiene monitoring, emergency medical support, hearing conservation program, respiratory protection, and hazard communication, etc.). Provide a list of environmental and health services that are provided by the Contractor when these environmental services are not to be provided by MSFC.
- A description of the methods the Contractor will use to ensure the worksite is easily identified, clearly separated from other ongoing activities in the same general area, and effectively barricaded to prevent accidental entry into the worksite by unauthorized employees.
- A description of the methods the Contractor will use to ensure structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations are protected against damage.
- A description of the methods the Contractor will use to ensure all employees are provided with a fall protection system and protected from potential fall hazards when they are on walking/working surfaces with unprotected sides or edges where the potential exists for them to fall to the next lower level in accordance with 29 CFR 1926.501, 29 CFR 1926.502, 29 CFR 1910.23, and MPR 8715.1. (**NOTE 1**: In cases where it can be demonstrated that the use of conventional fall protection systems are infeasible or greater hazards can be created by using conventional fall protection system, an additional "Site Specific Fall Protection Plan" is required and shall be submitted for Government approval.) (**NOTE 2**: Safety nets are not allowed to be used as a fall protection system at MSFC, unless approval is received from the FMO CO, FMO Project Manager, and ISB.)

d. <u>CPR 4 - Safety, Health and Environmental Training</u>

- (**NOTE**: The preferred method for documenting an employee's training is to provide a certificate of training that contains (1) the name of the training, (2) date the training was provided, (3) name of the company that provided the training, and (4) the employee's name that indicates the employee attended the training and met all training requirements. In cases where a certificate of training is unavailable for an employee the Contractor can elect to provide an alternate documentation of employee training. The alternate documentation shall (1) be written on a document that contains the company letterhead, (2) contain rationale that clearly states why the employee is considered as trained, knowledgeable, experienced, and qualified to perform the job/task, and (3) be signed and dated by a company official or supervisor. In either case the Contractor is assuming the responsibility that the employee is trained, knowledgeable, experienced, and qualified to perform the job/task in a safe and healthful manner.)

- A description of the methods the Contractor will use to ensure each contractor employee is informed and trained to recognize conditions in the workplace that have the potential or probability to cause (1) injury/illness to or death to personnel or the public, (2) damage to or loss of facilities/equipment, (3) an undesired outcome that could result in a serious adverse impact on mission capability or operability, or (4) detrimental impact to the environment and the surrounding community, and (5) be able to recognize signs and symptoms of workplace-related illnesses. (**NOTE**: Contractors shall maintain a record of this training and provide documentation of this training to the Government, when requested.)
- A description of the methods the Contractor will use to ensure each Contractor employee is informed and trained to (1) fully understand they are empowered and authorized to "stop or halt" an activity that is unsafe and has the potential or probability to cause (1) injury/illness to or death to personnel or the public, (2) damage to or loss of facilities/equipment, (3) an undesired outcome that could result in a serious adverse impact on mission capability or operability, or (4) detrimental impact to the environment and the surrounding community. (**NOTE 1**: When an activity is "stopped or halted" the activity cannot resume until the condition has been corrected. At MSFC the FMO CO, FMO Project Manager, FMO Inspector, and the MSFC Industrial Safety Branch shall be notified.) (**NOTE 2**: Contractors shall maintain a record of this training and provide documentation of this training to the Government, when requested.)
- A description of the methods the Contractor will use to ensure each Contractor employee is trained and fully understands the Contractor's disciplinary policy/program and the actions that can be taken by the Contractor when an employee is discovered not following safety and environmental policies, procedures, and rules, and the disciplinary actions are warranted. (**NOTE**: Contractors shall maintain a record of this training and provide documentation of this training to the Government, when requested.)
- A description of the methods the Contractor will use to evaluate each job/task performed by Contractor employees in support of this contracted effort to (1) identify the specific training required by the applicable parts of 29 CFR 1910 and 29 CFR 1926 and (2) ensure the employees have received the training in order to perform the job/task in a safety and healthful manner. Examples of OSHA required training include, but are not limited to, the following: (1) Use of fall protection systems; (2) operating lifting equipment, heavy equipment, and machinery; (3) rigging and hoisting; (4) erecting and use of scaffolds; (5) handling harmful substances; and (6) confined space entry. (**NOTE**: Contractors shall maintain a record of this evaluation and provide documentation of this evaluation to the Government, when requested.)
- A description of the methods the Contractor will use to ensure Contractor employees receive training and are designated as "qualified" to operate equipment and machinery and perform the jobs that they have been assigned in accordance with the applicable parts of 29 CFR 1910 and 29 CFR 1926. (**NOTE**: Contractors shall maintain a record of this training and provide documentation of this training to the Government, when requested.)
- A description of the methods the Contractor will use to ensure any employee(s) identified to serve in the role of the "competent person" for any operation identified in 29 CFR 1910 or 29 CFR 1926 that require a "competent person" (1) has received the necessary training and experience, (2) is capable

of identifying the hazards associated with the operation, (3) has the authority to take the necessary corrective actions, and (4) is knowledgeable of and understands the mandatory and applicable regulations and standards associated with the equipment or operation. (**NOTE 1**: Examples of operations that require a "competent person" in accordance with OSHA include, but are not limited to, the following: (1) all protection systems; (2) erection and use of scaffolds; and (3) excavations.) (**NOTE 2**: Contractor shall maintain a record of this training and make available to the Government upon request.) (**NOTE 3**: Certificate or letter from company providing rationale why the employee is considered a "competent person" or is trained and qualified to perform selected jobs or operate selected equipment.)

- A description of the methods the Contractor will use to ensure each Contractor employee receives the initial MSFC SHE Program Awareness Training within 60 days of the Authority to Proceed (ATP) or their arrival at the worksite. (**NOTE 1**: Construction Contractors shall receive, at a minimum, the following training: SHE 101C, "MSFC SHE Program Construction Awareness Training." A copy of this training will be provided to the Contractor by the MSFC ISB at the Pre-Construction Conference. The Contractor shall provide this training within the time limits specified to all Contractor employees that will be working onsite in support of this contracted effort. It is recommended that this training be provided during a weekly pre-work meeting. A signed attendance sheet of employees attending this training shall be provided to the FMO Project Manager as a record of this training being conducted.) (**NOTE 2**: Contractors shall maintain a record of this training and provide documentation of this training to the Government, when requested.)
- A description of the methods the Contractor will use to ensure Contractor employees receive a MSFC Safety Certification when required by the Industrial Safety Branch or Environmental Engineering and Occupational Health Office. (**NOTE**: At the present time if the Contractor is expected to operate MSFC owned lifting equipment in accordance with MWI 3410.1, a MSFC Safety Certification is required.)
- A description of the methods the Contractor will use to ensure a copy of any Contractor developed training that is intended to be used in lieu of MSFC provided training for a MSFC Safety Certification is provided to the MSFC Industrial Safety Branch for approval prior to its use when applicable.

e. <u>CPR 5 - Environmental Management System</u>

- A description of the methods the Contractor will use to ensure compliance with environmental laws and regulations CFR Title 40 Parts 1-1068, Alabama Department of Environmental Management (ADEM), Executive Order 13423 and 13514, and MPR 8500.1 and 8500.2 by:

    - Complying with MWI 8550.5 for reporting and management of chemicals.
    - Implementing and reporting green procurements in accordance with MWI 8540.2.
    - Reducing, reusing, and recycling of hazardous and toxic substances prior to disposal in accordance with MPR 8500.1.
    - Managing storm water pollution in accordance with MWI 8550.2.

- Ensuring equipment and processes are permitted by applicable Clean Air Act Title V permit and in accordance with MWI 8550.4.
- Managing solid and hazardous waste as permitted by applicable laws in accordance with MWI 8550.1.
- Managing wastewater discharges in accordance with MWI 8550.3.

2. Control of Hazardous Energy, Lockout/Tagout System (29 CFR 1910.147, 29 CFR 1926.417, and MWI 8715.2). At MSFC, maintenance and service activities on equipment and systems that have the potential to release energy and injure employees or damage equipment shall be locked and tagged in accordance with MWI 8715.2. At MSFC **ONLY**, locks with a red case and tags with red diagonal strips containing the word "lockout" are allowed to be used for Lockout/Tagout during construction, maintenance and servicing activities. All construction employees that are expected to place a lock and/or tag or perform Lockout/Tagout activities at MSFC are required to attend and complete the MSFC Lockout/Tagout Training. Contact the Facilities Management Office (FMO) or the MSFC Industrial Safety Branch (ISB) for more information on obtaining this training. Contractors are responsible for maintaining records of the completion of this training. The Contractor shall provide documentation of this training to the Government, when requested. **NOTE**: Work on energized equipment shall only be allowed under special situation in accordance with MWI 8715.1.

3. Hazard Communication (29 CFR 1910.1200 and MWI 8550.5). During the Pre-Construction Conference, to be arranged by the FMO, ISB and/or the Environmental Engineering & Occupational Health (EEOH) Office may discuss common safety and health requirements at MSFC and distribute handouts addressing these requirements.

B. **Reports**. In addition to documentation and reports required elsewhere in this section, the following reports shall also be submitted:

1. Monthly Report: The Contractor shall complete each month MSFC Form 4371, MSFC Contractor Accident and Safety Statistics, and submit to the CO by the 15th day of the month following the report month. The form shall be complete and accurate in every detail.
2. General: a) Safety meetings and training shall be documented and retained at the construction site. Safety meeting sign-in sheets and a general description of the items covered shall be submitted to the CO. b) All job hazard analyses (JHA's) and Hazardous Operations Checklists (HOC's) shall be in writing and communicated to all affected workers. c) All safety, health, and environmental related documents (plans, forms, reports, supervisor safety visits, inspections, correspondence, JHA's MSDS, logs, certifications, etc.) shall be retained in an orderly fashion at the construction site and readily available for review by the Government when requested. (Safety Checklists are located on the SHE web page under the "News and Information" pull down menu.)
3. MSFC SHE 101 "MSFC SHE Program Construction Awareness Training" will be provided to the Contractor by the ISB during the Pre-construction Conference. The Contractor shall provide this training within the time limits specified to all Contractor employees that will be working onsite in support of this contracted effort. It is recommended that this training be provided during a weekly safety meeting. A signed attendance sheet of employees attending this training shall be provided to the COTR or FMO Project Manager as a record of this training being conducted.

1.4 GENERAL SAFETY PROVISIONS

A. Contractor is subject to applicable federal, state, and local laws, regulations, ordinances, codes, and orders relating to safety and health in effect on the date of this contract.

B. During the performance of work under this contract, the Contractor is responsible for control and safety of persons working on and visiting the project site. Contractor is responsible for ensuring their employees and all subcontractor employees supporting them comply with all SHE requirements while working at MSFC. Contractor shall advise the CO or FMO Project Manager of any special safety restriction he has established so that Government personnel can be notified of these restrictions.

C. For any operation identified in 29 CFR 1910 or 29 CFR 1926 that requires a "competent" person, the Contractor shall identify that person(s) by name, post the name of this person(s) at the project site or designated meeting area where the workers gather prior to commencing work, and they shall be on the project site during any operation for which they have been identified as the "competent person." Use the "MSFC Emergency Telephone List" provided by FMO or ISB or a similar format to post these names at the project site or designated meeting area.

1.5 ACCIDENT TREATMENT AND RECORDS

A. Contractor shall post emergency first aid, ambulance information, and a list of key personnel to be contacted in times of emergency at the project site.

B. Contractor employees may utilize Government dispensary facilities located in building 4249 for injury and emergency medical treatment. Contact occupational medicine services (telephone 256-544-2390).

C. Contractor shall report all accidents and mishaps that can lead to employee injury or illness to FMO Project Manager and ISB in accordance with the process described in MWI 8621.1, "Mishap and Close Call Reporting and Investigation Program."

1.6 FIRE PREVENTION AND PROTECTION

A. Open-flame heating devices are not permitted except by approval of a hot work permit by ISB in accordance with MWI 8715.11, Fire Safety Program. Approval for the use of open-flame heating devices or open-fires does not relieve the Contractor from the responsibility for any damage incurred as a result of a fire.

B. Hot Work Permits are issued by ISB in accordance with MWI 8715.11, Fire Safety Program. Details for requesting a hot work permit will be provided by the ISB representative during the Pre-Construction Conference.

C. Burning trash, brush, or wood on the project site shall not be permitted.

1.7 ELECTRICAL

A. Contractor shall appoint an employee to serve as the "competent employee" for electrical safety. This employee shall have received training in the hazards of electricity and familiar with the

safety requirements in 29 CFR 1926. 400 – 449 (Subpart K) to be responsible for the electrical safety of the contracted effort and to restrict entry to dangerous locations to only those authorized by him and the FMO. The contractor shall provide documentation of this training to the Government, when requested.

1.8 CONFINED SPACE ENTRY

A. At least 10 days prior to commencing activities, the Contractor or sub-contractor shall submit to EEOH and ISB the following for review:

1. Training records showing personnel that have been trained in confined space entry in accordance with OSHA standard 29 CFR 1910.146.

2. Communication of company letterhead and signed by an officer or supervisor of the company stating that all personnel who are to work in the confined space entry have had appropriate training, physicals, and are fit to safely perform the role they are assigned. The letter shall call out who are to act as entrants, attendants, and entry supervisors. At no time shall the person performing the task of entry supervisor also be an entrant unless another designated entry supervisor is present and duties are transferred.

3. A copy of the company's written confined space entry program.

4. Submission of this information earlier than 10 day is encouraged since failing to comply with this section can lead to delays and completion penalties.

B. Contractor shall be responsible for removing water and debris before commencement and during execution of work in manholes.

C. Contractor shall furnish their own atmospheric testing equipment and have one or more employees properly trained in operation of the testing equipment and formally qualified as Confined Space Entry Supervisors who shall be on duty during times workers are in confined spaces in accordance with 29 CFR 1910.146(g) and (i). Their primary functions shall be to perform the duties of Confined Space Entry Supervisor and to test for atmospheric hazards and operate testing equipment. Unless equipment of constant supervisory type with automatic alarm is employed, atmospheric tests shall be made at least every 30 minutes or more often when character of ground or experience indicates gas may be encountered. An atmospheric test shall be made before workers are permitted to enter the space after an idle period exceeding one-half hour, or more frequently at the discretion of the Contractor's Entry Supervisor or by direction of EEOH or ISB. A duly designated Confined Space Entry Supervisor may borrow atmospheric testing equipment from NASA's Environmental Engineering and Occupational Health (EEOH) Office, if the equipment is available.

D. 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. Consultation with and approval by EEOH and ISB is required prior to entering these types of confined spaces.

1.9 RADIATION SAFETY REQUIREMENTS

A. The Contractor shall comply with 29 CFR1926.53, MPR 1860.1 and MPD 1860.2 for use of all radioactive material. The Contractor shall notify the MSFC Radiation Safety Officer (RSO) at least 48 hours in advance of any planned radiography. However, if planned during a weekend, notice shall be provided by Thursday. The Contractor shall report to the RSO once on-site and prior to starting work.

B. Loss of radioactive material shall be reported immediately to the CO and RSO.

C. Actual exposure of the radiographic film or unshielding the source shall not be initiated until after 5:00 p.m. on weekdays, unless prior approval is obtained from the COTR and RSO to accomplish such activities prior to 5:00 p.m.

D. In instances where radiography is scheduled near or adjacent to buildings or areas having limited access or one-way doors, no assumptions shall be made as to building occupancy. Where necessary the CO will direct the Contractor to conduct an actual building entry, search, and alert. Where removal of personnel from such a building cannot be accomplished and it is otherwise safe to proceed with the radiography, a fully instructed employee shall be positioned inside such building or area to prevent exiting while external radiographic operations are in process.

E. Contractor shall perform a hazard analysis (HA) when lasers are used or are in the work area. The HA shall be approved by the CO and communicated to all personnel and all necessary protective measures taken.

1.10 ROOFING AND COATING

A. At the beginning of each work day the Contractor shall check with the Government Inspector before proceeding to work on the roof to ensure safe work conditions. Roofing and coating work shall adhere to NFPA-241.

B. Barricades or covers shall be provided for all roof openings which present a hazard.

C. Any employees designated to serve as a “Fire Watch” during roofing and coating operations where a tar kettle or similar fired equipment is used shall be trained in the use of fire-extinguishing equipment, familiar with the procedures for sounding an alarm in the event of a fire, and monitor the area where the hot work operation was conducted for at least 30 minutes after completion of the hot work operation to detect and extinguish any smoldering fires. Documentation of this training shall be provided to the Government, when requested.

1.11 TEMPORARY HANDRAILS AND GUARDRAILS (29 CFR 1910.23 AND 29 CFR 1926 SUBPART M – FALL PROTECTION)

A. Temporary handrails shall be provided on all stair wells until permanent handrails are installed. All floor and wall openings from which there is a drop of more than 4 feet or there is a potential for employees to fall to a lower level shall guarded by rail. Where there is exposure below of falling materials, a removable toe board or equivalent shall also be provided. In places where people are required to access an area close to or underneath walkways, handrails, and toe boards, approved netting shall be used.

1.12 TOOLS, HAND AND POWER (29 CFR 1910.241-244 (SUBPART P), 29 CFR1926.300-307 (SUBPART I)

A. Hand and power tools shall be in a safe operating condition and operators shall be familiar with their safe operations.

B. All portable electrically-powered tools used on this work shall be grounded by means of a 3-wire polarity type grounding system via ground fault interrupter unless the tool is UL-listed as double insulated. Operators of power-operated tools shall be familiar with their safe operation in accordance with 29 CFR 1910.241 -244 (Subpart P) and 29 CFR 1926.300 – 307 (Subpart I).

C. Operators of explosive activated tools shall be trained to operate such tools in accordance with 29 CFR 1926.302(e) and provide documentation of this training to the Government, when requested.

1.13 WELDING, FLAME CUTTING, AND MELTING

A. Contractor shall clear welding and cutting operations with the ISB before operations begin.

B. Contractor shall ensure welding and cutting operators are familiar with the safe operation of welding and cutting equipment requirements in 29 CFR 1926.350 -354 (Subpart J).

C. Contractor shall discontinue burning, welding, or cutting operations 1 hour prior to the end of the normal work day. A workman shall remain at the site for 1 hour, or as required by the Hot Work Permit (MSFC Form 1155), after discontinuing these operations to make a thorough inspection of the area for possible sources of latent combustion. He shall be equipped with two full 15-pound (6.8 kilogram) carbon dioxide fire extinguishers. Details for reporting fires will be provided by the ISB representative during the Pre-Construction Conference.

D. During operations involving possible fire hazard, the Contractor shall notify the CO and/or Government Inspector and not proceed until clearance is obtained in writing. CO and/or Government Inspector may request a standby from the Fire Station. This requirement does not relieve the Contractor of his responsibility for welding and cutting safety.

E. Roofing/Tar Melting/Handling Devices shall comply with the requirements of NFPA 241. Tar melting kettles and handling devices shall be used in a safe manner to eliminate any chance of an employee being burned or starting a fire. Melting kettles shall be placed on a level, firm foundation and protected against traffic, accidental tipping or similar hazard. An approved type of fire extinguishers shall be available at all locations where melting kettles or heating devices are in use. Melting kettles or heating devices, when in use, shall be provided with a lid and thermometer.

F. Any employees designated to serve as a “Fire Watch” during welding, flame cutting and melting shall be trained in the use of fire extinguishing equipment, familiar with the procedures for sounding an alarm in the event of a fire, and monitor the area where the hot work operation was conducted for at least 30 minutes after completion of the hot work operation to detect and extinguish any smoldering fires. Documentation of this training shall be provided to the Government when requested.

1.14 HIGH NOISE LEVEL PROTECTION

A. Contractor shall ensure employees required to wear Personal Protective Equipment (PPE) have been trained in PPE usage in accordance with 29 CFR 1910.132(f) and MPR 8715.1. Documentation of this training shall be provided to the Government when requested.

B. Operations performed by the Contractor that involve the use of equipment with output of high noise levels (jackhammers, air compressors, and explosive device activated tools) shall be scheduled for weekends or after duty working hours as directed at the pre-construction conference. Use of any such equipment shall be approved in writing by the CO prior to commencement of work.

C. When the sound pressure level in any working area exceeds 85 dBA, personnel shall be required to wear hearing protective devices in accordance with 29 CFR 1926.101.

D. When the sound pressure level in any work area exceeds 120 dBA, hearing protection equivalent to the combination of ear plugs and ear muffs shall be required.

1.15 SEVERE STORM PLAN

A. In the event of a severe storm warning, the Contractor shall:

1. Secure outside equipment and materials and place materials possible to damage in protected locations.
2. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.
3. Ensure that temporary erosion controls are adequate.
4. Vacate temporary construction trailers.

1.16 SCAFFOLDS AND LADDERS (29 CFR 1926 Subpart L, 29 CFR 1926.454, 29 CFR 1910.66, 29 CFR 1910.28-29 and 29 CFR 1910.24-27)

A. The Contractor shall comply with the requirements of 29 CFR 1926 Subpart L and 29 CFR 1910.66 for use of scaffolds. All scaffolds, ladders, platforms, and runways shall be erected, inspected and maintained in accordance with the applicable sections listed above.

B. An adequate number of ladders shall be furnished at all times. Job constructed ladders shall be of select materials. All fixed ladders above 20 feet in height shall be staggered or caged. All ladders placed on concrete floors or slippery surfaces shall be equipped with an approved type no-skid shoe or adequately made to prevent slipping.

1.17 ROPES/SLINGS/CHAINS

A. No loads shall pass over workmen and other personnel at any time. Slings, their fittings and fastenings, when in use, shall be inspected daily by a qualified craft person for evidence of overloading, excessive wear or damage. Defective slings shall be removed from service. Proper storage shall be provided for qualified slings when not in use. Wire rope shall be inspected by a competent person at the time of installation and at scheduled intervals thereafter. Drums,

sheaves, or pulleys having eccentric bores or cracked hubs, spokes, or flanges shall be removed from service. To eliminate rope damage: drums, sheaves, and pulleys shall be smooth and free of surface defects.

B. Connections, fittings, fasteners, parts, etc., used in connection with ropes shall be of good quality and of proper size and strength, and shall be installed in accordance with recommendations of the manufacturer. Chains used for lifting loads shall be inspected before each use. After the initial inspection, the chains shall be inspected each week. Chains shall be removed from service when showing evidence of cracks, nicks, or other damage. All hooks, used to support human loads (on approved lifting devices) or any loads, shall be closed or equipped with a safety latch.

C. Hooks, shackles, rings, pad eyes, and other fittings that show excessive wear or that have been bent, twisted or otherwise damaged shall be removed from service. Frozen fiber rope shall not be used. Fiber rope that has been subjected to acids or excessive heat shall not be used. Fiber rope shall be protected from abrasion by padding where it is fastened. The same protection applies for fiber rope drawn over square corners, sharp or rough surfaces.

D. The Contractor shall ensure employees performing rigging and hoisting operations are trained and familiar with the safety requirements in 1926.753 and 761. Documentation of this training shall be provided to the Government when requested.

1.18 OPERATIONS ADJACENT TO POWER LINES

A. Equipment or any part thereof shall not have the capability of coming within the following minimum clearances from energized power lines. Positioning and blocking of equipment to assure that no part thereof, including cables, can come within the following minimum clearances will be considered an acceptable alternate.

Power Lines Nominal System KV	Minimum Required Clearance (Feet)
5	3
15	8
44	10
69	12
115-161	15

B. A notice of the minimum required clearance shall be posted at the operator’s position.

C. The Contractor shall ensure employees performing operations adjacent to power lines are trained and familiar with the safety requirements in 29 CFR 1926. 950 – 960 (Subpart V). Documentation of this training shall be provided to the Government when requested.

1.19 CONSTRUCTION EQUIPMENT

A. All construction equipment and machinery, including required guards, brakes, cable, etc., shall be inspected by qualified personnel before use for safe and serviceable mechanical condition. All inspections shall be done daily before each shift and will be properly maintained by qualified personnel. A warning device or service of a signal-man shall be provided where there

is danger to personnel from moving equipment, swinging loads, buckets, booms, etc. All equipment capable of hauling 5 tons of material is considered to be heavy duty and shall be equipped with an emergency brake system. The State Commercial Drivers License, (CDL) requirement and regulation applies on Redstone Arsenal. Documentation of this training shall be provided to the Government when requested.

B. Before any machinery or mechanized equipment is placed in use, it shall be inspected and tested by a competent mechanic and certified to be in safe operating condition. Records of tests and inspections will be maintained at the site and will be available upon request. All machinery or equipment found to be unsafe shall be tagged out and its use prohibited until unsafe conditions have been corrected. Machinery or equipment requiring an operator shall not be permitted to run unattended. Equipment shall be locked or secured to prevent operation by unauthorized personnel. All guards and devices shall be replaced immediately after completion of repairs and adjustments.

C. The Contractor shall ensure employees working with construction equipment are trained in its safe operation and are familiar with the safety requirements in 29 CFR 1926. 600 – 606 (Subpart O). Documentation of this training shall be provided to the Government when requested.

D. Self-propelled construction equipment (except light service vehicles), crawler-type equipment, such as cranes, power shovels and draglines, whether moving alone or in combination shall be equipped with a reverse signal alarm in accordance with 29 CFR 1926.601.

1. The alarm shall be mounted on the rear of the equipment and shall withstand severe wear and tear, adverse weather, and unfavorable environmental working conditions and shall be certified by the manufacturer as fully meeting the following performance standards.
2. The alarm shall produce a relatively pure tone which shall peak within the United Standard Association standard octave passband of 600 to 2,400 cycles per second and shall produce a 0.2 to 0.5 second audible warning within the initial 3 feet of backward movement of the vehicle on which it is mounted and at regular intervals, not to exceed 3 seconds, throughout the backward movement. The alarm shall automatically cut out when the backward movement ceases. The sound intensity of the alarm shall range from and not exceed 100 dB at a horizontal distance of 5 feet from the alarm.
3. Actuation of the alarm shall be automatic by direct connection to any part of the equipment that moves or acts in a manner distinctive only to the rearward movement of the vehicle with no manual controls of any kind between the source of actuation and the alarm. Where application of this requirement to specific types of equipment has impractical application, other means of actuation may be used upon written approval of the CO.

1.20 TEMPORARY ELECTRICITY AND LIGHTNG

A. All temporary wiring shall be in accordance with the National Electric Codes, OSHA standards, and installed by competent personnel. Adequate, safe lighting shall be provided in advance for any work requiring artificial light. Grounding of all electrical portable equipment and hand tools shall be accomplished by installing three-wire plug systems. All 120 volt, single-phase, 15 and 20 ampere receptacle outlets on construction sites which are not part of the permanent wiring of the building or structure and which are in use by employees shall have approved ground fault circuit interrupters (GFCI) for personnel protection.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

September 12, 2013

Alternate Safety, Health and Environmental (SHE) Plan for Construction

Company Name:	
Contract Number:	**Date:**
MSFC Organization supported:	
MSFC Contracting Officer:	
MSFC Contracting Officer Technical Representative:	
Contract begin date:	**Contract End date:**

Marshall Space Flight Center (MSFC) is committed to providing a workplace that is incident and injury free by (1) preventing employee fatalities, (2) reducing the number and severity of employee injuries and illnesses, and (3) protecting the MSFC environment and property by implementing the five (5) MSFC SHE Program Core Program Requirements (CPRs). During (or for the duration of) the construction, alteration, demolition and/or repair of this contracted effort shall:

_____

(company name)

CPR 1 – Management Leadership and Employee Involvement

1. Provide a visible management commitment, policy, and culture that value the safety and health of employees and provides a safe and healthful workplace free from incidents and injuries.

2. Protect MSFC property and the environment over the duration of this contracted effort.

3. Perform work activities and operations in compliance with EPA, OSHA, NASA, MPR 8715.1 and all MSFC SHE documents listed in 1.02B that contain requirements applicable to this contracted effort.

4. Hold supervisors and employees accountable to perform their work activities in a safe and healthful manner and also understand their roles and responsibilities in the SHE Program.

5. Authorize and provide the necessary resources for the elimination, reduction or for controlling identified hazardous conditions to a safe working level.

6. Evaluate the safety performance of subcontractors or teammates prior to their selection to perform any work in support of this contracted effort, where applicable.

7. Flow down responsibilities and requirements contained in this contracted effort to subcontractors and teammates over the duration of this contracted effort, when applicable.

8. Provide SHE meetings/toolbox meeting/safety awareness training to employees at least weekly and document. (**NOTE**: Contractors shall maintain documentation of these meetings and provide to the Government, upon request).

9. Maintain the SHE Plan current with contract, NASA and MSFC requirements, review and update as necessary. Provide the frequency of this review.

10. Provide the identification, by title, of the individual assigned by the contractor to be responsible to

implement the contractor's SHE program elements and designated to serve as the day-to-day SHE Point of Contact (POC) for this contracted effort. [**NOTE:** The names of these employees shall be posted on the attached Emergency Phone listing.]

CPR 2 – Worksite Analysis

11. Evaluate work areas, jobs and operations by the use of job hazard analysis, safety or risk assessments, or hazard identification safety checklists to identify hazardous conditions and implement the appropriate control measures to eliminate, reduce or control hazardous conditions to an acceptable safe working level.

12. Reevaluate work areas, jobs and operations when significant changes are made to verify that existing control measures are still effective in controlling the hazardous conditions. (**NOTE 1**: This also includes evaluating health conditions to identify and prevent an occupational disease.) (**NOTE 2**: Contractors shall maintain documentation of these evaluations and provide to the Government, upon request).

13. Perform worksite safety inspections of the worksite at least weekly and document. (**NOTE**: Contractors shall maintain documentation of these inspections and provide to the Government, upon request).

14. Encourage employees to report any condition that they feel is hazardous or unsafe without the fear of reprisal from management.

15. Report all contractor mishaps and close calls that occur in support of this contracted effort and investigate to the extent necessary to determine the proximate or root cause(s), develop and implement corrective actions, and track to closure in accordance with MWI 8621.1. Contact the CO, FMO Project Manager or MSFC Industrial Safety Branch for assistance if needed.

16. Perform post-mishap drug and alcohol testing when the initial mishap investigation provides reason to believe an employee's actions or failure to perform a required action is reasonably suspected of having caused or contributed to causing the mishap in accordance with NPR 3792.1, "Plan for Drug-Free Workplace."

CPR 3 – Hazard Prevention and Control

17. Perform a supervisor level review for work activities identified as hazardous or safety critical prior to them being started.

18. Perform work at MSFC in full compliance with the MSFC SHE documented programs listed in 1.02B that contain requirements that are applicable to this contracted effort while working onsite at MSFC (e.g., Personal Protective Equipment (PPE), Respiratory Protection, Hazard Communication, Confined Space Entry, Lockout/Tagout, Bloodborne Pathogens).

19. Provide an emergency management program at the worksite for all types of emergencies that can occur during this contracted effort (e.g., fire, chemical spill, accidents, natural disasters). (**NOTE 1**: Contractors located at the Center, when applicable, should contact their Contracting Officer or Contracting Officer Representative for additional instructions.) (**NOTE 2**: A list of emergency phone numbers and points-of-contacts is recommended to be posted at the worksite for employee reference.)

20. Provide the necessary safety, health, and environmental services at the worksite (i.e., hazardous waste disposal, industrial hygiene monitoring, emergency medical support, hearing conservation program, respiratory protection, and hazard communication, etc.). Provide a list of environmental and health services that will not be provided by MSFC.

21. Provide a worksite that is easily identified, clearly separated from other ongoing activities in the same

general area and effectively barricaded to prevent accidental entry into the worksite by unauthorized employees.

22. Provide protection against damage for structures, utilities, sidewalks, pavements, and other facilities that are immediately adjacent to excavations.

23. Provide fall protection to employees that will be walking/working surfaces with unprotected sides or edges where the potential exists for them to fall to the next lower level in accordance with 29 CFR 1926.501, 29 CFR 1926.502, 29 CFR 1910.23 and MPR 8715.1.

24. Develop a "site specific (building) fall protection plan" when a conventional fall protection system cannot be used to provide fall protection at the worksite and submit for approval to the COTR and MSFC Industrial Safety Branch (ISB) in accordance with 29 CFR 1926.501(k) and MPR 8715.1.

25. Develop operating procedures/instructions for operations identified as hazardous or safety critical, or when directed by MSFC ISB, EEOH or FMO.
[**NOTE**: The operating procedures/instructions shall be documented, clearly identify the potentially hazardous situations, the mitigation techniques necessary to control the concern/hazard, and made available to the Government upon request.]

CPR 4 – Safety, Health and Environmental Training

[NOTE: The preferred method documenting an employee's training is to provide a certificate of training that contains (1) the name of the training, (2) date the training was provided, (3) name of the company that provided the training, and (4) the employee's name that indicates the employee attended the training and met all training requirements. In cases where a certificate of training is unavailable for an employee the Contractor can elect to provide an alternate documentation of employee training. The alternation documentation shall (1) be written on a document that contains the company letterhead, (2) rationale that clearly states why the employee is considered as trained, knowledgeable, experienced, and qualified to perform the job/operation, and (3) signed and dated by an a company official or supervisor. In either case the Contractor is assuming the responsibility that the employee is trained, knowledgeable, experienced, and qualified to perform the job/operation in a safe and healthful manner.

26. Provide training to employees so they are informed, knowledgeable and are able to recognize hazardous conditions in the workplace and the signs and symptoms of workplace-related illnesses, understand the safe work practices and procedures to be used in the workplace, and are empowered and authorized to "stop or halt" any activity when they have reason to suspect the activity is being performed in an unsafe or unhealthy manner in accordance with 29 CFR Part 1926.21(b)(2). [NOTE: This training can be accomplished during a safety (toolbox) meeting and evidence of this training made available to the Government upon request.]

27. Clearly communicate to all employees the contractor's disciplinary policy/program, so that each employee fully understands the actions that can be taken by the contractor when an employee is discovered not following safety, health, and environmental policies, procedures and rules, and the disciplinary actions are warranted.

28. Evaluate each job/operation performed by contractor employees to identify the specific training required by the applicable parts of 29 CFR 1910 and 29 CFR 1926, and provide the specific training to employees prior to them performing the job/operation.

a. Operate Contractor owned equipment and machinery in accordance with 29 CFR 1926.20(a)(4)

b. Handle or use poisons, caustics, and other harmful substances in accordance with 29 CFR 1926.21(b)(3).
c. Enter into confined or enclosed spaces in accordance with 29 CFR 1926.21(b)(6). [NOTE: At MSFC all manholes associated with water, sewer, steam, electrical, communication or any other utility are considered permit-required confined spaces and must be treated as such for entry. This includes provisions such as, but not limited to, written confined space program, documentation of appropriate training, atmospheric testing and retrieval equipment.]
d. Operate any MSFC owned lifting equipment (forklift, crane, etc.) in accordance with MWI 3410.1.
e. Perform rigging and hoisting operations in accordance with 29 CFR 1926.753-761 and 29 CFR 1910.178(l)6).
f. Perform operations adjacent to power lines in accordance with 29 CFR 1926.950-960.
g. Operate or use construction equipment considered as heavy equipment or machinery in accordance with 29 CFR 1926.600-606.
h. Wear personal fall arrest system in accordance with 29 CFR 1926.503.
i. Wear Personal Protective Equipment in accordance with 29 CFR 1910.132.
j. Designated as "qualified" to operate equipment and machinery, and perform the work activities that they have been assigned in accordance with the applicable parts of 29 CFR 1910 and 29 CFR 1926.
k. Designated as "competent person" for any operation identified in 29 CFR 1910 or 29 CFR 1926 that require a "competent person."

(**NOTE**: Contractors shall maintain documentation of this training and provide to the Government.)

29. Provide MSFC SHE Program Awareness Training to all employees within 30 days of the Authority to Proceed (ATP) or their arrival at the worksite. [**NOTE** 1: Contact Facilities Management Office (FMO) Project Manager or Industrial Safety Branch (ISB) to receive a copy of this training. **NOTE** 2: Contractors shall maintain a record of this training and made available to the Government, upon request.]

30. Provide MSFC Safety Certification to employees when required by the ISB or Environmental Engineering and Occupational Health (EEOH) Office. (**NOTE**: At the present time if the Contractor is expected to operate MSFC owned lifting equipment in accordance with MWI 3410.1 a MSFC Safety Certification is required.)

31. Inform all employees on the methods of how to report an emergency or accident while working at MSFC. [**NOTE**: Call 4-HELP (4357) and select the appropriate option. If using a cell phone call 911 and tell the operator you are located at Marshall Space Flight Center, provide building number and road name.]

CPR 5 – Environmental Management System

32. Comply with the MSFC Environmental Management System (EMS). The EMS provides the necessary training and procedures to ensure NASA's compliance with all environmental laws and regulations. Environmental procedures are as follows:

a. MPD 8500.1 "MSFC Environmental Management Policy"
b. MPR 8500.1 "MSFC Environmental Engineering & Occupational Health (EEOH) Program"
c. MPR 8500.2 "MSFC Environmental Management System"
d. MWI 8540.2 "Green Purchasing Program"
e. MWI 8550.1 "Waste Management"
f. MWI 8550.2 "Storm Water Management"
g. MWI 8550.3 "Wastewater Compliance"
h. MWI 8550.4 "Air Emissions Compliance"
i. MWI 8550.5 "Hazardous Material Management"

[**NOTE**: Coordination with EEOH is required.]

ADDITIONAL REQUIREMENTS

Pre-work Inspections

33. Erect and inspect scaffolds prior to use each day in accordance with 29 CFR 1926 Subpart L and 29 CFR Part 1910.66 and 29 CFR 1926.451(f)(3).

34. Dig, form and inspect excavations/trenches prior to entry and as needed throughout the day in accordance with 29 CFR 1926.651, 29 CFR 1926.652 and 29 CFR 1926.651(k).

[**NOTE**: Evidence of these inspections shall be documented and made available to the Government upon request.]

Equipment and Tools

35. Provide Contractor owned or rented hoisting equipment (cranes and forklifts) that have their rated load capacities conspicuously posted on the equipment in accordance with 29 CFR 1926.550(a)(2) if brought on MSFC.

36. Provide Contractor owned or rented motorized vehicles and lifting equipment that comply with the applicable requirements in 29 CFR 1910.178 – 184, 29 CFR 1926.606, 1000-1003, and 1501 if brought on MSFC. [**NOTE**: Documentation of equipment inspections shall be made available to the Government upon request.]

37. Provide a documented annual inspection for Contractor owned or rented hoisting equipment (cranes and forklifts) in accordance with 29 CFR 1926.550(a)(6) if brought on MSFC. [**NOTE**: Documentation of the annual inspection shall be made available to the Government upon request.]

38. Perform a visual inspection of each hoisting equipment (cranes or forklifts) prior to use in accordance with 29 CFR 1926.753(c)(1).

39. Remove any equipment, machinery or tools if it is discovered to be in an unsafe operating condition in accordance with 29 CFR 1926.20 (a)(3).
[**NOTE**: Equipment, machinery or tools discovered in an unsafe operating condition shall be removed from the worksite or identified (tagged) as unsafe, or rendered inoperable by the use of a lock.]

40. Provide a reverse signal alarm on all self-propelled construction equipment in accordance with 29 CFR 1926.601. [**NOTE**: This is not required for light service vehicles.]

41. Locate and store equipment and materials outdoors so to not cause possible damage to other buildings or structures during severe weather.

Electrical Equipment

42. Provide power portable tools that are double-insulated or grounded by means of a 3-wire polarity type grounding system via a ground fault interrupter in accordance with 29 CR 1926.302.

43. Provide ground-fault circuit interrupters (GFCI) on all single-phase 15 and 20 ampere receptacle outlets used by employees at the worksite during the construction in accordance with 29 CFR 1926.404(b)(1).

44. Provide cord sets and receptacles that are equipped with a grounding plug and are grounded in accordance with 29 CFR 1926.404(b)(1). [**NOTE**: This applies to cord sets and receptacles that are not part of the permanent building structure.]

45. Apply lockout devices to equipment and systems when required in accordance with 29 CFR 1910.147, 29 CFR 1926.417 and MWI 8715.2. [**NOTE** 1: At MSFC all locks used for locking out equipment/system while an employee is working on the equipment/system shall be identified by a "red" colored case. These lockout devices shall also be identified with tags containing "red diagonal stripe". Reference MWI 8715.2 for more information.] [**NOTE** 2: Work on energized equipment is strictly prohibited at MSFC, but occasionally a situation will arise where this is not possible. In these situations an Energized Electrical Work Permit shall be required. Contact FMO for more information.]

Lighting

46. Provide adequate lighting (permanent or temporary) in the work area that enables employees to safely perform their jobs/operations in accordance with 29 CFR 1926.26.

Fire Protection

47. Provide fire protection equipment that is appropriate for the work being performed at the worksite in accordance with 29 CFR 1926.24. [**NOTE** 1: Portable fire extinguishers are to be located at the worksite and accessible to employees.] [**NOTE** 2: Any employee that might use a portable fire extinguisher are to receive training in the general principles of fire extinguisher use and the hazards involved with incipient stage firefighting in accordance with 29 CFR 1910.157.]

Barricades

48. Erect barricade fencing that is effective in preventing unauthorized entry around the worksite and hazardous conditions such as excavations, trenches, etc. in accordance with 29 CFR 1926.200 -203, Subpart G.
[**NOTE**: Orange mesh barricade fencing is the preferred method for construction at MSFC, but other means (signs, signals, tags) of warning employees are also acceptable. The FMO inspector or ISB can provide more information.]

49. Provide protection against damage for structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations.

Personal Protective Equipment

50. Communicate Personal Protective Equipment (PPE) requirements to employee whose jobs/operations can expose them to hazardous conditions in accordance with 29 CFR 1926.28 and MWI 8715.15.
[NOTE: The communication can be by the use of signs posted at the worksite that clearly identify the type PPE and when it is required to be worn.]

Personal Fall Arrest System (PFAS)

51. Provide a system that ensure PFAS and associated positioning device systems are inspected prior to each use in accordance with 29 CFR 1926.502(d)(21) and 29 CFR 1926.502(e)(9).

52. Provide a system that ensures PFAS are inspected at least on a semi-annual basis by a Competent or Qualified person in accordance with ANSI A10.32 (2004) section 6.3).
[**NOTE**: Documentation of equipment inspections shall be made available to the Government upon request.]

Housekeeping

53. Remove all scrap lumber and debris from work areas, passageways and stairs in accordance with 29 CFR 1926.25(a).

54. Remove combustible scrap and debris from the worksite at regular intervals in accordance with 29 CFR 1926.25(b).

55. Provide waste/trash containers at the worksite empty them at regular intervals in accordance with 29 CFR 1926.25(c). [**NOTE**: Containers for garbage and other oily, flammable, or hazardous wastes, such as caustics, acids, harmful dusts, etc. shall be equipped with covers and the covers kept closed.]

Permits/Plans

56. Obtain the following abatements/impairment plans when needed for:

Lead removal – 29 CFR 1926.62
Asbestos removal - 29 CFR 1926.1101
Fire Protection system outages – 29 CFR 1926.150 and MWI 8715.11

57. Obtain the following permits when needed:

- Hot Work Permits (MSFC Form 1155) shall be required for activities that are not performed in a MSFC Designated Hot Work Area and use an “open flame”, welding, cutting, grinding, Tar Kettles. etc.
  [**NOTE**: All hot work shall end 1 hour prior to the end of the normal work day.]
- Digging Permit (MSFC Form 4392) shall be required for all excavations and trenching
- Confined Space Entry Permit (MSFC Form 2519) shall be required for all entries in MSFC spaces identified as a confined space in accordance with MWI 1840.1.
- Energized Electrical Work Permit (MSFC Form 4462) shall be required if the equipment or system cannot be de-energized to perform work.
  [**NOTE**: No work shall be performed on energized equipment without concurrence from FMO and approval from ISB.]
- Air Emissions Permit (coordinate with EEOH 256-544-4246) shall be required if the equipment or process emits fumes, smoke, particles, dust, chemicals, or other emissions into the air. If the following equipment is installed on site, it shall be evaluated for air emissions permit requirements before installation:
  - Fuel burning equipment (examples: boilers, incinerators, generators, engines, etc)
  - Paint booths
  - Sand/Grit blasters
  - Surface coating equipment

- Machine shops
- Woodworking shops
- Chemical baths, vapor degreasers, solvent cleaning equipment/operations
- Air strippers/water purification
- Tanks containing Volatile Organic Chemicals (VOC's) (examples: gasoline tanks, diesel tanks, etc.)
- Liquid rocket engine, solid motor, or component testing
- Vapor degreasing
- Laboratory equipment
- Equipment for melting or applying wax
- Hydraulic or hydrostatic test equipment
- Brazing, soldering, or welding
- Non-digital photography
- Exhaust/fume hoods
- Parts Washers

- Storm Water Permit

General

58. Instruct all employees on the methods to receive emergency medical attention at MSFC in accordance with 29 CFR 1926.23 & 50. [**NOTE**: First aid is available to all employees at the MSFC Medical Center, building 4249 for job related illnesses and injuries.]

59. Identified employee(s) to serve in the role of a "Competent person" for pre-job inspections/verifications/activities (scaffolding, trenches, etc.) as required by the applicable subparts of 29 CFR 1910 and 29 CFR 1926 for this contracted effort. [**NOTE** 1: A "competent person" is identified in 29 CFR 1926.32 and 29 CFR 1910 as "capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who have authorization to take prompt corrective measures to eliminate them."] [**NOTE** 2: Justification/rational of selecting these employees shall be documented (employee's training, work experience and knowledge of the job/operation) and made available to the Government upon request. The name(s) of the "Competent person(s) and the corresponding job/operation for which that are designated to serve as the "Competent person" shall be listed on the attached Emergency Phone listing, Appendix C and posted at the project site or designated meeting area where the worker gather prior to commencing work.]

60. Appoint an employee to be "in charge and responsible" and is physically located onsite while work is being performed. [**NOTE**: This is normally a job superintendent or foreman.]

61. Provide a list of company employee(s) to be contacted in the event of an emergency while work is performed onsite under this contracted effort.

62. Post the "Emergency Phone List" Appendix C at the project site, or a designated meeting area where workers gather prior to commencing work, or for other activities. The "Emergency Phone List" can also be located in company vehicles if the Contractor does not have a designated meeting area.

63. Provide additional requirements not previously listed, if required, specific to the work performed under this contracted effort in Appendix A.

64. Instruct employees to adhere to the MSFC emergency procedures when there is a probability of exposure to Unexploded Ordnance (UXO), hazardous or radiological material.

65. If Unexploded Ordnances (UXO) are suspected of being in the worksite notify the FMO Construction Management Inspector to contact the UXO services organization to perform an assessment/investigation of the worksite in accordance with the MSFC Technical Specifications for Repair and Construction (TSRC) section 01 10 50.

REPORTS/DOCUMENTATION SUBMITTAL

Reports/documentation listed below shall be made available to the Government upon request.

1. Safety (toolbox) meeting and/or safety awareness training documentation
2. Safety Assessments: Hazard Analysis (HA) or Job Hazard Analysis (JHA), Hazardous Inventory Checklists (HIC) for the work being performed
3. Worksite inspections conducted by the contractor documentation
4. Employee training/qualification/certification records
5. Equipment inspections conducted by the contractor documentation
6. Safety Data Sheets (SDS) for chemical and hazardous materials
7. Storm water inspection reports
8. Green purchasing reports
9. Construction Best Management Practices Plan (CBMPP)
10. Waste Management plan
11. Waste reduction report

SUBMISSIONS FREQUENCY

1. Submit MSFC Contractor Accident and Safety Statistics (MSFC Form 4371) or an equivalent method to the Contracting Officer (CO) or FMO representative designated by the CO. This information shall be provided to the CO in accordance to the reporting requirements and frequency determined by the CO. At a minimum the following information shall be provided:
   - Contract number
   - North American Industry Classification System (NAICS)
   - Number of employees and supervisors
   - Number of hours worked during the month
   - Lost work day cases, days away from work, and restricted work days
   - Number of safety meeting and worksite inspection

2. Initial reporting for Type A, Type B, High-Visibility Mishaps and Close Calls – The initial reporting for these types of mishaps/close call **shall be made as soon as possible after initiating emergency response, but no later than one hour of occurrence or awareness.**

2.1 Initial reporting for Type C, Type D, Low-Visibility Mishaps and Close Calls– The initial reporting for these types of mishaps/close calls **shall be reported as soon as possible after initiating emergency response, but no later than four hours of occurrence or awareness.**

2.2 Initial report shall be made to the MSFC ISB by one of the following: 1) Call the Safety Hotline at (256)-544-0046 or 4-HELP (4-4357), select the appropriate option, or 2) Submit a "SHE Report" located on "Inside Marshall," or 3) Direct input to the NASA Incident Reporting Information System (IRIS) Quick Incident Report located at https://nasa.ex3host.com/irisquickincident/safety_default.asp., or 4) an equivalent electronic notification method to the MSFC Industrial Safety Branch.

The link to the "SHE Report" is located at the bottom of the "Inside Marshall" web page under the "MSFC Safety Reporting System" link. Open "SHE Reporting," select "Continue to SHE Report Form," select "Category," select "Incident or Mishap" and enter all the required information,

2.3 The initial reporting for all mishaps/close calls shall include 1) location and time of incident, 2) number of fatalities and/or hospitalized employees (if known), 3) Company or MSFC organization contact person and phone number, 4) a brief description of the mishap/close call including damage to equipment and/or facilities.

3. Follow-up reporting and documentation of a mishap/close call shall be within 24 hours of initial notification to the FMO Incident Reporting Information System (IRIS) administrator or ISB in accordance with MWI 8621.1.

The extent of investigation to determine the root cause of the mishap or close shall be conducted in accordance with MWI 8621.1.

Approval Signatures

By signing this Alternate SHE Plan the Contactor confirms their agreement and commitment to (1) provide a workplace that is incident and injury free, and (2) to adhere to and comply with all of the requirements contained in MPR 8715.1, MWI 8621.1 and other MSFC SHE documents identified above as applicable to the jobs/operations associated with this contracted effort while working on MSFC.

Contract Number: _____

Company Name: _____

Company Onsite Superintendent/Foreman

(print):_____

(signature):_____Date:_____

Company Onsite SHE representative

(print):_____

(signature):_____Date:_____

APPENDIX A
Additional Information

List of jobs/operations identified as hazardous or safety critical.
List of hazardous operating procedures/instructions
List of JHA, Risk Assessments, or Hazard Identification Safety Checklists
List additional requirements that are specific to the work performed under this contracted effort, if necessary.

1.

2.

Appendix B
Applicable Documents

"Check the box" of the following MSFC SHE Program documents that are **NOT** applicable to the work being performed under this contracted effort.

No.		**Federal Directives and Standards**
1		29 CFR Part 1910, Department of Labor, Occupational Safety and Health Administration Standards for General Industry
2		29 CFR Part 1925, Safety and Health Standards for Federal Service Contracts
3		29 CFR Part 1926, Department of Labor, Occupational Safety and Health Administration Standards for Construction
4		CFR Title 40 Parts 1-1068, Protection of the Environment
5		ANSI Stds., American National Standards Institute, applicable to the scope of this contract (ANSI 10.32)
6		ASME, American Society of Mechanical Engineers, applicable to the scope of this contract
7		NFPA, National Fire Protection Association
8		CGA, Compressed Gas Association, applicable to the scope of this contract
		NASA Directives
9		NPR 3792.1, Plan for a Drug-Free Workplace
10		NPR 8715.1, NASA Occupational Safety and Health Programs
11		NPR 8715.3, NASA General Safety Program Requirements
		MSFC Directives
12		MPR 1800.3, MSFC Sanitation Program
13		MPR 1840.4, MSFC Asbestos Program
14		MPR 1860.1, MSFC Radiation Safety Procedural Requirements
15		MPD 1860.2, Radiation Safety Program
16		MPR 1860.2, Nonionizing Radiation Safety
17		MPR 3410.1, Training
18		MPD 8500.1, MSFC Environmental Management Policy
19		MPR 8500.1, MSFC Environmental Engineering and Occupational Health Program
20		MPR 8500.2, MSFC Environmental Management System (EMS)
21		MWI 1800.1, MSFC Occupational Medicine
22		MWI 1810.1, Automated External Defibrillator (AED) Program
23		MWI 1840.1, Industrial Hygiene Program
24		MWI 3410.1, Personnel Certification Program
25		MWI 8540.2, Green Purchasing Program
26		MWI 8550.1, Waste Management
27		MWI 8550.2, Storm Water Management
28		MWI 8550.3, Wastewater Compliance
29		MWI 8550.4, Air Emissions Compliance
30		MWI 8550.5, Hazardous Material Management
31		MWI 8621.1, Mishap and Close Call Reporting and Investigation Program
32		MPR 8715.1, Marshall Safety, Health, and Environmental (SHE) Program

33		MWI 8715.1, Electrical Safety Program
34		MWI 8715.2, Control of Hazardous Energy (Lockout/Tagout) Program
35		MWI 8715.5, Area/Building Manager Program
36		MWI 8715.10, Explosives, Propellant, and Pyrotechnics Program
37		MWI 8715.11, Fire Safety Program
38		MWI 8715.12, Safety, Health and Environmental-Finding Tracking System (SHEtrak)
39		MWI 8715.13, Safety Concerns Reporting System (SCRS)
40		MWI 8715.15, Ground Operations Safety Assessment Program
41		MWI 8715.17, Hazardous Operations Readiness Review Program
42		For Construction - Indefinite Delivery Indefinite Quantity (IDIQ) and Blanket Purchase Agreement (BPA) – MSFC Technical Specifications for Repairs and Construction (TSRC)
43		For Construction – Construction of Facilities (CoF) – MSFC Master Specs

APPENDIX C
MSFC EMERGENCY TELEPHONE LIST

[Post at worksite or a designated meeting area where workers gather prior to commencing work or for other activities. The "Emergency Phone List" can also be located in company vehicles if the Contractor does not have a designated meeting area.]

MSFC NETWORK TELEPHONE		**OTHER TELEPHONE**
AMBULANCE	911	911- Specify at MSFC or 544-4357, Option (Security)
CHEMICAL SPILLS	911	544-4357, Option (Security)
Environmental Engineering Office		544-4246
FIRE	911	876-2117
SECURITY	911	544-4357, Option (Security)
MEDICAL CENTER (bldg 4249)		544-2390

[Identify that you are on MSFC property if using a cell phone and give location, building number, road, intersection, etc. if known.]

TO REPORT UNSAFE, UNHEALTHFUL OR ENVIRONMENTAL CONCERNS

OCCUPATIONAL HEALTH SERVICES	544-2390
ENVIRONMENTAL ENGINEERING OFFICE	544-4246
INDUSTRIAL SAFETY BRANCH	544-0046

TO REQUEST A PERMIT

Welding/Burning/Cutting Permits	544-0046
Inside Test Area	544-7374, 961-1178
CONFINED SPACE PERMITS (call all numbers listed below)	
Occupational Health Services	544-2390
Industrial Safety Branch	544-0046
Inside Test Area	544-7374, 961-1178
Fire Department	876-3437
Digging Permit	544-6759

Company Name:	
Company Emergency Contact:	Phone:
Company Emergency Contact:	Phone:
Company Emergency Contact:	Phone:
Company SHE POC:	Phone:
Competent SHE POC (Alt)	Phone:
Competent Person – Lifting Equip:	Phone:
Competent Person – Excavation/Trench:	Phone:
Competent Person - Scaffold:	Phone:
Competent Person - Rigging:	Phone:
Competent Person:	Phone:
Competent Person:	Phone:

SECTION 01065 – ENVIRONMENTAL COMPLIANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Related Section include the following:

1. Division 1 Section “Construction Waste Management” for administrative and procedural requirements for recycling non-hazardous construction waste and disposing of hazardous construction waste.

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01330, “Submittal Procedures,” in sufficient detail to show full compliance with the specification:

A. Material Data: Material Safety Data Sheets (MSDS) and Chemical Inventory Worksheet (MSFC Form 4099) for all hazardous materials brought on site shall be submitted to the Government initially and as volume changes occur.

B. Submit Site Specific Construction Best Management Practices Plan (CBMPP) (Attachment A for sites less than 1 acre) or Site Specific CBMPP (Attachment A and B for sites greater than 1 acre) for AD10 approval prior to on-site work start.

C. Training Records: Provide documentation for Hazardous and Controlled Waste Generator training and Chemical Inventory training.

D. Closeout Submittals: Submit Inspection Records at the end of the project for review and approval.

E. Record and report purchases for EPA guideline items containing recycled materials (para. 3.7D)

F. Monthly Submittals (by the 10^{th} for the previous month): Stormwater Inspection Records, EPA guideline items.

G. Permits and Notices: Submit within 10 days a copy of any and all permits and notices received or granted.

H. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

I. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

J. Qualification Data: For Waste Management Coordinator, Qualified Construction Planner, and Qualified Construction Inspector.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Off-site removal of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Inspection: Examining satellite accumulation points to ensure compliance with the State of Alabama Regulations. Examining site conditions, records, and plans for compliance.

E. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

F. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

G. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

H. Waste Stream: A generation of a spent/waste hazardous or recyclable material that requires either recovery or disposal in accordance with appropriate environmental, NASA, Federal, State and local laws and regulations.

PART 2 - PRODUCTS

2.1 ACCUMULATION CONTAINERS

A. Hazardous Waste Accumulation containers will be provided by the Government. The containers shall be requested by the Contractor three days in advance of the initial need date. The containers will be labeled by the Government. The Contractor shall ensure that the accumulation containers are secured such that the containers shall not be exposed to vehicular traffic. The Contractor shall turn-in the containers when ninety percent (90%) of the rated volume of each container is used for liquid waste. Containers of solid waste may be filled to hundred percent (100%). At the time of turn-in, the Contractor shall identify if a replacement container is required. The Contractor shall ensure that hazardous and controlled waste is segregated and labeled by type in different accumulation containers.

PART 3 - EXECUTION

3.1 HAZARDOUS WASTE GENERATOR NOTIFICATION AND TRAINING

A. The Contractor shall designate a person as point of contact (POC) and as many as two alternate people for each hazardous and controlled waste accumulation site. The POC's shall be responsible for maintaining the Contractor's accumulation site in compliance with all applicable Federal, State and local laws and regulations. The Contractor shall send the POC to the first available Hazardous and Controlled Waste Generator training after initiation of the contract. The training is conducted on site by the Government at no cost to the Contractor. The training shall be attended annually by all POC's and alternates. Government personnel will inspect the accumulation site(s) to ensure compliance.

3.2 HAZARDOUS MATERIAL NOTIFICATION AND TRAINING

A. The Contractor shall submit Material Safety Data Sheets (MSDS) for all hazardous materials brought on site to the Government as defined by Federal Standard 313. The Contractor shall maintain a copy of all MSDS at the job site. The Contractor shall submit a Chemical Inventory Worksheet, MSFC Form 4099 for all hazardous materials to be brought on site. The inventory will be submitted to the Government prior to delivery of material on site. MSFC Form 4099 can be obtained from the Government. The Contractor shall maintain a copy of all Chemical Inventory Worksheets at the job site. The Contractor shall send a POC to the first available Chemical Inventory training after initiation of the contract. The training is conducted on site by the Government at no cost to the Contractor. The training shall be attended annually. The Contractor is responsible for assuring that all personnel working in the area are made aware of the chemical hazards associated with chemicals located at the jobsite.

3.3 HAZARDOUS AND CONTROLLED WASTE COLLECTION

A. The Contractor shall notify the Government of hazardous and controlled wastes being generated. The Government will determine the correct method of disposal. The following types of hazardous and controlled waste are commonly associated with construction projects; however, it is not necessarily an all inclusive list. All hazardous and controlled wastes shall be collected and placed into accumulation containers for disposal.

1. All fluorescent light ballasts.
2. High Intensity Discharge (HID) mercury bulbs.
3. Free oil liquids and oil filters. Oil rags that are not saturated (no free liquids dripping) shall be disposed as solid waste.
4. Paint cans, paint, and paint thinners.
5. Sandblast material from tanks, equipment, and piping.
6. Materials used for cleaning and degreasing of equipment, tanks, and piping.
7. Paint chips from waterblasting operation, scraping, sandblasting, grinding, demolition, etc. shall be collected on a daily basis. Materials to be recycled will be free of loose lead paint chips prior to recycling.
8. Aerosol cans.

B. The Contractor shall adhere to Government guidelines for inspections, collection, and turn-in of waste materials.

3.4 EMPTY CONTAINER MANAGEMENT

Empty hazardous material containers shall be turned into the Government. The Contractor shall ensure the containers are empty using practices commonly employed to remove materials from that type of container such as pouring, pumping, and aspirating. Clean and purge/triple rinse all empty containers as required by the Government. Assure bungs and/or tops are secured prior to storage/turn-in. Empty containers shall not be stacked more than two high for any size container on pallets. Containers that are damaged and will not seal shall be taped over the damaged area or turned upside down to prevent rainwater collection. Empty containers shall be turned in frequently, as determined by the Government.

3.5 CONSTRUCTION BEST MANAGEMENT PRACTICES PLAN (CBMPP)

A. Construction Best Management Practices Plan (CBMPP) (**Site disturbing less than 1 acre**): The Contractor shall prepare, submit, and have approved a CBMPP in the format provided in Attachment A prior to work commencing on site. The Contractor will implement the CBMPP throughout the duration of the construction.

B. Construction Best Management Practices Plan (**Site disturbing greater than 1 acre**): The Contractor shall prepare, submit, and have approved a CBMPP on ADEM Form 498 (http://www.adem.state.al (ADEM Forms)) and include the information from Attachment A and B prior to work commencing on site. The Contractor will implement the CBMPP throughout the duration of the construction. This site specific CBMPPs must be prepared in accordance with ADEM Administrative Code 335-6-12-.21 by a Qualified Credential Professional (QCP).

C. Stormwater Inspection Record: The Contractor shall perform daily inspections of hazardous waste containers, hazardous materials containers, empty containers, vehicles and equipment, and erosion and sediment controls. The daily inspection will be documented in a similar format as shown on Stormwater Inspection Record (available from the Government), or other format acceptable to the Contracting Officer. The inspection documentation will be maintained and available at the site for periodic verification of compliance by the Government and will be submitted to the Government upon completion of construction.

D. Inspections: When no work is being conducted (e.g., weekends, holidays, etc.), no inspection is necessary. The Contractor shall ensure that the site is in compliance with Center General Stormwater Permit and the CBMPP.

The Contractor shall inspect daily, unless otherwise noted, hazardous waste containers, hazardous material containers, empty containers, vehicles and equipment, and erosion and sediment controls (monthly) for:

1. Containers protected from traffic.
2. Containers labeled.
3. Storage area neat and orderly.
4. No spillage from material handling.
5. Containers sealed, during inactivity.
6. No damaged pallets.

7. No damaged containers.
8. Spill kits available.
9. Containment system in good condition.
10. Containment valves closed.
11. Containment system water managed appropriately.
12. Fluid leaks from vehicles and equipment.
13. No signs of excessive erosion (monthly).
14. Erosion controls are effective and in good condition (monthly).
15. No sediment buildup in stormwater structures such as inlets, ditches, etc. (monthly).

E. Deficiencies and Inspections: All deficiencies noted during the contractor's Stormwater Inspection must be corrected promptly to be in compliance with the Center's General Stormwater Permit.

F. Stormwater Discharge Permit Modification: Prior to any construction activities including clearing, grading, and excavation resulting in the disturbance of more than 1 acre of total land area (includes equipment parking, access roads, laydown yards), the Government must be notified to ensure that the project is incorporated into the Center's General Construction Stormwater Permit. Work shall not proceed until the contractor has submitted the information outlined in Attachment B to the government and the government has made the appropriate notifications to the Alabama Department of Environmental Management.

3.6 SPILLS OF HAZARDOUS MATERIALS

A. The Contractor shall activate the MSFC Emergency Plan by dialing 911 with a MSFC phone or by dialing 544-4357 (MSFC Security Office) with any phone for hazardous materials spills that cannot be cleaned up with Contractor spill kits. The Contractor is responsible for costs incurred in cleaning up spills. The Government will determine the correct disposal method for spilled materials. The Contractor shall maintain spill kits for the type of hazardous materials used at the construction site.

3.7 PRODUCTS CONTAINING RECOVERED MATERIALS

A. The Resource Conservation and Recovery Act (RCRA) and Executive Order 13101, "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition," require the use of recovered/recycled ("recycled") materials in products to the greatest extent practicable. Additionally, the Environmental Protection Agency (EPA) established guidelines for various items.

B. Technical Specifications: The Contractor shall determine from the technical specifications listed for construction products on the EPA's website (http://www.epa.gov/cpg/products.htm) what products require recycled material content and purchase accordingly.

C. Non-Compliance Report: Whenever a product is required to contain recycled material by the technical specification but cannot be procured as specified, the Contractor shall notify the COTR by submitting a product substitution request per the section entitled "Product Requirements" with a Contractor-signed letter explaining in detail what suppliers and manufacturers were contacted and why the product cannot be procured as specified. An internal

waiver (MSFC Form 4412), coordinated with the COTR, is required prior to procuring the non-compliance product.

D. Product Reporting: The Contractor shall submit a monthly report itemizing and accounting for the products incorporated into the work as delineated below. The accounting shall include all products that meet the EPA guidelines whether specified or not and additional data as indicated below. A monthly report shall be submitted each contract month beginning the first month a product is incorporated into the work. The report is due on the 10th of the month following the report month. Dollar amounts shall include actual product cost incurred, as in purchase price. Products to be reported include:

1. Cement and Concrete Products: Cement and concrete products ("concrete"), including flowable fill, containing fly ash and granulated blast furnace slag (slag). Total cubic yards of cement incorporated into the work by the Contractor as well as a breakdown as to cubic yards of concrete with fly ash and cubic yards with slag.
2. Building Insulation Products: Total quantity and dollar amount of building insulation products purchased and/or used containing recycled materials as specified.
3. Structural Fiberboard and Laminated Paperboard: Total quantity and dollar amount of structural fiberboard and laminated paperboard purchased and/or used containing recycled materials as specified.
4. Carpet (Low and Medium Wear Polyester Fiber Only) and Carpet Cushion: Carpet for MSFC projects is typically Government-furnished, High Wear, and has the cushion adhered to the carpet. The Contractor shall not include Government-furnished carpet in his accounting. However, the project may include carpet that is "Low and Medium Wear Polyester Fiber". If so, provide total quantity and dollar amount of carpet and cushion incorporated into the work and the dollar amount containing recycled materials.
5. Floor Tiles (Rubber and Plastic Only): Total quantity and dollar amount of rubber and/or plastic floor tiles purchased and/or used containing recycled materials as specified.
6. Patio Blocks (Rubber and Plastic Only): Total quantity and dollar amount of rubber and/or plastic patio blocks purchased and/or used containing recycled materials as specified.
7. Shower and Restroom Dividers/Partitions: Total quantity and dollar amount of shower and restroom dividers/partitions purchased and/or used containing recycled materials as specified.

3.8 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

3.8.1 Quality Assurance

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Waste Management Conference: Conduct conference at Project site. Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.

3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

3.8.2 Waste Management Plan

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of land-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.

2. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.

3. Recycled Materials: Include list of local receivers and processors, and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

5. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

3.8.3 Plan Implementation

A. General: Implement waste management plan as approved by the Government. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, and donated.
2. Comply with Division 1 Section "Special Conditions" for controlling dust and dirt, environmental protection, and noise control.

3.8.4 Salvaging Demolition Waste

Salvaged Items for Donation are permitted.

3.8.5 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

Solid Waste Disposal Authority, Huntsville, Alabama; 1-256-830-BINS.

C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

2. Inspect containers and bins for contamination and remove contaminated materials if found.

3. Stockpile processed materials in containers on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

4. Stockpile materials in designated areas. Do not store within drip line of remaining trees.

5. Store components off the ground and protect from the weather.

6. Remove recyclable waste off the Government's property and transport to recycling receiver or processor.

3.8.6 RECYCLING DEMOLITION WASTE

A. Metals: Separate metals by type.

1. Structural Steel and Siding: Stack members according to size, type of member, and length.
2. Remove bolts, nuts, washers, and other rough hardware.

B. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

C. Conduit: Reduce conduit to straight lengths and store by type and size.

D. Concrete and Masonry: Segregate block and concrete.

3.8.7 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site Clearing Wastes: Chip brush, branches, and trees on-site.

1. Use of chipped organic waste as organic mulch.

C. Wood Materials:

1. Clean Cut-offs of Lumber: Grind or chip into small pieces.

2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

   a. Use of clean sawdust as organic mulch.

D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.8.8 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to the Government.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials and dispose in accordance with Section 01059 – “Special Conditions” at the onsite landfill if permissible or dispose off the Government's property and legally dispose of them.

ATTACHMENT A - CONSTRUCTION BEST MANAGEMENT PRACTICES PLAN (CBMPP)
(For sites disturbing less than 1 acre)

Contract Information

Contractor: _____

Address: _____

Phone: _____

Construction Site Contact Name: _____

Construction Contract Number: NAS8-_____

General Information: Describe the planned construction project. Include a description of amount of disturbed land, expected duration, and location. Provide a site map or use the site map included on the design drawings detailing the construction site including general drainage areas and gradients, nearby landmarks (buildings, paved areas, etc.), erosion control measures, topography.

Construction Materials: Provide a general list of the types of chemicals, substances that will be used at the construction site.

Erosion and Sediment Controls: Describe any erosion and sediment controls necessary. These controls shall be implemented during the construction period to prevent or control the loss of soil from the construction site. The methods could incorporate structural practices and/or vegetative stabilization. Examples are mulching, checkdams, temporary downdrain structures, sediment barriers, etc.

ATTACHMENT B - SITE SPECIFIC CONSTRUCTION BEST MANAGEMENT PRACTICES PLAN
(For sites disturbing more than 1 acre)

General construction activities have the potential to affect storm water at MSFC. If a construction project has the potential to disturb >1 acre of land (including the creation of access roads, equipment parking areas, and laydown yards) the contractor must prepare a site specific CBMPP. The CMBPP must include Attachment A above and the following as a minimum:

- A detailed description of the site, including topography and surface and sub-surface soil types, and the nature of construction, including design plans.
- A description of the intended sequence of construction activities that will involve soil disturbance, including grubbing, excavation, grading, etc.
- Planned project phasing to minimize the surface area that is exposed at any one time.
- Estimates of the total area of the construction site and portion of that total that will be disturbed.
- Estimates, including calculations, of the runoff coefficients of the site before and after construction.
- Identification of receiving waters for storm water discharges on a USGS 7.5-minute topographic map
- Detailed descriptions of temporary and permanent site stabilization practices that will be employed, including schedule and site plan.
- Detailed descriptions of structural controls that will be employed at the site.
- Maps showing topography and drainage patterns (pre-and post-construction), existing and proposed structures, roads, utilities, ROWs, water bodies, property boundaries and ownership, boundaries of construction and soil disturbance, locations where structural controls will be implemented, locations where flow channels and/or sedimentation basins will be constructed, areas where permanent stabilization and revegetation will be implemented after construction, etc.
- Schedules for inspections to ensure that the site-specific BMPs are implemented and maintained.

END OF SECTION

SECTION 01070 – CONTRACTOR QUALITY ASSURANCE/QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This specification sets forth quality assurance/quality control requirements for the provision of materials, equipment, systems, inspections, tests, services, and construction of facilities and site improvements. The quality of work-in-progress and finished work is the responsibility of Contractor line management. These requirements provide for an effective system to ensure that contractual quality requirements and technical criteria are satisfactorily met.

1.2 RELATION TO OTHER CONTRACT DOCUMENTS

A. The requirements of this specification shall be fully complied with in close concert with the detail requirements of the technical specifications and all other contract documents. Overlapping and interfacing contractual requirements shall not result in duplication of Contractor efforts. The quality program shall effectively complement and support functions required by the technical specifications and other contract documents.

1.3 SUBMITTALS

A. The following shall be submitted in accordance with Section 01330, “Submittal Procedures,” in sufficient detail to show full compliance with the specification:

1. Preconstruction Submittals: The Contractor shall submit a detailed written statement describing procedures that will be implemented to achieve quality on the project according to the paragraph entitled, “Contractor’s Quality Assurance/Quality Control Plan.” The plan shall be submitted and approved by the Government prior to Notice to Proceed.
2. Contractor’s Quality Assurance/Quality Control Plan: Describe how the quality requirements of the specifications will be met using a detailed written statement and address each of the following:
    a. Delegation of Contractor‘s authorized representative responsible for quality assurance/control of contract work.
    b. The Contractor’s quality assurance/control plan and procedure for accomplishing and reviewing construction methods and controls, fabrication controls, certifications, documentation of quality control operations, inspections, and test records including those required for suppliers and subcontractors. Describe methods to be effected during the procurement cycle (order to deliver) for the selection of construction materials, suppliers, subcontractors, on-site and off-site fabrication and assembly of Contractor- furnished materials and equipment, work procedures, workmanship, and testing to ensure full compliance with plans, specifications, codes, regulatory requirements, and other contract documents.
    c. The Contractor’s program shall provide for a functional system to document that quality provisions of contract schedules, specifications, and drawings have been performed.

d. Training, certification(s), and re-certification(s) of personnel as required by the specifications.
e. Certification of materials, processes, or equipment as required by the specifications.
f. Qualification of procedures as required by the specifications.
g. Nondestructive testing requirements as required by the specifications.
h. Identification of independent certifying and testing laboratories to be used.

3. Records: Records shall include all quality control data; factory test plans/results, manufacturer's certifications, receiving inspections, deficiency correction reports; training/certifications; letter of authority or delegation; and routine technical test plans/results, i.e., hydrostatic, electrical continuity, grounding, welding, line cleaning, etc. Quality records shall be available for examination upon request by the designated Government representatives. The Contractor shall submit copies of tests plans/reports and data to Government's designated representative. Quality control records shall be maintained in a central on-site location. Maintenance of quality control records shall not relieve the Contractor from submitting samples, test data, detail drawings, material certificates, or other information required by each section in the specification.

1.4 QUALITY ASSURANCE

A. Qualifications: When approval or certification of special processes, operating personnel, and special equipment or procedures is required by the specifications, the Contractor shall obtain necessary approvals or certifications prior to starting the work.

B. Management and Organization: Contractor shall ensure effective execution of quality assurance/quality control functions and provide competent personnel with experience in quality assurance/quality control functions to provide supervision, inspection, and testing. Contractor shall be responsible for each of his suppliers and subcontractors. Contractor shall provide quality assurance oversight of suppliers and subcontractors and ensure that each provides effective quality control in the execution of their work. The program shall encompass management and supervisory actions that affect quality of all work-in-progress and finished construction work. The individual designated to direct the program shall report to the Contractor's management and shall have the necessary authority to discharge his responsibilities.

C. Identification and Data Retrieval: The Contractor shall have an identification and data retrieval system. Records, drawings, submittals, and equipment shall be identified to reference the following:

1. Contract Number
2. Contract Specification Number
3. Contract Drawing Number
4. Submittal Document Number
5. Contract Change Number
6. Contractor's Drawing Number System

D. Procurement: The Contractor shall be responsible for controlling procurement sources and those of his subcontractors to ensure that each purchase meets quality requirements. The Contractor shall ensure that his purchase documents include:

1. The basic quality requirements, standards, drawings, and specifications called out in the contract specifications.
2. Inspection and Test Characteristics.
3. Inspection and Test Records.
4. Operational and Maintenance (O&M) manuals, Instructions, Certifications of Compliance, and such other data as may be required by the specification.
5. Preservation, packaging, shipping directions.

E. When Government source inspection is required on a Contractor's purchase, the purchase document shall include the following statement: "All work on this order is subject to inspection and testing by the Government at any time and place. The Contracting Officer shall be notified immediately upon receipt of this order. The Contracting Officer shall be notified 72 hours in advance of the time articles or processes are ready for inspection or test."

F. Procurements that do not require Government source inspection shall include the following statement: "The Government reserves the right to inspect any or all of the materials included on this order at the Contractor's plant."

G. Required Government source inspections will be determined by the Contracting Officer. Government source inspections shall not replace Contractor inspections or relieve the Contractor of his responsibility for ensuring quality procurements and records verifying quality control activities.

H. Receiving Inspection System: Contractor shall maintain a receiving inspection system that ensures procured materials and equipment are inspected and tested as required by specifications, drawings, and approved submittal documents. Shipping/receiving inspection records will accompany each procurement delivery to the construction site. Maintain records of receiving inspections at the construction site by the Contractor. Records shall show defects, discrepancies, dispositions, and waivers, including evidence of Government source inspection.

I. Nonconforming Articles and Material Control: The Contractor shall control nonconformances discovered by the Contractor, subcontractors, suppliers or Government quality representatives to prevent their use and to correct deficient operations.

1. Contractor shall prepare a construction deficiency report for each instance comprising:
   a. A unique and traceable number.
   b. Identification of the nonconforming article or material.
   c. A description of the nonconformance and the applicable requirement.
   d. Cause or reason for the nonconformance.
   e. Remedial actions taken or recommended.
   f. Disposition of the nonconforming article or material.
2. The Contractor shall identify, mark, and segregate each nonconforming article for removal from the work area to prevent inadvertent use.
3. The Contractor shall monitor and correct deficient operations.

J. Fabrication, Process, and Work Control: The Contractor's procedures and controls shall be derived from stated requirements in contract specifications and drawings. The Contractor shall establish in-process inspections and ensure compliance with quality requirements that are not readily detectable or measurable by inspection and test of finished elements. Special processes may include, but are not limited to, concrete placement, piping system cleaning, plating, anodizing, nondestructive testing, welding, and soldering.

K. Drawings and Change Control: Drawing-control system shall be maintained to provide revised drawings and change distribution and removal of obsolete drawings from work areas. Changes involving interface with other work areas, or affecting articles or materials controlled by others shall be controlled by the Contractor. This system shall be integrated with the document requirements of the contract. Drawing changes shall be clearly specified. Accomplished changes shall be clearly identified and associated drawings shall be revised. Drawings that have been approved, or approved as noted, by the Contracting Officer shall be used for fabrication and inspection.

L. Quality Inspections: Government Inspections: Work performed under the general direction of the Contracting Officer will be subject to inspection by authorized representatives. No representative is permitted to change specifications or drawings without written authorization of the Contracting Officer. Government in-process and end-item inspections may, at the Government's discretion, be performed on site and/or at the Contractor's or subcontractor's facility by Government representatives. Government shall be notified with sufficient advance notice of Contractor work plans which will cover up or make inaccessible previously installed work which may require Government inspection, i.e., backfilling or encasing of any underground utility, concrete placement, etc. Failure to provide such notification may require the work be uncovered to inspect the work. Uncovering and restoration of the work shall be at the Contractor's expense. The Contractor's quality assurance/control program is subject to continuous evaluation, review, and verification by the Contracting Officer. The Contractor will be notified in writing of any noncompliance area and will be given 5 days to correct identified deficiencies.

M. Contractor's Quality Inspections: Contractor shall implement an inspection system. Documentation shall indicate quality control through records of inspections and tests. Contractor shall ensure that nonconforming products are discovered, documented, and controlled. Procedures eliminating future deficiencies shall be implemented. Contractor's quality assurance system shall include the following:

1. Single Contractor's representative responsible for on-site/off-site communication and operation of the inspection program.
2. Purchasing control system documenting project procurement to drawings, specifications, and approved submittals.
3. Receiving inspection system documenting inspections for each procurement verifying material and equipment is compliant with plans and specifications.
4. Documentation for handling and disposing of nonconforming components and materials.
5. Inspection records as required for each specific section of the specification and drawings.
6. Identification of test(s) to be performed, test procedures, test plans/reports, records, and independent organizations used.
7. Documenting and maintaining certification or re-certification of procedures, personnel, and equipment.
8. Management of Government-furnished equipment, components, and materials.
9. Calibration of gages, tools, measuring instruments, and independent laboratories used and all associated documentation.

N. The Contractor shall establish his own system of scheduled or random sample inspections and audits to ensure objectives are met.

O. Manufacturer's Field Services: Responsibility for Inspection and Testing: Contractor is responsible for the performance of inspections and tests. Each shall be recorded. The

Contractor shall utilize independent inspection and testing laboratories or services that are acceptable to the Government. Tests of construction materials shall be accomplished by the Contractor utilizing the services of an acceptable independent testing laboratory.

P. Inspection and Test Records: The Contractor shall provide on-site records of each inspection and test performed throughout the life of the contract. Records shall include, but not be limited to, factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved, identification of operators and inspectors, test plans/reports, result of inspections or tests, nature of defects, causes for rejection, proposed remedial action, and corrective actions taken.

Q. Records of in-process inspections and controls away from the job site may be used as evidence of quality of materials/work and, at the discretion of the Government, may reduce further inspection or testing after delivery to the job site.

R. The Contractor shall ensure each record is identified and traceable to specific requirements in the specifications and drawings.

1.5 HANDLING AND STORAGE

A. The Contractor shall provide controls and procedures which meet requirements of each section of the specifications. The Contractor shall include documentation with each shipment. The data shall consist of documentation required by the contract along with specifications required to identify, store, preserve, operate, and maintain the items shipped.

1.6 SEQUENCING AND SCHEDULING

A. Contractor shall notify the Government a minimum of 48 hours prior to scheduled inspections and tests. Contractor shall provide 24-hour notice to the Government of the date when the contract work will begin at the site. When Contractor suspends work for 5 days or longer prior to completion, he shall notify the Contracting Officer. Work shall not suspend nor resume without notification of the Contracting Officer.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01320 – CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Submittals Schedule.
2. Progress Schedule.
3. Status Report on Material Orders.

1.2 DEFINITIONS

A. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains the least float.

B. Float: The measure of leeway in starting and completing an activity.

1.3 SUBMITTALS

A. General: Upon contract award, the Contractor shall begin preparation of the submittals schedule, the Contractor's construction schedule, and critical path submittals necessary to meet the Contractor's construction schedule.

B. Submittals Schedule: Submit five copies of the first submittals schedule within 21 days of Notice to Proceed. Resubmit five copies of the submittals schedule monthly, annotated by the Contractor, with actual submission and approval dates. When all submittals on the schedule have been fully approved, no further resubmittal of the schedule is required.

C. Contractor's Construction Schedule: The Contractor's construction schedule consists of a bar chart and a network analysis. One reproducible, four copies, and a computer diskette, including software to read diskettes, of the project schedule shall be submitted and approved prior to Notice to Proceed (NTP). The Contractor shall arbitrarily use an NTP milestone date of 90 days from contract award date for the "initial schedule." When NTP is given, the Contractor shall submit the "baseline schedule" within 7 calendar days after NTP changing only the initial schedule NTP date to the actual date. Each subsequent progress schedule submitted shall be chronologically labeled starting with the letter "A". The schedule shall reflect not only construction site activities but also supporting activities, such as Government submittal review, major material order and delivery, engineering, fabrication, user activity and milestones, etc., as well as activities at the request of the Contracting Officer. The Contractor shall update the schedule and submit the same copies as above monthly beginning 7 days after the return of the approved schedules. Updating shall include a complete revision of the graphic and data displays incorporating approved changes and actual percent complete of each task. Redlined updates will only be acceptable at the weekly meetings.

D. Status Report on Major Material Orders: For material orders deemed major by the Contracting Officer, the Contractor shall submit a copy of the purchase order within 5 days of placing the order. Status of each order shall be reviewed at each weekly project meeting.

E. Delay, Changes, and Cost: Submit documentation as required in Paragraph 3.2.

F. Subcontract List: Prior to Notice to Proceed, submit a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

PART 2 - PRODUCTS

2.1 SCHEDULES

A. The submittal schedule shall include:

1. A schedule of shop drawings and technical submittals required by the specifications and drawings. The schedule shall indicate the specification or drawing reference requiring the submittal; the material, item, or process for which the submittal is required; identifying title of the submittal; the Contractor's anticipated submission date and the approval need date, which must be consistent with the Government's review schedules and the requirements of the Contractor’s construction schedule.
2. Submittals called for by the contract documents will be listed on the submittal schedule. If a submittal is called for but does not pertain to the contract work, the Contractor shall include it in the schedule and annotate it "N/A" with a brief explanation. Approval of the schedule by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the schedule or marked “N/A.” Waiver of required submittals shall be documented on a “Request for Information” (RFI).

2.2 CONTRACTOR’S CONSTRUCTION SCHEDULE

A. The Contractor’s construction schedule consists of a bar chart and a network analysis. Coordinate the preparation and processing of the bar chart and network analysis to ensure consistency with each other and with the submittals schedule, payment requests, and other required schedules and reports.

B. Bar Chart: The Contractor shall:

1. Use a recognized computerized construction progress manager such as "Sure Trak," "Microsoft Project," etc. for preparing progress chart, determining progress, and work scheduling.

2. Prepare the progress chart in the form of a bar chart utilizing format acceptable to the Contracting Officer.
3. Include no less than the following information on the progress chart:

    a. Break out by major headings for primary work activity.
    b. A line item break-out under each major heading sufficient to track the progress of the work.
    c. Milestones: NTP, field work, phased work start and complete, final inspection, project planned completion, contract completion date.
    d. A line item showing contract finalization task which includes punch list, clean-up and demolition, and final closeout submittals.
    e. Each line item will show the scheduled percentage complete for any activity for that given week within the contract performance period.
    f. The estimated cost and percentage weight of total cost for each activity on the chart.
    g. Separate line items for bonding.
    h. Separate line item for punchlist closeout.
    i. Separate line item for major material procurement.

C. Project Network Analysis: Project network analysis shall include:

1. The graphic display shall be a computerized standard network or arrow diagram capable of illustrating the required data. Display shall be computer generated in color on standard 24 by 36 inch (nominal size) drafting sheets or on small (11 by 17 inch minimum) sheets with separate overview and detail breakouts. The graphic display system used shall be readily legible with a clear, consistent method for continuations and detail referencing. The critical path shall be clearly delineated on the display. When milestone dates are included in the Contract they shall be clearly indicated on the display.
2. Data shall be presented as a separate printout on paper or, where feasible, may be printed on the same sheet as the graphic display. Data shall be organized in a logical coherent display capable of periodic updating.
3. Data shall include activity descriptions with a numerical ordering system cross referenced to the graphic display. Additionally, duration, early start date, early finish date, late start date, late finish date, and float shall be detailed for each activity. A running total of the percent completion based on completed activity costs versus total contract cost shall be indicated. A system for indicating scheduled versus actual activity dates and durations shall be provided.
4. The schedule shall be of sufficient detail to facilitate the Contractor's control of the job and to allow the Contracting Officer to readily follow progress for portions of the work. Node identification is required.
5. The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished.
6. Diagrams shall show a continuous flow from left to right with no arrows from right to left. The activity or event number, description, duration, and estimated earned value shall be shown on the diagram.
7. Activities shall be grouped to assist in the understanding of the activity sequence. Typically, this flow will group activities by categories of work, work area, and/or responsibility.
8. Activities shall be indicated from notice to proceed date through actual project close out date in an organized, logical, and consistent order depicting the construction methods and organization employed. Typically activities shall have a duration of 10 work days or less.

All activities shall have at least one predecessor and one successor activity and/or milestone. These detailed activities shall then be summarized into logical, coherent groups consistent with the construction progression to enhance visibility, understanding, and control of the project's overall construction. As a minimum, the following detailed activities and milestones shall be included:

a. Specific project site construction tasks of all activities.
b. Specific off-site tasks necessary to achieve specific project site activities.
c. Submittal review activity by the Government, as specified herein and its subparagraphs, for each submittal required. Furthermore, each of these activities shall be linked as a predecessor to all affected tasks.
d. Any and all utility outages and road crossings/closures.
e. Mobilization, demobilization, punchlist, cleanup, and close out as separate activities.
f. Major equipment and material procurement including delivery (submittal handling shall be separate per above).
g. Contract required notices to the Government which affect any task/activity (show as a one-day duration) and shall be entitled "Notice," followed by a brief description.
h. Line items showing contract finalization tasks which include punchlist, cleanup/demolition, and final closeout submittals.
i. Milestones: NTP, field work, phased work start and complete, final inspection, project planned completion, contract completion date.

D. Status Report on Major Material Orders: The report shall list, in chronological order by need date, materials orders necessary for completion of the contract. The following information will be required for each material order listed:

1. Material name, supplier, and invoice number.
2. Bar chart line item and CPM activity number affected by the order.
3. Delivery date needed to allow directly and indirectly related work to be completed within the contract performance period.
4. Current delivery date agreed on by supplier.
5. When item 4 exceeds item 3, the effect that delayed delivery date will have on contract completion date.
6. When item 4 exceeds item 3, a summary of efforts made by the Contractor to expedite the delayed delivery date to bring it in line with the needed delivery date, including efforts made to place the order (or subcontract) with other suppliers.

PART 3 - EXECUTION

3.1 SCHEDULING AND DETERMINATION OF PROGRESS

A. Independent of partial payments made pursuant to Standard Form 1422, Section I (Payments Under Fixed-Price Construction Contracts), Provision No. 52.232-5, there shall be no payment to exceed 90 percent of the actual cost of materials or equipment that is not installed and no partial payments will be made for materials or equipment not on site. The effort shown toward installation of this equipment will be considered by the Contracting Officer in determining the amount of partial payment.

3.2 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Bar Chart: The progress bar chart will be utilized for progress payments.

B. Project Network Analysis: The project network analysis shall relate directly with the activities on the progress chart schedule. Updating the network analysis shall entail complete revision of the graphic and data displays incorporating changes in scheduled dates and performance periods. Redlined updates will only be acceptable for use as weekly status reviews. The Contractor shall provide a single point contact from his on-site organization as his Schedule Specialist. The Schedule Specialist shall have the responsibility of updating and coordinating the schedule with actual job conditions. The Schedule Specialist shall participate in weekly status meetings and present current information on the status of purchase orders, shop drawings, off-site fabrication, materials deliveries, Subcontractor activities, anticipated needs for Government furnished equipment, and any problem which may impact the contract performance period.

C. Construction Schedule Approval: Government approval of the construction schedule is in general terms of overall compliance. The Government may question and seek clarification of certain details of the schedule to ensure contract compliance. The Contractor shall make such clarifications within 5 working days. The Contractor retains full responsibility for creation and maintenance of the schedule as well as its contents, logic, and use to fulfill all contract obligations.

D. Requests for Time Extensions: In the event the Contractor requests an extension of the contract completion date, he shall furnish such justifications, project schedule date, and supporting evidence as the Contracting Officer may deem necessary for a determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof of delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is obligatory to any approvals.

E. Justification for Delay: The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with this request. The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in the extension of the schedule, will not be a cause for a time extension to the contract completion date.

F. Submission Requirements: The Contractor shall submit a justification for each request for a change in the contract completion date of under 2 weeks based upon the most recent schedule update at the time of the Notice to Proceed or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

1. A list of affected activities, with their associated project schedule activity number.
2. A brief explanation of the causes of the change.
3. An analysis of the overall impact of the changes proposed.
4. A sub-network of the affected area.
5. Activities impacted in each justification for change shall be identified by a unique activity code contained in the required data file.

G. Additional Submission Requirements: For any requested time extension of over 2 weeks, the Contracting Officer may request an interim update with revised activities for a specific change request. The Contractor shall provide this information within 4 days of the Contracting Officer's request.

H. Directed Changes: If Notice to Proceed (NTP) is issued for changes prior to settlement of price and/or time, the Contractor shall submit proposed schedule revisions to the Contracting Officer within 2 weeks of the NTP being issued. The proposed revisions to the schedule will be approved by the Contracting Officer prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until revisions are submitted, and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, the Contractor shall advise the Contracting Officer within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor shall continue to update the schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work. All logic changes pertaining to notice to proceed on change orders, change orders to be incorporated into the schedule, Contractor proposed changes in work reference, correction to schedule logic for out-of-sequence progress, lag duration, and other changes that have been made pursuant to contract provisions shall be specifically identified and discussed.

I. Float off the critical path may be used at the Contractor’s discretion. However, use of float on the critical path shall be coordinated with the Government at each weekly project meeting. The Government reserves the right to utilize at its discretion use of float created by the Government acceleration of activities or milestones such as early GFE delivery, use of facilities or space, and early submittal review.

END OF SECTION

SECTION 01330 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

PART 2 - PRODUCTS

2.1 SUBMITTALS

A. General: Prepare and submit Submittals required by individual Specification Sections.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

3. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. The Government reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Transmittal Form: A standard transmittal form provided by the Government shall be used to transmit each submittal. All data fields on the form shall be completed and the form signed by the Contractor. Incomplete submittals will be returned to the Contractor without Government review.

D. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Drawing Preparation: Include the following information, as applicable:

    a. Dimensions.
    b. Identification of products.
    c. Fabrication and installation drawings.

d. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
e. Shopwork manufacturing instructions.
f. Templates and patterns.
g. Schedules.
h. Design calculations.
i. Compliance with specified standards.
j. Notation of coordination requirements.
k. Notation of dimensions established by field measurement.

2. Drawing Format: Drawing submittals shall be prepared using computer interactive graphics and presented on sheets, not less than 11 by 17 inches nor larger than 30 by 42 inches in size, except for full size patterns or templates. Drawings shall be prepared to accurate size, with scale indicated, unless other form is required. Drawings shall have dark lines on a white background. Drawings shall be numbered in logical sequence. The Contractor may use his own number system. Each drawing shall bear the number of the submittal in a uniform location adjacent to the title block. The Government contract number shall appear in the margin, immediately below the title block, for each drawing. A blank space, no smaller than 4 inches by 4 inches, shall be reserved on the right hand side of each sheet for the Government disposition stamp. Copies of each drawing shall have the following information clearly marked thereon:

a. The job name, which shall be the general title of the contract drawings.
b. The date of the drawings and revisions.
c. Name of Contractor.
d. Name of Subcontractor.
e. The name of the item, material, or equipment detailed thereon.
f. The number of the submittal (e.g., first submittal, etc.) in a uniform location adjacent to the title block.
g. The Government contract number shall appear in the margin, immediately below the title block.

3. Drawings Submittals: One translucent reproducible copy and five blackline or blueline opaque prints of each drawing shall be submitted. One print, marked with review notations by the Contracting Officer, will be returned to the Contractor.

E. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.

1. Product Data Preparation: Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.

i. Mill reports.
j. Standard product operating and maintenance manuals.
k. Compliance with recognized trade association standards.
l. Compliance with recognized testing agency standards.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

2. Product Data Format: Required data submittals for each specific material, product, unit of work, or system shall be collected on an individual submittal and marked for choices, options, and portions applicable to the submittal. Mark each copy of each submittal to show which products and options are applicable. All options not marked out shall be considered as included. Marking of each copy of product data submitted shall be identical. Partial submittals will not be accepted.

3. Each Product Data Submittal: Eight complete sets of indexed and bound data shall be submitted. One set, marked with review notations by the Contracting Officer, will be returned to the Contractor.

F. Samples: Prepare physical units of materials or products, including the following:

1. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

2. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

3. Sample Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Government’s sample where so indicated. Attach label on unexposed side that includes the following:

a. Name of project
b. Name of Contractor
c. Material or equipment
d. Place of origin
e. Name of producer and brand
f. Specification Section to which sample applies
g. Samples of furnished material shall have additional markings that will identify them under the finished schedules.

4. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:

a. Size limitations.
b. Compliance with recognized standards.
c. Availability.
d. Delivery time.

5. Samples Format: Samples shall be physically identical with the proposed material or product to be incorporated in the work, fully fabricated and finished in the specified manner, and full scale. Where variations in color, finish, pattern, or texture are inherent in the material or product represented by the sample, multiple units of the sample, showing the near-limits of the variations and the "average" of the whole range (not less than 3 units), shall be submitted. Each unit shall be marked to describe its relation to the range of the variation. Where samples are specified for selection of color, finish, pattern, or texture, the full set of available choices shall be submitted for the material or product specified. Sizes and quantities of samples shall represent their respective standard unit.

6. Sample Submittals: One set of identified samples shall be submitted. Shipping charges shall be paid by the Contractor. Materials or equipment requiring sample approval shall not be delivered to the site or used in the work until approved in writing by the Contracting Officer. A copy of the transmittal form, marked with review notations including selections by the Contracting Officer, will be returned to the Contractor. Samples that are intended or permitted to be returned and actually incorporated in the work are so indicated in the individual technical sections. These samples will be returned to the Contractor, at his expense, to be clearly labeled, with installation location recorded. Samples shall be in undamaged condition at the time of installation. Where mockups and similar large samples are required by individual technical sections, it is recognized that these are a special type of sample which cannot be readily "transmitted" as specified for submittal of samples. Otherwise, and except as indicated in the individual technical sections, the requirements for samples shall be complied with and a transmittal form shall be processed for each mockup, to provide a record of the activity.

G. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Indicate relationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. See Division 15 Section “Basic Mechanical Materials and Methods” for specific Coordination Drawing requirements for mechanical installations.
4. See Division 16 Section “Basic Electrical Materials and Methods” for specific Coordination Drawing requirements for electrical installations.

H. Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.

I. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

J. Contractor’s Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."

K. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."

L. Subcontract List: Prior to Notice to Proceed, submit a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

M. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

N. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

O. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

P. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

Q. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

R. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

S. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements. Reports must be signed by authorized representative of the testing agency.

T. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements. Reports must be signed by authorized representative of the testing agency.

U. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate

preparation needed for adhesion. Reports must be signed by authorized representative of the testing agency.

V. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements. Reports must be signed by authorized representative of the testing agency.

W. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency. Reports must be signed by authorized representative of the testing agency.

X. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures" and "Operation and Maintenance Data."

Y. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

Z. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

AA. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

BB. Product Closeout Submittals: See Section 01770 – Closeout Procedures.

PART 3 - EXECUTION

3.1 GENERAL

A. Each submittal shall reference drawing number, location of item on drawing, and Specification Section, including page and paragraph, pertaining to the submittal and fully describe the submittal item.

B. The numbering system used (on the transmittal form) for transmission and tracking of submittals shall be provided by the Government and used by the Contractor. Typically the submittal number is composed of the Specification Section number followed by a hyphen, then the chronological numerical order of each submission, then for revisions/resubmittals follow with an A, B, C, etc.

C. Each transmittal form shall transmit items relative to one Specification Section. Data pertaining to that Specification Section may be transmitted together, unless required to be submitted as an individual “item” as defined below.

D. An "item" is defined as an individual piece recognized by the type of data being submitted. Examples in general of acceptable individual submittal transmittals:

1. Groups of valves of different sizes. A submittal would allow that all of the information pertaining to those valves could be listed and submitted on one submittal transmittal.
2. Electrical conduit, fittings, boxes, wall switches, outlets, and other miscellaneous electrical items.
3. Structural drawings and calculations for individual structures.
4. Electrical lighting troffers, ballast, bulbs, and lenses along with installation instructions and certificates of compliance.
5. Air handlers of the same type.
6. Acceptable submittal transmittals can list one individual piece pertaining to specific data, such as one valve on one submittal and one instruction manual on another, etc.

3.2 CONTRACTOR’S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. See “Product Requirements” for deviations.

3.3 GOVERNMENT’S REVIEW

A. General: The Government will not review submittals that do not bear Contractor's signature and will return them without action. The Government will review submittals and provide pertinent notation within 28 calendar days. The 28-day review clock shall start the day after submittals are received by the Reviewing Authority.

B. Review Notations:

1. Submittals will be returned to the Contractor with the following notations:

a. Submittals marked "Approved (APP)" authorize the Contractor to proceed with the work covered.

b. Submittals marked "Approved as Noted (AAN)" authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections. The notes shall be incorporated prior to submission of the final submittal.

c. Submittals marked "Approved as Noted – Resubmittal Required (AEN)" require the Contractor to make the necessary corrections and revisions and to resubmit them for approval in the same routine as before, prior to proceeding with any of the work depicted by the submittal.

d. Submittals marked "Rejected (REJ)" indicate noncompliance with the contract requirements and shall be resubmitted with appropriate changes prior to proceeding with any work.

2. The Contractor shall make corrections required by the Contracting Officer and resubmit (if required) within 14 calendar days of receipt. 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 clause entitled "Changes" shall be given to the Contracting Officer. Approval of the submittals by the Contracting Officer shall not be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory. The Contractor shall be 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.

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

C. Sample Approval: The Contractor shall furnish, for the approval of the Contracting Officer, samples required by the Specifications or by the Contracting Officer.

1. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any contract requirements. Before submitting samples, the Contractor shall 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.

2. Materials and equipment incorporated in the work shall match the approved samples. 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.

3. 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. The Government reserves the right to disapprove any material or equipment which previously has proved unsatisfactory in service.

4. 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. The Contractor shall replace such materials or equipment to meet contract requirements.

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

END OF SECTION

SECTION 01420 – REFERENCES

PART 1 - GENERAL

1.1 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

C. Conflicting Requirements: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the Contracting Officer for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to the Contracting Officer for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.

E. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	 (800) 872-2253 (202) 272-5434
CFR	Code of Federal Regulations Available from Government Printing Office www.access.gpo.gov/nara/cfr	 (888) 293-6498 (202) 512-1530

CRD	Handbook for Concrete and Cement Available from Army Corps of Engineers Waterways Experiment Station www.wes.army.mil	(601) 634-2355
DOD	Department of Defense Specifications and Standards Available from Defense Automated Printing Service //astimage.daps.dla.mil/online	(215) 697-6257
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Defense Automated Printing Service //astimage.daps.dla.mil/online	(215) 697-6257
	Available from General Services Administration www.fss.gsa.gov/pub/fed-specs.cfm	(202) 619-8925
	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MILSPEC	Military Specification and Standards Available from Defense Automated Printing Service //astimage.daps.dla.mil/online	(215) 697-6257
NSS	NASA Safety Standards www.hq.nasa.gov/office/codeq/codeg/doctree/1740-9.pdf	
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-5434

1.2 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The)	(202) 862-5100

	www.aluminum.org	
AAADM	American Association of Automatic Door Manufacturers www.aaadm.com	(216) 241-7333
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AAN	American Association of Nurserymen (See ANLA)	
AASHTO	American Association of State Highway and Transportation Officials www.aashto.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists (The) www.aatcc.org	(919) 549-8141
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute/ACI International www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
ADC	Air Diffusion Council www.flexibleduct.org	(312) 201-0101
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AFPA	American Forest & Paper Association (See AF&PA)	
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AGMA	American Gear Manufacturer’s Association	(703) 684-0211

	www.agma.org	
AHA	American Hardboard Association www.ahardbd.org	(847) 934-8800
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.e-architect.com	(202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALA	American Laminators Association (See LMA)	
ALCA	Associated Landscape Contractors of America www.alca.org	(800) 395-2522 (703) 736-9666
ALSC	American Lumber Standard Committee	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANLA	American Nursery & Landscape Association (Formerly: AAN - American Association of Nurserymen) www.anla.org	(202) 789-2900
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts www.aosaseed.com	(402) 476-3852
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(941) 454-6989
API	American Petroleum Institute	(202) 682-8000

	www.api.org	
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ASCA	Architectural Spray Coaters Association www.ascassoc.com	(609) 848-6120
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (212) 591-7722
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	American Society for Testing and Materials www.astm.org	(610) 832-9585
AWCI	AWCI International (Association of the Wall and Ceiling Industries International) www.awci.org	(703) 534-8300
AWCMA	American Window Covering Manufacturers Association (See WCMA)	
AWI	Architectural Woodwork Institute www.awinet.org	(800) 449-8811 (703) 733-0600
AWPA	American Wood-Preservers' Association www.awpa.com	(817) 326-6300
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010

BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
CCC	Carpet Cushion Council www.carpetcushion.org	(203) 637-1312
CCFSS	Center for Cold-Formed Steel Structures www.umr.edu/~ccfss	(573) 341-4471
CDA	Copper Development Association Inc. www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 412-0900
CGSB	Canadian General Standards Board www.pwgsc.gc.ca/cgsb	(819) 956-0425
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CMAA	Crane Manufacturer’s Association of America, Inc. www.mhia.org	(704) 676-1190
CPA	Composite Panel Association (Formerly: National Particleboard Association) www.pbmdf.com	(301) 670-0604
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRI	Carpet & Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176

CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(800) 463-6727 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
EIA/TIA	Electronic Industries Alliance/Telecommunications Industry Association www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eifsfacts.com	(800) 294-3462 (770) 968-7945
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
FCI	Fluid Controls Institute www.fluidcontrolsinstitute.org	(216) 241-7333
FGMA	Flat Glass Marketing Association (See GANA)	
FM	Factory Mutual System (See FMG)	
FMG	FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com	(401) 275-3000
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America (Formerly: FGMA - Flat Glass Marketing Association) www.glasswebsite.com/gana	(785) 271-0208

GRI	Geosynthetic Research Institute www.drexel.edu/gri	(215) 895-2343
GTA	Glass Tempering Division of Glass Association of North America (See GANA)	
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (See NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAS	International Approval Services (See CSA International)	
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(508) 394-4424
ICRI	International Concrete Repair Institute (The) www.icri.org	(703) 450-0116
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
IRI	Industrial Risk Insurers www.industrialrisk.com	(800) 243?8308 (860) 520?7300
ITS	Intertek Testing Services	(800) 345-3851

	www.itsglobal.com	(607) 753-6711
IWS	Insect Screening Weavers Association (Now defunct)	
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LGSI	Light Gage Structural Institute www.loseke.com	(972) 370-0967
LMA	Laminating Materials Association (Formerly: ALA - American Laminators Association) www.lma.org	(201) 664-2700
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (847) 577-7200
LSGA	Laminated Safety Glass Association (See GANA)	
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MCA	Metal Construction Association www.metalconstruction.org	(312) 201-0193
MFMA	Maple Flooring Manufacturers Association www.maplefloor.org	(847) 480-9138
MFMA	Metal Framing Manufacturers Association	(312) 644-6610
MGPHO	Medical Gas Professional Healthcare Organization, Inc. www.mgpho.org	(877) 238-5157 (913) 681-6548
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(614) 228-6194
ML/SFA	Metal Lath/Steel Framing Association (See SSMA)	
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(312) 332-0405

NAAMM	North American Association of Mirror Manufacturers (See GANA)	
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(281) 228-6200
NAIMA	North American Insulation Manufacturers Association (The) www.naima.org	(703) 684-0084
NAMI	National Accreditation and Management Institute, Inc.	(304) 258-5100
NAPM	National Association of Photographic Manufacturers (See PIMA)	
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(414) 248-9094
NCTA	National Cable Television Association www.ncta.com	(202) 775-3669
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(303) 697-8441
NFPA	National Fire Protection Association www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-6372
NGA	National Glass Association	(703) 442-4890

	www.glass.org	
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933?0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	National Oak Flooring Manufacturers Association www.nofma.org	(901) 526-5016
NPA	National Particleboard Association (See CPA)	
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSA	National Stone Association www.aggregates.org	(800) 342-1415 (703) 525-8788
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NTMA	National Terrazzo and Mosaic Association, Inc. www.ntma.com	(800) 323-9736 (703) 779-1022
NWWDA	National Wood Window and Door Association (See WDMA)	
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDCA	Painting and Decorating Contractors of America www.pdca.com	(800) 332-7322 (703) 359-0826
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (508) 230-3516
PGI	PVC Geomembrane Institute //pgi-tp.ce.uiuc.edu	(217) 333-3929
PIMA	Photographic & Imaging Manufacturers Association (Formerly: NAPM - National Association of Photographic Manufacturers) www.pima.net	(914) 698-7603

RCSC	Research Council on Structural Connections www.boltcouncil.org	(800) 644-2400 (312) 670-2400
RFCI	Resilient Floor Covering Institute (Contact by mail only)	
RIS	Redwood Inspection Service www.calredwood.org	(888) 225-7339 (415) 382-0662
RMA	Rubber Manufacturers Association www.rma.org	(800) 220-7620 (202) 682-4800
SAE	SAE International www.sae.org	(724) 776-4841
SDI	Steel Deck Institute www.sdi.org	(847) 462-1930
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabfurn.com	(843) 689-6878
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIGMA	Sealed Insulating Glass Manufacturers Association www.sigmaonline.org/sigma	(312) 644-6610
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPI	The Society of the Plastics Industry www.plasticsindustry.org	(202) 974-5200
SPIB	Southern Pine Inspection Bureau (The)	(850) 434-2611

	www.spib.org	
SPI/SPFD	The Society of the Plastics Industry Spray Polyurethane Foam Division (See SPFA)	
SPRI	SPRI (Single Ply Roofing Institute) www.spri.org	(781) 444-0242
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSMA	Steel Stud Manufacturers Association (Formerly: ML/SFA - Metal Lath/Steel Framing Association) www.ssma.com	(312) 456-5590
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(800) 837-8303 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWRI	Sealant, Waterproofing, and Restoration Institute www.swrionline.org	(816) 472-7974
TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TPI	Truss Plate Institute	(608) 833-5900
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 705-9898
UFAC	Upholstered Furniture Action Council www.ufac.org	(336) 885-5065
UL	Underwriters Laboratories Inc. www.ul.com	(800) 704-4050 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902

USITT	United States Institute for Theatre Technology, Inc. www.culturenet.ca/usitt	(800) 938-7488 (315) 463-6463
USP	U.S. Pharmacopeia www.usp.org	(800) 822-8772 (301) 881-0666
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association (Formerly: AWCMA - American Window Covering Manufacturers Association) www.windowcoverings.org	(800) 506-4653 (212) 661-4261
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WIC	Woodwork Institute of California www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

BOCA	BOCA International, Inc. www.bocai.org	(708) 799-2300
CABO	Council of American Building Officials (See ICC)	
IAPMO	International Association of Plumbing and Mechanical Officials (The) www.iapmo.org	(909) 595-8449
ICBO	International Conference of Building Officials www.icbo.org	(800) 284-4406 (562) 699-0541
ICC	International Code Council	(703) 931-4533

(Formerly: CABO - Council of American Building Officials)
www.intlcode.org

SBCCI Southern Building Code Congress International, Inc. (205) 591-1853
www.sbcci.org

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

P1

CE	Army Corps of Engineers www.usace.army.mil	
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-0990
DOC	Department of Commerce www.doc.gov	(202) 482-2000
EPA	Environmental Protection Agency www.epa.gov	(202) 260-2090
FAA	Federal Aviation Administration www.faa.gov	(202) 366-4000
FCC	Federal Communications Commission www.fcc.gov	(202) 418-0190
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(202) 708-5082
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley Laboratory (See LBNL)	
LBNL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-5605
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478

OSHA	Occupational Safety & Health Administration www.osha.gov	(202) 693-1999
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
TRB	Transportation Research Board www.nas.edu/trb	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USPS	Postal Service www.usps.com	(202) 268-2000

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CAPUC (See CPUC)

CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation www.dca.ca.gov/bhfti	(800) 952-5210 (916) 445-1254
CPUC	California Public Utilities Commission www.cpuc.ca.gov	(415) 703-2782
TFS	Texas Forest Service Forest Products Laboratory //txforestservice.tamu.edu	(936) 639-8180

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01600 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. Related Sections include the following:

1. Division 1 Section "References" for applicable industry standards for products specified.
2. Division 1 Section "Closeout Procedures" for submitting warranties for contract closeout.
3. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 DEFINITIONS

A. Products: Items purchased for incorporating into the Work. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Product Specification: Where a specific manufacturer's product is, including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form provided at end of Section.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   a. Statement indicating why specified material or product cannot be provided.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Government and separate contractors, that will be necessary to accommodate proposed substitution.
   c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   e. Samples, where applicable or requested.
   f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
   g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
   i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
   j. Cost information, including a proposal of change, if any, in the Contract Sum.
   k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
   l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, the Contracting Officer will determine which products shall be used.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.
10. Product shall be stored and handled in a safe manner and housekeeping conducted daily to the satisfaction of the Contracting Officer.

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
4. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: The Contracting Officer will consider requests for substitution if received within 90 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of the Contracting Officer.

B. Conditions: The Contracting Officer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, the Contracting Officer will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers the Government a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Government must assume.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution is compatible with other portions of the Work.
7. Requested substitution has been coordinated with other portions of the Work.
8. Requested substitution provides specified warranty.
9. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION

Advancement of Construction Technology

SUBSTITUTION REQUEST

(After the Bidding Phase)

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ Project Number: _____

Re: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data attached

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

_____

Savings to Government for accepting substitution: _____ ($ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

SUBSTITUTION REQUEST
(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

_____

_____

_____

GOVERNMENT'S REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ COTR

_____

_____

_____

_____

_____

_____

_____

SECTION 01700 – PROJECT MEETINGS

PART 1 - GENERAL

1.1 PRECONSTRUCTION CONFERENCE

A. The Contractor shall attend a preconstruction conference scheduled by the Contracting Officer. Work shall not commence prior to the conference. Subcontractor representatives shall attend. Discussion shall address project orientation, personnel contact, safety issues, permits, deficiencies, and the location of the Contractor's office.

1.2 PROJECT MEETINGS

A. The Contractor shall hold weekly project meetings (attended by the Government) to discuss safety, the project submittal schedule, the project progress Schedule, and construction issues. The Contractor shall provide a representative from his organization with expertise and knowledge in matters related to the project Schedule. The representative shall have the responsibility of updating and coordinating the Schedule with actual job conditions. During this meeting, the Contractor shall describe, on an activity-by-activity basis, all proposed revisions and adjustments to the project Schedule required to reflect the current status of the project. The Government shall approve activity progress, proposed revisions and adjustments as appropriate. Only Government approved revisions and adjustments shall be incorporated into the schedule. The representative shall also present current information on the status of purchase orders, shop drawings, off-site fabrication, material deliveries, Subcontractor activities, anticipated needs for any Government-Furnished Equipment (GFE), and any problem which may impact the contract performance period. Subcontractor representatives shall attend as appropriate and as requested. Contractor shall record minutes from the meetings and distribute them as directed by the Government.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01731 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
   a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 15 and 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.2 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.3 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.4 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-protection systems.
4. Control systems.
5. Communication systems.
6. Conveying systems.
7. Electrical wiring systems.

C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise- and vibration-control elements and systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1. Retain recognized, experienced, and specialized firm to cut and patch exposed Work listed below.

a. Processed concrete finishes.
b. Stonework and stone masonry.
c. Ornamental metal.
d. Preformed metal panels.
e. Roofing.
f. Firestopping.
g. Window wall system.
h. Fluid-applied flooring.
i. Aggregate wall coating.
j. Wall covering.

k. HVAC enclosures, cabinets, or covers.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections of these Specifications.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to interruption of services to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION

SECTION 01732 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate detailed sequence of selective demolition and removal work, with starting and ending dates for each activity, interruption of utility services, use of elevator and stairs, and locations of temporary partitions and means of egress.

B. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations.

C. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.4 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

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

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Predemolition Conference: Conduct conference at Project site

1.5 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

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

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

E. Hazardous Materials: It is unknown whether hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

F. Hazardous Materials: Hazardous materials are present in construction to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

G. Storage or sale of removed items or materials on-site is not permitted.

H. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.6 WARRANTY

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

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

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

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

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

1. Comply with requirements specified in Division 1 Section "Photographic Documentation."

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

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass

area of selective demolition and that maintain continuity of services/systems to other parts of building.

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

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION

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

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
5. Dispose of demolished items and materials promptly. **Comply with requirements in Division 1 Section "Construction Waste Management."**

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.

4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Comply with requirements specified in Division 1 Section "Construction Waste Management."

B. Burning: Do not burn demolished materials.

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

3.6 CLEANING

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

END OF SECTION 01732

SECTION 01770 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes, but is not limited to, administrative and procedural requirements for contract closeout.

B. Related Sections include the following:

1. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
2. Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.2 FINAL INSPECTION

A. Before requesting final inspection, complete the following:

1. All salient parts of the work are substantially complete.
2. All systems and subsystems are substantially complete.
3. Startup testing of systems are complete.
4. Submission and approval of adjust/balance records.
5. Submission and approval of Operation and Maintenance Manuals.
6. Instruct Government’s personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, the Government will either schedule a day for the inspection or reject the Contractor’s request for due cause. Requests for “partial” final inspections will only be considered when multiple and functionally separate buildings are involved or when the project is phased or when systems or occupancies are required by the Government. The Government reserves the right to reject all “partial” requests.

1.3 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. After final inspection, the Government shall issue a punchlist to be completed by the Contractor.

1.4 PROJECT CLOSEOUT SUBMITTALS

A. As-built Drawings: Submit the redlined as-built drawing set maintained by the Contractor and verified by the Government.

B. Record Submittals: Submit one hard copy and CD ROM that includes all project submittals. Create CD ROM of submittals using *.PDF format from Adobe Acrobat Author. CD ROM to contain Acrobat Reader. Submittals to be indexed by the use of “AcroBld” program, available from NASA or from Internet http://mroed-d_3.mro.usae.army.mil/EBS.HTM.

C. Warranties: Organize warranty documents into an orderly sequence.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Provide additional copies of each warranty and include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 AS-BUILT DRAWINGS

A. As-built Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings at the project site.

1. Preparation: Mark As-built Prints completely and accurately to show the actual installation where installation varies from that shown originally.
   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an understandable drawing technique.
   c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
   d. For DCR’s, RFI’s, CDR’s, and Change Items, cloud the area on the drawing affected by the change, note the changing document number, and attach the approved changing document to the affected drawing.
2. Content: Types of items requiring marking include, but are not limited to, the following:
   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.
   i. Locations of concealed internal utilities.
   j. Changes made by Change Order.
   k. Changes made following the Contracting Officer’s written orders.
   l. Details not on the original Contract Drawings.

m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.
o. Note and dimension all underground utilities and structures (including existing) on the drawings.

3. Mark as-built set with red-colored pen.
4. Mark important additional information that was either shown schematically or omitted from original Drawings.

2.2 RECORD SUBMITTALS

A. Preparation: Mark Record Submittals to indicate the actual product installation where installation varies substantially from that indicated in the data submittal.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period. Post changes and modifications to Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Provide access to Project Record Documents at the project site during normal working hours.

3.2 PROJECT CLOSEOUT

A. General: The final pay application shall not be accepted by the Government until all contract requirements are met and the following is performed.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations:
   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
g. Sweep concrete floors broom clean in unoccupied spaces.
h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
j. Remove labels that are not permanent.
k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
    1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
l. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Replace parts subject to unusual operating conditions.
n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
p. Clean ducts, blowers, and coils if units were operated without filters during construction.
q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
r. Leave Project clean and ready for occupancy.

C. Complete all punchlist items.

D. Demobilize and remove all temporary utilities.

E. All permits shall be closed out, notifications made, and hazardous wastes removed.

F. All DCR’s signed and closed out.

G. Turn in excess and salvage materials and spare parts as required.

H. Security: Turn in badges, decals, passes, keys, and all other security items.

I. Final Reports: Contractor accident and safety statistics.

J. Release all liens.

3.3 PUNCHLIST

A. The Contractor shall complete all punchlist items as quickly as possible but within 30 days after final inspection.

END OF SECTION

SECTION 02050 – DEMOLITION

PART 1 - GENERAL

1.1 The extent of demolition work for this section is that which may be required by the installation of the standing seam metal roof as shown on the Drawings.

1.2 Demolition includes removal of the wall panels and disposal of demolished materials, as may be required and as specified to be performed herein.

1.3 Provide a detailed sequence of demolition and removal work to ensure the uninterrupted progress of the Owner's operations. In general, demolition should follow the phasing requirements shown in the drawings.

1.4 Contractor shall be responsible for complying with all applicable local, state and Federal regulations regarding demolition and disposal activities.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 JOB CONDITIONS

A. Storage or sale of removed panels will not be permitted.

B. The use of explosives will not be permitted.

C. Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent injury and insure safety and health in accordance with Section 01061.

3.2 DEMOLITION

A. Comply with governing regulations pertaining to environmental protection.

B. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations as directed by the A/E or governing authorities. Return adjacent areas to the condition existing prior to the start of the work.

C. Demolish wall panels completely as required by the installation of the roof system, and remove from the site. Use such methods as are required to complete the work within the limitations of governing regulations.

3.3 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove debris, rubbish, and other materials resulting from roofing demolition from the site, and dispose of in accordance with local, state, and Federal regulations.

B. Transport materials removed from demolished structures, and dispose of off the site in accordance with the general notes shown on the Drawings.

END OF SECTION

SECTION 02080 – ASBESTOS ABATEMENT PROCEDURES

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. General: This section includes all work necessary for the removal, containment, and disposal of asbestos-containing material (ACM) identified in the Drawings in the Contract Documents.

B. This section is included for the purpose of general abatement guidelines and procedures for general contractors.

C. Related Work Specified in Other Sections: SECTION 01061 — GENERAL SAFETY AND ENVIRONMENTAL HEALTH REQUIREMENTS" applies to all work covered by this section.

1.2 QUALITY ASSURANCE

A. Contractor Qualifications: The Contractor shall be licensed in the State of Alabama and shall be either a licensed asbestos abatement contractor or general contractor of established reputation (or if newly organized, whose personnel have previously established a reputation in the same field).

B. Asbestos Control Limits: As long as the identified ACM remains non-friable, air concentrations and sampling are not a requisite part of this section of work.

1.3 REFERENCES

A. Code of Federal Regulations (CFR):

29 CFR 1910 - Subpart C: General Safety and Health Provisions

29 CFR 1926.1101 - Asbestos OSHA Standards for Construction

40 CFR 61 - Subpart M: USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) - Asbestos

29 CFR 1926 - Subpart E: Personal Protective and Life Saving Equipment

B. State and Local Regulations, Contact:

Alabama Department of Environmental Management (ADEM)
Air Division
1400 Coliseum Boulevard
Montgomery, Alabama 36110
(334) 271-7879

Department of Natural Resources and Environmental Management
320 Fountain Circle
Huntsville, Alabama 35801
(256) 427-5750

1.4 SUBMITTALS

A. Submittals Prior to Beginning Work: Do not start work until following have been approved:

1. Asbestos Abatement Plan: Provide a description of the method for disposal of ACM. Included in this shall be name, address, and telephone number of the disposal facility, copy of the Waste Shipment Record (WSR) to be used, and the name, address, and telephone number of the waste transporter.
2. Provide a copy of the asbestos project notification that was made to the appropriate local or state regulatory authority, if applicable.

B. Project Closeout Submittals: These submittals must be submitted and accepted for the project to be considered complete.

1. Copies of all Waste Shipment Records for the disposal of ACM waste.
2. Copies of all disposal records, landfill receipts, from the point of disposal of all ACM.

1.5 CONTRACTOR RESPONSIBILITY: The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, state, and local regulations pertaining to the protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, state, and local regulations, and shall hold the Owner harmless for failure to comply with any applicable safety or health regulation on the part of himself, his employees, or his subcontractors.

A. Suspect Material: During the course of the project, if work involves disturbance of suspect material not previously identified, the Contractor shall have the material tested for asbestos content after notifying the Engineer. Immediately contact and coordinate with the COTR.

B. Safety: The Contractor shall have full responsibility for the safe accomplishment of all asbestos abatement work included in this project.

1.6 PROJECT/SITE CONDITIONS

A. Means of Egress: Establish and maintain emergency and fire exits from the work area. The Contractor shall identify and mark all emergency exits from the work area. At least 1 emergency exit from the work area shall be provided in addition to the exit through the decontamination facility.

B. Use of Existing Facilities: The use of existing restroom or other facilities for decontamination is prohibited.

C. Air Handling Equipment: Air handling equipment serving the air handling zones where asbestos work will be accomplished must be locked off or must have both supply and return

air positively sealed off from the time the asbestos removal work starts until completion of the abatement.

D. Access to Work Area: Only the Contractor's workers, governmental agency inspectors, authorized employees of the Government, the Owner and his representatives, and/or testing laboratory personnel shall have access to work areas.

E. Use of Elevators: Not Allowed

F. Contamination of Adjacent Areas: In the event any area in the building outside of a controlled work area should become contaminated as a result of the Contractor's work, the Contractor shall thoroughly decontaminate the affected area until the area has been visually inspected.

G. Security: At all times asbestos control measures are in effect, the Contractor shall provide adequate security to prevent any unauthorized entry into a work area. These work areas shall never be left unattended unless access can be positively blocked. Asbestos contaminated waste materials shall also be provided adequate security to prevent access to the materials by unauthorized persons.

H. Coordination of Work of All Trades: Coordinate the work of all trades to ensure that their work is performed in accordance with the applicable regulations and that the asbestos control limits are maintained at all times both inside and outside the asbestos work area.

1.7 SEQUENCING/SCHEDULING

A. Asbestos abatement work is required to be completed before renovation work can be started in the areas below the roofing.

B. The asbestos work will be scheduled with the COTR a minimum of 2 weeks prior to the start of the asbestos work. The Owner will be given 48 hours notice prior to beginning the scheduled asbestos work. **All asbestos removal work will be conducted during non-core hours. Core hours are as determined by the Owner**.

PART 2 PRODUCTS

2.1 EQUIPMENT: Equipment, including protective clothing and respirators, used in the execution of this contract and provided to visitors to the site shall comply with applicable Federal, State, and local regulations. Respirators shall conform to the OSHA requirements in 29 CFR 1926.1101.

2.2 SEALERS – Not applicable.

PART 3 EXECUTION

3.1 PROHIBITIONS

A. The following work practices and engineering controls shall not be used for work related to asbestos or for work which disturbs ACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:

1. High-speed abrasive disc saws.
2. Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.
3. Dry sweeping, shoveling or other dry clean-up of dust and debris containing ACM and PACM.

3.2 ASBESTOS ABATEMENT IN FULL WORK AREA ENCLOSURES – Not applicable.

3.3 ASBESTOS ABATEMENT UTILIZING GLOVEBAGS – Not applicable.

3.4 ASBESTOS ABATEMENT OF VINYL ASBESTOS TILE (VAT) – Not applicable.

3.5 ASBESTOS ABATEMENT OF ASBESTOS CONTAINING ROOFS

A. Work Areas Outside of Building: Preparation of work areas are as follows:

1. Coordinate sequence of work on roof or siding to prevent water leakage into the building due to wet weather.
2. Post warning signs at all access points to roof (if applicable).
3. Place warning signs and asbestos warning ribbon around perimeter of work area.
4. Close, secure, and seal for duration of work all roof and wall openings and penetrations in work area except sanitary stack vents and storm water drains.

B. Removal of ACM Roofing Material

1. General: Perform all asbestos related work and comply with the general safety and health provisions in conformance with 29 CFR 1926.1101. When work involves removal of roofing material containing asbestos, a decontamination unit may not be required. However, disposable clothing and respiratory protection will be required. Disposable clothing may be worn over street clothing. Discard and dispose of the disposable clothing as asbestos contaminated waste when leaving the work area.
2. Roofing material shall be removed in an intact state to the extent feasible.
3. Wet methods shall be used where feasible.
4. Cutting machines shall not be allowed.
5. Unwrapped or unbagged roofing material shall be immediately lowered to the ground via covered, dust-tight chute, crane or hoist, or placed in an impermeable waste bag or wrapped in plastic sheeting and lowered to ground no later than the end of the work shift.
6. Upon being lowered, unwrapped material shall be transferred to a closed receptacle in such manner so as to preclude the dispersion of dust.

C. Special Safety Precautions: Discontinue all work if either of the following conditions develop:

1. Wind velocities or gusts in the work area exceed 15 miles per hour.

3.6 FIELD QUALITY CONTROL

A. Work Inspection

1. The A/E or his representative shall make visual inspection to insure:
   a. Use of the approved asbestos working procedures by the Contractor's employees.
   b. Disposal and transport of waste.
   c. Coordination of non-abatement work in the project with the abatement work.
   d. Sufficiency of warning signs posted and labeling on waste materials packaged for disposal.
2. Conduct joint inspection with the Contractor to verify completion of abatement work before the final cleaning work begins. Inspect again after final cleaning is completed. Verify that no visual trace of dust or debris is present in the work area.
3. Air Monitoring – Not applicable.

B. Site Inspections

1. While performing asbestos abatement work, in addition to inspection by the Owner or the Owner's Representative, the Contractor shall be subject to on site inspection by agency officials; by OSHA and EPA inspectors; and state enforcement officials.

3.7 CLEANUP AND DISPOSAL

A. Housekeeping: Essential parts of asbestos dust control actions are housekeeping and cleanup procedures. Maintain all surfaces in the work area free of accumulations of contaminated debris to prevent further dispersion. Use approved industrial vacuum cleaners equipped with a HEPA filter to collect dust and small scrap. The blowing down of the space with compressed air is forbidden. Post appropriate asbestos hazard warning signs. In all possible instances, workmen shall cleanup their own areas. Equip personnel engaged in cleaning up asbestos scrap and waste with necessary respiratory equipment and protective clothing.

B. Disposal of Contaminated Waste

1. Collect and dispose of friable asbestos waste, scrap, debris, bags, containers, consumable hand tools, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers in sealed impermeable bags. Double bag prior to removing waste from work area. Prior to placing in bags, or containers, wet down asbestos wastes to minimize airborne fibers.
2. Asbestos waste materials shall be disposed of in accordance with all Federal regulations at a sanitary landfill approved for asbestos by the appropriate state or local authority.

3. Establish a temporary holding area approved by the Owner for properly packaged asbestos waste. Waste must be transported to the landfill in a covered vehicle or in sealed, rigid, impermeable containers.
4. Provide copies of all waste shipment records to the Owner.

C. Final Cleaning and Visual Inspection

1. All final cleaning shall be accomplished using HEPA vacuums and/or wet wiping methods. No visible dust or debris is allowed in the work area.
2. The final visual inspection will be conducted jointly by the Contractor and the Contractor's Asbestos Testing Company. When the area has passed inspection the final clearance air sampling will be performed.

D. Final Clearance Monitoring and Removal of Enclosure – Not applicable.

E. Removal of Signs

1. Warning signs shall be removed when the work area has passed final visual inspection.

END OF SECTION

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes structural steel and grout.

1.2 SUBMITTALS

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

B. Shop Drawings: Show fabrication of structural-steel components.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category Sbd.

B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

C. Comply with applicable provisions of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Welding Electrodes: E70XX.

E. Anchor Rods: Post-installed expansion type as indicated on the Drawings.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.

1. Finish: Plain unless noted otherwise in the construction documents.
2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8,) compressible-washer type.

    a. Finish: Plain unless noted otherwise in the construction documents.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy hex head steel structural bolts with splined ends; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.

1. Finish: Plain unless noted otherwise in the construction documents.

2.3 PRIMER

A. Primer: SSPC-Paint 25, Type II, iron oxide, zinc oxide, raw linseed oil, and alkyd.

B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: Masterflow 928 by Masterbuilders.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Fully tensioned bolts with direct tension indicating devices.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.

4. Surfaces to receive sprayed fire-resistive materials.
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 2.0 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

PART 3 - EXECUTION

3.1 ERECTION

A. Examination: Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.

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

B. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."

C. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base plates. Clean bottom surface of base plates.

1. Set base plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of base plate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and base plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

D. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.2 FIELD CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Fully tensioned bolts with direct tension indicating devices.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges".

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 05120

SECTION 05400 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Non-load-bearing wall and roof framing.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.

1.3 SUBMITTALS

A. Product Data: For each type of product and accessory indicated.

B. Shop Drawings: Show layout, spacing, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.

1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Qualification data.

E. Product test reports.

F. Research/evaluation reports.

1.4 QUALITY ASSURANCE

A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements.

B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code--Sheet Steel."

C. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.
2. Coating: G60, A60, AZ50, or GF30.

2.2 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Flange Width: 1-3/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and same minimum base-metal thickness as steel studs.

C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

2.3 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members, unless otherwise indicated.

B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

C. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

D. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

E. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

F. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

G. Pneumatically or Fuel-Powered Driven Fastener: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials tested and approved per test report ER-6070 by the ICC Evaluation Service, Inc.

2.4 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

C. Install framing members in one-piece lengths.

D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

E. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

F. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.2 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05400

SECTION 07412 – INSULATED METAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Foamed insulation core vertical metal wall panel assembly with integral reveals and profiled panels, and related trim and accessories.

1.2 RELATED SECTIONS

A. Division 7 Section "Sheet Metal Flashing and Trim" for sheet metal copings, flashings, reglets and roof drainage items.

B. Division 7 Section "Joint Sealants" for field-applied joint sealants.

1.3 REFERENCES

A. American Architectural Manufacturer's Association (AAMA):

B. AAMA 501.1 - Standard Test Method for Exterior Windows, Curtain Walls and Doors for Water Penetration Using Dynamic Pressure.

C. American Society of Civil Engineers (ASCE):

1. ASCE 7- Minimum Design Loads for Buildings and Other Structures.

D. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):

1. Architectural Sheet Metal Manual.

1.4 PERFORMANCE REQUIREMENTS

A. Air Infiltration: Maximum 0.06 cfm/sf (0.3 L/s per sq. m) per ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sf (300 Pa), using minimum 10 feet by 10 feet (3050 mm by 3050 mm) test panel that includes horizontal and vertical joints.

B. Water Penetration:

1. Wall panel system for this application shall perform to ASTM E331 for static pressures and AAMA 501.1 for dynamic pressures at 15psf.

2. Standard horizontal and vertical joints shall perform to ASTM E331 for static pressure at 40 psf on a minimum 10 foot by 10 foot mockup.

3. Horizontal joint design shall demonstrate pressure equalization in accordance with AAMA 508-07, which includes static and dynamic testing with imperfect air barriers.

C. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, per ASTM E 72:

1. Wind Loads: Determine loads based on uniform pressure indicated on Drawings or calculated per IBC 2003 whichever is more stringent.

2. Deflection Limits: Withstand test pressures of inward and outward wind-load design pressures with maximum deflection of L/180 of the span with no failure.

3. Secondary Framing: Design secondary framing system according to AISI 'Standard for Cold-Formed Steel Framing - General Provisions.' Provide bearing surface for metal wall panels at the following locations:

a. Vertical Panel System: At horizontal stack joints 4 inches minimum (102 mm).

D. Seismic Performance: Comply with ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

1.5 SUBMITTALS

A. Product Data: Manufacturer's data sheets for metal wall panels and accessories.

B. Product Test Reports: Indicating compliance of products with requirements, from a qualified independent testing agency.

C. Shop Drawings: Prepared by manufacturer or factory trained authorized dealer. Include elevations showing metal wall panels, and details of each condition of installation and attachment. Indicate coordination dimensions related to structural support system elements. Complete shop drawings including elevations, fastening patterns and sections of each condition shall be submitted and approved prior to fabrication. Shop drawings shall include material type, metal thickness, paint finish, and manufacturer’s installation recommendations.

1. Include structural data indicating compliance with performance requirements.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

F. Qualification Information: For Installer firm, proof of installer's manufacturer trained field supervisor.

G. Warranty: Submit proposed warranty meeting requirements of this Section.

1.6 QUALITY ASSURANCE

A. Manufacturer/Source: Provide metal wall panel system and panel accessories from a single manufacturer.

B. Installer Qualifications: Experienced Installer with minimum of 5 successful completed projects of similar materials and scope, approved by manufacturer, and employing workers trained by manufacturer to install specified products.

C. Calculations supporting structural performance of the wall panels shall be prepared by a professional structural engineer.

D. Fire-Test-Response Characteristics per ASTM E 84 or UL Standard 723:

1. Flame spread index: 25 or less.

2. Smoke developed index: 450 or less.

E. Pre-installation Conference: Conduct conference at Project site in compliance with Division 01 requirements.

F. Substitutions: No substitution will be considered unless the COTR has received a request for approval at least ten days prior to the established bid date. Evidence shall be submitted to demonstrate equivalency to the products and performance levels specified. The written request shall include:

1. A complete description of the substitution, including details of all transition conditions at panel termination points.

2. Independent test reports verifying compliance with the performance requirements.

3. A detailed list of each item that does not fully comply with the specifications.

4. A letter indicating that the substitution is a foamed-in-place panel.

5. A letter stating that the manufacturer or wall systems contractor proposing the substitution will pay additional costs incurred by subcontractors affected by the proposed substitution.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect metal wall panels during shipping, handling, and storage to prevent staining, denting, or other visible damage. Deliver, unload, store, and erect metal wall panels and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.

1.8 WARRANTY

A. Standard Manufacturer's Warranty: Manufacturer's two (2) year limited warranty that panels are free from defects inmaterials and workmanship, beginning from the date of shipment of panels, but excluding coil coatings (paint finishes) covered under a separate warranty.

B. The installation contractor shall issue a separate one (1) year warranty against defects in installed materials and workmanship, beginning from the date of substantial completion of the installation.

C. Submit exterior paint manufacturer's forty (40) year limited warranty on paint finish against cracking, peeling and blistering. Exterior paint manufacturers twenty (20) year limited warranty on paint finish against chalk and color change.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers listed in other Part 2 articles.

B Basis of Design: Metl-Span, LLC; 1720 Lakepointe Drive, Suite #101, Lewisville, TX 75057; Toll-Free (877) 585-9969; Fax: (972) 420-9382; E-mail: panel@metlspan.com ; Website: http://www.metlspan.com

C. Bidders that are using materials supplied by a manufacturer other than that specified above shall list the material supplier/manufacturer of the metal walls panels, provide a sample of the panel including a complete side joint with clip, and provide a letter signed and sealed by a professional engineer registered in the jurisdiction of the project indicating that the proposed products meet or exceed specified requirements. Manufacturers unable to provide this information prior to the time of bid will not be considered.

2.2 FOAMED INSULATION CORE METAL WALL PANELS

A. Panel – General Requirements: Metl-Span "Striated Insulated Metal Wall Panel" – Roll-formed exterior and interior steel sheet faces chemically bonded to continuously foamed-in-place polyurethane; laminated panels are not acceptable.

1. Exterior Face: G-90 galvanized stucco embossed painted steel, minimum Grade 33 and/or AZ-50 Aluminum-Zinc stucco embossed painted steel, minimum Grade 33 in 24ga (0.0236").

2. Interior Face: G-90 galvanized stucco embossed painted steel, minimum Grade 33 and/or AZ-50 Aluminum-Zinc stucco embossed painted steel, minimum Grade 33 in 24ga (0.0236"), unless otherwise indicated.

3. Longitudinal Joint Sealants: Field applied.

4. Foam core shall be continuously foamed-in-place, zero ODP and zero VOC

closed cell polyurethane.

5. Exterior Finish: One coat 70% polyvinylidene fluoride (PVDF) coil coating, nominal 0.7 mil (0.02 mm), over 0.2 mil (0.005 mm) primer; color as selected by Architect from manufacturer's standard colors.

6. Interior Finish: One coat factory applied Polyester coil coating nominal 0.7 mil (0.02 mm) in Igloo White, 0.2 mil (0.005 mm) primer.

7. Panel width: 36".

8. Panel thickness: 2-1/2" minimum thickness.

9. R-value: 18.5 minimum.

B. Metl-Span Striated Insulated Metal Wall Panel: Concealed fastener wall panels with offset double tongue and groove joinery.

2.3 ACCESSORIES

A. Metal Wall Panel Accessories:

1. Provide complete metal wall panel assembly including trim, copings, fascia, parapet caps, soffits, sills, inside and outside corners, jambs, and miscellaneous flashings. Include required fasteners, gaskets, closure strips, and sealants.

2. Fabricate accessories listed above from aluminum extrusions, 6063-T5 unless noted otherwise on the Drawings.

3. Finish exposed trim and extrusions to match panels.

4. Provide extrusions with thermal breaks.

2.4 MISCELLANEOUS MATERIALS

A. Sealant: Synthetic non-skinning butyl rubber sealant, as recommended by panel manufacturer, for metal wall panel assemblies to remain watertight.

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

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine metal wall panel supports, substrates, and conditions for compliance with requirements for installation tolerances and other conditions affecting work.

1. Verify that structural panel support members and anchorage have been installed within

the following tolerances:

a. Plus or minus 1/4 inch (6.35 mm) in 20 feet (6096 mm).

b. Plus or minus 1/2 inch (12.7 mm) across building elevation.

c. Plus or minus 1/8 inch (3.17 mm) within 5 feet (1524 mm) of any change in plane.

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

3.2 PREPARATION

A. Install miscellaneous framing and anchorage according to ASTM C 754, metal wall panel manufacturer's written recommendations, and approved shop drawings.

3.3 METAL WALL PANEL INSTALLATION

A. Install metal wall panels and accessories in accordance with manufacturer's standard written recommendations and approved shop drawings.

B. Tear-off work shall be accomplished at night and night crew shall provide cover with EPDM draping to protect the interior of the building(s). New siding shall be applied during the day. Remove no more siding than can be replaced during the next day’s work. Maintain weather-proofing at all times.

C. General: Install metal wall panels in orientation, sizes, and locations indicated. Anchor metal wall panels and other components securely in place. Provide for thermal and structural movement.

1. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as approved by manufacturer.

2. Field cutting of metal wall panels is not permitted.

3. Fasten metal wall panels to supports with concealed clips at each joint at location, spacing, and with fasteners recommended by manufacturer. Install clips to supports with self-tapping fasteners.

4. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

D. Fasteners for Steel Wall Panels:

1. Exterior: Stainless-steel.

2. Interior: Carbon steel.

E. Metal Protection: Provide metal wall panel manufacturer's recommended permanent separation material where dissimilar metals will contact each other or corrosive substrates.

F. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required or recommended by manufacturer for weatherproof performance of metal wall panel assemblies.

1. Seal metal wall panel end laps to supports or back-up flashing sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer. Do not install sealant in locations that will interfere with drainage of pressure-equalized panel chambers.

2. Prepare joints and apply sealants per requirements of Division 07 Section "Joint Sealants."

3.4 ACCESSORY INSTALLATION

A. General: Install metal wall panel accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install related flashings and sheet metal trim per requirements of Division 07 Section "Sheet Metal Flashing and Trim."

2. Install components required for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

3. Comply with performance requirements and manufacturer's written installation instructions.

4. Provide concealed fasteners except where noted on approved shop drawings.

5. Contractor shall coordinate with the wall panel manufacturer all fasteners that penetrate, and supports that are in contact with, the new wall panel system to ensure material compatibility and minimize damage to new wall panel finish. Follow wall panel manufacturer’s standard recommendations for fastening to and through the new insulated wall panels.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: An independent testing and inspecting agency acceptable to COTR to perform field tests and inspections and to prepare test reports.

B. Water-Spray Test: After completing portion of metal wall panel assembly including accessories and trim, test 2-bay area selected by COTR for water penetration, according to AAMA 501.2. Wall areas should be tested as a routine QA procedure. Areas erected by each crew should be checked at various stages of erection.

C. Manufacturer's Field Service: Engage a service representative authorized by metal wall panel manufacturer to inspect completed installation. Submit written report. Correct deficiencies noted in report.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective films. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.

B. Replace damaged panels and accessories that cannot be repaired by finish touch-up or minor repair.

END OF SECTION

SECTION 07413 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Metal roof panels.

B. Related Sections:
   1. Division 05 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal roof panels.
   2. Division 07 Section "Metal Wall Panels" for factory-formed metal soffit panels.
   3. Division 07 Section "Sheet Metal Flashing and Trim" for field-formed fasciae, copings, flashings, roof drainage systems, and other sheet metal work not part of metal roof panel assemblies.
   4. Division 07 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

1.3 DEFINITIONS

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight roofing system.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:

D. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of roof panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

C. Samples for Initial Selection: For each type of metal roof panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

E. Coordination Drawings: Roof plans, drawn to scale, on which the following are shown and coordinated with each other, based on input from installers of the items involved:

1. Roof panels and attachments.
2. Purlins and rafters.

F. Warranties: Samples of special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain each type of metal roof panels from single source from single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.

B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.

B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate metal roof panels with rain drainage work, flashing, trim, and construction of parapets, walls, and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.2 UNDERLAYMENT MATERIALS

A. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.3 MISCELLANEOUS METAL FRAMING

A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G40 (Z120) hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

B. Hat-Shaped, Rigid Furring Channels:

1. Nominal Thickness: As required to meet performance requirements.
2. Depth: 1-1/2 inches (38 mm).

C. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.4 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 EXPOSED-FASTENER, LAP-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners.

1. Roof panels for Buidling 4619:
    a. Panels shall be “PBU” steel panels manufactured by MBCI as indicated on the Drawings

2.6 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Metal roof panels for Building shall be as follows:
    a. Roof panels shall be by the same manufacturer as the insulated wall panels
    b. “CFR” (non-insulated) standing seam roof panels as manufactured by Metl-Span.
    c. 2” high seams
    d. 36” wide panels
    e. AZ-50 aluminum-zinc coated steel in 24 ga.
    f. Manufacturer’s standard two-piece clip with fasteners concealed in the side joint.
    g. Paint finish on the exterior of panel shall match the type and color of the new insulated wall panels on Building 4755.

2.7 ACCESSORIES

A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. 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.

B. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

C. 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.

D. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

E. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

3.3 METAL ROOF PANEL INSTALLATION, GENERAL

A. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

B. Install metal roof panels as follows:
1. Field cutting of metal panels by torch is not permitted.
2. Locate and space fastenings in uniform vertical and horizontal alignment.
3. Install metal flashing to allow moisture to run over and off metal roof panels.

C. Fasteners:

1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.

D. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

E. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

1. Coat back side of roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.

F. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

3.4 METAL ROOF PANEL INSTALLATION

A. Lap-Seam Metal Roof Panels: Fasten metal roof panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

3.6 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07413

SECTION 07620 – SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following sheet metal flashing and trim:

1. Formed roof flashing and trim.
2. Formed equipment support flashing.
3. Gutters and downspouts.

B. Related Sections include the following:

1. Division 7 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

C. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:

1. Identify material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
4. Details of expansion-joint covers, including showing direction of expansion and contraction.

C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

B. Preinstallation Conference:

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of wall panels, roofing materials, and translucent panels.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003, H-14 Temper.

1. Mill Finish: Standard two-sides bright.
2. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

b. Note: This finish shall be used for all aluminum sheet unless (1) Not exposed to view; (2) Noted to have another type finish.

2.2 UNDERLAYMENT MATERIALS

A. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.

B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

C. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
4. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
5. Nails for Copper Sheet: Copper or hardware bronze, 0.109 inch (2.8 mm) minimum and not less than 7/8 inch (22 mm) long, barbed with large head.

C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

H. Asphalt Roofing Cement: ASTM D 4585, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.

F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

1. Coat side of uncoated aluminum, stainless steel, and lead sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.

2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

1. Cleats shall be continuous, unless noted otherwise.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

1. Aluminum: Use aluminum or stainless steel fasteners.

H. Seal joints with elastomeric sealant as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

I. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

3.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07920 – JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes joint sealants for the following applications:

1. Exterior joints in the following vertical surfaces and horizontal non-traffic surfaces:

a. Joints between metal panels.
b. Joints between different materials listed above.
c. Perimeter joints between materials listed above and frames of doors louvers.
d. Other joints as indicated.

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

D. Qualification Data: For Installer and testing agency.

E. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.

D. Multicomponent Nonsag Polysulfide Sealant ES-1:

1. Type and Grade: M (multicomponent) and NS (nonsag).
2. Class: 25.
3. Use Related to Exposure: NT nontraffic.
4. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

    a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, granite, limestone, marble, ceramic tile, and wood.

E. Single-Component Neutral-Curing Silicone Sealant ES-#2:

1. Type and Grade: S (single component) and NS (nonsag).
2. Class: 50.
3. Use Related to Exposure: NT (nontraffic).

4. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

    a. Use O Joint Substrates: Coated glass, aluminum coated with a high-performance coating, galvanized steel, brick, and wood.

5. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

2.4 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated], and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 COMPRESSIBLE PREFORMED JOINT SEALANTS

A. Preformed Foam Sealant PS-1: Manufacturer's standard preformed, precompressed, opencell foam sealant that is manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent; is factory produced in precompressed sizes in roll or stick form to fit joint widths indicated; is coated on one side with a pressure-sensitive adhesive and covered with protective wrapping; develops a watertight and airtight seal when compressed to the degree specified by manufacturer; and complies with the following:

1. Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.

    a. Density: Manufacturer's Standard.

2.6 PREFORMED TAPE SEALANTS

A. Back-Bedding Mastic Tape Sealant: Preformed, butyl-based elastomeric tape sealant with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for applications in which tape is subject to continuous pressure.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.

B. Joint Priming: Prime joint substrates,where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.

5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Installation of Preformed Tapes: Install according to manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed elastomeric sealant joints as follows:

    a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each type of elastomeric sealant and joint substrate.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab in Appendix X1 in ASTM C 1193, as appropriate for type of joint-sealant application indicated.

    a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
4. Inspect tested joints and report on the following:

    a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
    b. Whether sealants filled joint cavities and are free of voids.
    c. Whether sealant dimensions and configurations comply with specified requirements.

5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

08950 - INSULATED TRANSLUCENT FIBERGLASS SANDWICH PANEL UNIT SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the insulated translucent sandwich panel system and accessories, factory unitized, as shown and specified. Work includes providing and installing:

1. Flat factory prefabricated structural insulated translucent sandwich panels.
2. Aluminum installation system
3. Aluminum sill flashing

B. Related Sections:

1. Joint Sealants: Section 07920
2. Insulated metal wall panel systems: Section 07412

1.2 SUBMITTALS

A. Submit manufacturer’s product data. Include construction details, material descriptions, profiles and finishes of components.

B. Submit shop drawings. Include elevations, details, dimensions and attachments to other work.

C. Submit manufacturer's color charts showing the full range of colors available for factory finished aluminum.

1. When requested, submit samples for each exposed finish required, in same thickness and material indicated for the work and in size indicated below. If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.
   a. Sandwich panels: 14” x 28” units
   b. Factory finished aluminum: 5” long sections

D. Submit Installer Certificate, signed by installer, certifying compliance with project qualification requirements.

E. Submit product test reports from a qualified independent testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed test reports will be acceptable if for current manufacturer and indicative of products used on this project.

1. Test reports required are:
   a. Flame Spread and Smoke Developed (UL 723) – Submit UL Card
   b. Burn Extent (ASTM D-635)
   c. Color Difference (ASTM D-2244)
   d. Abrasion/Erosion Resistance (ASTM D-4060) Impact Strength (UL 972)
   e. Bond Tensile Strength (ASTM C-297 after aging by ASTM D-1037
   f. Bond Shear Strength (ASTM D-1002)
   g. Beam Bending Strength (ASTM E-72)
   h. Insulation U-Factor (NFRC-100)
   i. NFRC System Certification
   j. Condensation Resistance Factor (AAMA 1503)

k. Performance for Windows (AAMA/NWWDA 101/I.S.2) (Optional)
l. Class 1 Fire Approval (FM 4881) (Optional)
m. Blast Analysis and Testing of Translucent Sandwich Panels Demonstrating Equivalent Performance to 1/4" Laminated Glass per DoD UFC 4-010-01. (Optional)

F. Submit current documentation indicating regular, independent quality control monitoring under a nationally recognized building code review and listing program.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications

1. Material and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least ten (10) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location. At least three (3) of the projects shall have been in successful use for ten (10) years or longer.
2. Panel system must be listed by the International Code Council – Evaluation Service (ICC-ES) which requires quality control inspections and fire, structural and water infiltration testing of sandwich panel systems by an approved agency.
3. Quality control inspections and required testing shall be conducted at least once each year and shall include manufacturing facilities, sandwich panel components and production sandwich panels for conformance with "Acceptance Criteria for Sandwich Panels" as regulated by the ICC-ES.

B. Installer's Qualifications: Installation shall be by an experienced installer, which has been in the business of installing specified panel systems for at least five (5) consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.

C. Performance Requirements: The manufacturer shall be responsible for the configuration and fabrication of the complete panel system.

1. When requested, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 DELIVERY STORAGE AND HANDLING

A. Deliver panel system, components and materials in manufacturer's standard protective packaging.

B. Store panels on the long edge, several inches above the ground, blocked and under cover in accordance with manufacturer's storage and handling instructions.

1.5 WARRANTY

A. Submit manufacturer's and installer's written warranty agreeing to repair or replace panel system work which fails in materials or workmanship within one (1) year of the date of delivery. Failure of materials or workmanship shall include leakage, excessive deflection, deterioration of finish on metal in excess of normal weathering and defects in accessories, insulated translucent sandwich panels and other components of the work. (Contact local representative for extended warranty periods.)

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
      a. Kalwall Corporation, tel: (800) 258-9777 – fax: (603) 627-7905 – email: info@kalwall.com
      b. Approved equal.

2.2 PANEL COMPONENTS

A. Face Sheets

1. Translucent faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.
   a. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.
2. Flammability of interior face sheets:
   a. Flamespread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flamespread rating no greater than 50 (20) and smoke developed no greater than 250 (200) when tested in accordance with UL 723.
   b. Burn extent by ASTM D-635 shall be no greater than 1”.
   c. Face sheets shall not deform, deflect or drip when subjected to fire or flame.
   d. Face sheets shall not delaminate when exposed to 200°F for 30 minutes per IBC and NBC (300°F for 25 minutes per UBC and SBC).
3. Weatherability of exterior face sheets:
   a. Color stability: Full thickness of the exterior face sheet shall not change color more than 3.0 CIE Units DELTA E by ASTM D-2244 after 5 years outdoor South Florida weathering at 5 degrees facing south, determined by the average of at least three (3) white samples with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.
   b. Erosion barrier: Exterior face shall have a permanent glass erosion barrier embedded beneath the surface to provide long-term resistance to reinforcing fiber exposure. Exterior face surface loss shall not exceed .7 mils and 40 mgs when tested in accordance with ASTM D-4060 employing CS17 abrasive wheels at a head load of 500 grams for 1000 cycles. Sacrificial surface films or coatings are not acceptable erosion barriers.
4. Appearance:
   a. Exterior face sheets: Smooth, 0.070” thick and crystal in color.
   b. Interior face sheets: Smooth, 0.045” thick and white in color.
   c. Face sheets shall not vary more than +/- 10% in thickness and be uniform in color.
5. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact equal to 70 (230) ft. lbs. without fracture or tear when impacted by a 3-1/4” diameter, 5 lb. free-falling ball per UL 972.

B. Grid Core

1. Thermally broken (aluminum) I-beam grid core shall be of 6063-T6 or 6005-T5 alloy and temper with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I- beam shall be no less than 7/16”. The I-beam grid shall be machined to tolerances of not greater than +/- .002”.
2. Thermal break: Minimum 1”.

C. Laminate Adhesive

1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council "Acceptance Criteria for Sandwich Panel Adhesives."
2. Minimum tensile strength of 750 PSI when the panel assembly is tested by ASTM C-297 after two (2) exposures to six (6) cycles each of the aging conditions prescribed by ASTM D-1037.
3. Minimum shear strength of the panel adhesive by ASTM D-1002 after exposure to five (5) separate conditions:
   a. 50% Relative Humidity at 73° F: 540 PSI
   b. 182° F: 100 PSI
   c. Accelerated Aging by ASTM D-1037 at room temperature: 800 PSI
   d. Accelerated Aging by ASTM D-1037 at 182° F: 250 PSI
   e. 500 Hour Oxygen Bomb by ASTM D-572: 1400 PSI

2.3 PANEL CONSTRUCTION

A. Provide sandwich panels of flat fiberglass reinforced translucent face sheets laminated to a grid core of mechanically interlocking thermally broken (aluminum) I-beams. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat, sharp edge.

1. Thickness: 2-3/4"
2. Light transmission: 20%.
3. Solar heat gain coefficient: .19.
4. U- factor by NFRC certified laboratory: 0.23 thermally broken.
   a. Complete insulated panel system shall have NFRC certified U- factor of 29.
5. Grid pattern: Nominal 12" x 24".

B. Panels shall be deflect no more than 1.9" at 30 psf in 10' 0" span without a supporting frame by ASTM E-72.

C. Panels shall withstand 1200°F fire for minimum one (1) hour without collapse or exterior flaming.

D. Thermally broken panels:

1. Minimum Condensation Resistance Factor of 80 by AAMA 1503 measured on the bond line.
2. Minimum CRF of 90 at center of grid cell.

E. Panel system shall be a Factory Mutual (FM) tested and approved Class 1 wall system in accordance with FM 4881.

2.4 BATTENS AND PERIMETER CLOSURE SYSTEM

A. Closure system: Extruded aluminum 6063-T6 and 6063-T5 alloy and temper clamp-tite screw type closure system.

1. Thermally broken perimeter system shall have a urethane bridge.

B. Sealing tape: Manufacturer's standard, pre-applied to closure system at the factory under controlled conditions.

C. Fasteners: 300 series stainless steel screws for aluminum closures, excluding final fasteners to the building.

D. Finish: Exposed aluminum, including all subsill flashing that will be exposed, to be manufacturer's factory applied finish that meets the performance requirements of AAMA 2604.

1. Color to be white.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, supporting structure and installation conditions. Do not proceed with panel erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint or method recommended by manufacturer.
3. Where aluminum will contact pressure-treated wood, separate dissimilar materials by methods recommended by manufacturer.

3.3 INSTALLATION

A. Install the panel system in accordance with the manufacturer's installation recommendations and approved shop drawings.

1. Anchor component parts securely in place by permanent mechanical attachment system.
2. Accommodate thermal and mechanical movements.
3. Set perimeter framing in a full bed of sealant compound, or with joint fillers or gaskets to provide weather-tight construction.

B. Install joint sealants at perimeter joints and within the panel system in accordance with manufacturer's installation instructions.

3.4 CLEANING

A. Clean the panel system inside and outside, immediately after installation, according to manufacturer's written recommendations.

END OF SECTION

SECTION 09912 - PAINTING (PROFESSIONAL LINE PRODUCTS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, the Government Representative will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:
   a. Finished mechanical and electrical equipment.
   b. Light fixtures.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

   a. Foundation spaces.
   b. Ceiling plenums.
   c. Pipe spaces.

3. Operating parts include moving parts of operating equipment and the following:

   a. Valve and damper operators.
   b. Linkages.
   c. Sensing devices.
   d. Motor and fan shafts.

4. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:

1. Division 5 Section “Metal Fabrications” for shop priming ferrous metal.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

A. Product Data: For each paint system indicated. Include primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.

Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.

D. Qualification Data: For Applicator.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain primers for each coating system from the same manufacturer as the finish coats.

C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.

1. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
2. Final approval of colors will be from benchmark samples.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.7 PROJECT CONDITIONS

A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C).

B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F (7 and 35 deg C).

C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.8 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to the Government Representative.

1. Quantity: Furnish Government with an additional 3 percent, but not less than 1 gal..

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Benjamin Moore & Co. (Benjamin Moore).
2. PPG Industries, Inc. (Pittsburgh Paints).
3. Sherwin-Williams Co. (Sherwin-Williams).
4. Or approved equal.

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

C. Colors: Match the Government Representative’s samples; as indicated by manufacturer’s designations; and as selected by the Government Representative from manufacturer’s full range.

2.3 EXTERIOR PRIMERS

A. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application.

1. Benjamin Moore; Moore's IMC Alkyd Metal Primer No. M06: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).
2. Pittsburgh Paints; 6-208 Speedhide Int./Ext. Rust Inhibitive Metal Primer: Applied at a dry film thickness of not less than 2.0 mils.

3. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils (0.076 mm).

B. Exterior Galvanized Metal Primer: Factory-formulated galvanized metal primer for exterior application.

1. Benjamin Moore; Moore's IMC Acrylic Metal Primer No. M04: Applied at a dry film thickness of not less than 2.0 mils (0.051 mm).
2. Pittsburgh Paints; 90-712 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 3.0 mils.
3. Sherwin-Williams; Galvite HS Paint B50WZ3: Applied at a dry film thickness of not less than 2.0 mils.

2.4 EXTERIOR FINISH COATS

A. Exterior Semigloss Acrylic Enamel: Factory-formulated semigloss waterborne acrylic-latex enamel for exterior application.

1. Benjamin Moore; Moorcraft Super Spec Latex House & Trim Paint No. 170: Applied at a dry film thickness of not less than 1.1 mils.
2. Pittsburgh Paints; 6-900 Series SpeedHide Exterior House & Trim Semi-Gloss Acrylic Latex Paint: Applied at a dry film thickness of not less than 1.5 mils.
3. Sherwin-Williams; A-100 Latex Gloss A8 Series: Applied at a dry film thickness of not less than 1.3 mils.

B. Exterior Full-Gloss Acrylic Enamel for Wood: Factory-formulated full-gloss waterborne acrylic-latex enamel for exterior application.

1. Benjamin Moore; Moore’s IMC Acrylic Gloss Enamel M28: Applied at a dry film thickness of not less than 2.0 mils.
2. Pittsburgh Paints; 90 Line Pitt-Tech One Pack Interior/Exterior High Performance Waterborne High Gloss DTM Industrial Enamels: Applied at a dry film thickness of not less than 3.0 mils.
3. Sherwin-Williams; DTM Acrylic Coating Gloss (Waterborne) B66W100 Series: Applied at a dry film thickness of not less than 2.4 mils.
4. Sherwin-Williams; SuperPaint Exterior High Gloss Latex Enamel A85 Series: Applied at a dry film thickness of not less than 1.2 mils.

C. Exterior Full-Gloss Alkyd Enamel: Factory-formulated full-gloss alkyd enamel for exterior application.

1. Benjamin Moore; Moore’s IMC Urethane Alkyd Enamel M22: Applied at a dry film thickness of not less than 2.0 mils.
2. Pittsburgh Paints; 7-282 Pittsburgh Paints Industrial Gloss-Oil Interior/Exterior Enamel: Applied at a dry film thickness of not less than 1.5 mils.
3. Sherwin-Williams; Industrial Enamel B-54 Series: Applied at a dry film thickness of not less than 2.0 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify Contracting Officer about anticipated problems when using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Prepare concrete surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
   a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
5. Paint surfaces behind movable equipment the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
6. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
7. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
8. Sand lightly between each succeeding enamel coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Apply primer over metal surfaces that have been shop primed and touchup painted.
3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Uninsulated metal piping.
2. Uninsulated plastic piping.
3. Pipe hangers and supports.
4. Tanks that do not have factory-applied final finishes.
5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
8. Roof top equipment.

G. Electrical items to be painted include, but are not limited to, the following:

1. Switchgear.
2. Panelboards.
3. Electrical equipment that is indicated to have a factory-primed finish for field painting.
4. Roof top equipment.

H. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or

unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

I. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by COTR.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 EXTERIOR PAINT SCHEDULE

A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

1. Full-Gloss Alkyd-Enamel Finish: Two finish coats over a rust-inhibitive primer.

a. Primer: Exterior ferrous-metal primer.
b. Finish Coats: Exterior full-gloss alkyd enamel.

B. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated metal surfaces:

1. Full-Gloss Alkyd-Enamel Finish: Two finish coats over a galvanized metal primer.

a. Primer: Exterior galvanized metal primer.
b. Finish Coats: Exterior full-gloss alkyd enamel.

END OF SECTION 09912

SECTION 10200 - LOUVERS AND VENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Fixed, extruded-aluminum louvers.

B. Related Sections include the following:
   1. Division 9 Section "Painting (Professional Line Products)" for field painting louvers.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide louvers capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act on vertical projection of louvers.

   1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
   2. Wind Loads: Determine loads based on a uniform pressure of 30 lbf/sq. ft. (1436 Pa), acting inward or outward.

B. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

C. Air-Performance, Water-Penetration, Air-Leakage, and Wind-Driven Rain Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other Work. Show blade profiles, angles, and spacing.

1. For installed louvers and vents indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Wiring Diagrams: Power, signal, and control wiring for motorized adjustable louvers.

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

D. Samples for Verification: For each type of metal finish required.

E. Qualification Data: For professional engineer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.2, "Structural Welding Code--Aluminum."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."

C. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

D. UL and NEMA Compliance: Provide motors and related components for motor-operated adjustable louvers that are listed and labeled by UL and comply with applicable NEMA standards.

1.7 PROJECT CONDITIONS

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

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating louvers without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T5 or T-52.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Aluminum Castings: ASTM B 26/B 26M, alloy 319.

D. Fasteners: Of same basic metal and alloy as fastened metal or 300 Series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.

1. Use types and sizes to suit unit installation conditions.
2. Use Phillips flat-head or Phillips pan-head screws for exposed fasteners, unless otherwise indicated.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 FABRICATION, GENERAL

A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Maintain equal louver blade spacing to produce uniform appearance.

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

1. Frame Type: Channel, unless otherwise indicated.

D. Include supports, anchorages, and accessories required for complete assembly.

E. Where indicated, provide subsills made of same material as louvers.

F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

G. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer, concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal, Drainable-Blade Louver:

1. Basis-of-Design Product: Complying with of one of the following:
   a. Requirements in first four subparagraphs and associated subparagraphs below are based on horizontal, drainable-blade louvers available from listed manufacturers. Revise to suit Project.
   b. Louver Depth: 4 inches (100 mm).
   c. Insert descriptive requirements below that relate to appearance, such as blade spacing and angle, if required. If inserting such requirements, verify that louvers are available that comply with these requirements and with performance requirements selected.
   d. Frame and Blade Nominal Thickness: As required to comply with structural performance requirements, but not less than .125 inch (3.2 mm) for blades and frames.
   e. Mullion Type: Exposed.
   f. Performance Requirements:
      1) Free Area: Not less than 54% free area.
      2) AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.
2. Screen Location for Adjustable Louvers: Interior face, unless otherwise indicated.
3. Screening Type: Bird screening.

B. Secure screens to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same kind and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
2. Finish: Same finish as louver frames to which louver screens are attached.
3. Type: Non-rewirable, U-shaped frames for permanently securing screen mesh.

D. Louver Screening for Aluminum Louvers:

1. Bird Screening: Aluminum, 1/2-inch- (12.7-mm-) square mesh, 0.063-inch (1.6-mm) wire.

2.5 BLANK-OFF PANELS

A. Insulated, Blank-off Panels: Laminated metal-faced panels consisting of insulating core surfaced on back and front with metal sheets.

1. Thickness: 1 inch (25 mm).
2. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch (0.8-mm) nominal thickness.
3. Insulating Core: Foamed-plastic rigid insulation board.
4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard extruded-aluminum-channel frames, not less than 0.080-inch (2.0-mm) nominal thickness, with corners mitered and with same finish as panels.
5. Seal perimeter joints between panel faces and louver frames with 1/8-by-l-inch (3.2-by-25-mm) PVC compression gaskets.
6. Panel Finish: Same type of finish applied to louvers, but black color.
7. Attach blank-off panels to back of louver frames with stainless-steel, sheet metal screws.
8. Locate blank-off panels at remaining louver sections that have fixed ductwork attached to louver. Blank-off panel will extend from the ductwork to the nearest fixed vertical or horizontal mullion of the louver frame.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish louvers after assembly.

2.7 ALUMINUM FINISHES

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

B. High-Performance Organic-Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Fluoropolymer Two-Coat Coating System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

a. Color and Gloss: As selected by COTR from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

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

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in light gage steel frame construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

F. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

C. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by the COTR, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 10200

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Mechanical sleeve seals.
5. Sleeves.
6. Escutcheons.
7. Grout.
8. Mechanical demolition.
9. Equipment installation requirements common to equipment sections.
10. Painting and finishing.
11. Concrete bases (equipment pads).
12. Supports and anchorages.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. HDPE: High density polyethylene plastic.
4. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Dielectric fittings.
2. Mechanical sleeve seals.
3. Escutcheons.

B. Welding certificates.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.6 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for mechanical items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

1. Available Manufacturers:

a. Capitol Manufacturing Co.
b. Central Plastics Company.
c. Eclipse, Inc.
d. Epco Sales, Inc.
e. Hart Industries, International, Inc.
f. Watts Industries, Inc.; Water Products Div.
g. Zurn Industries, Inc.; Wilkins Div.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

1. Available Manufacturers:

a. Capitol Manufacturing Co.
b. Central Plastics Company.
c. Epco Sales, Inc.
d. Watts Industries, Inc.; Water Products Div.

2.5 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Available Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.
e. Link-Seal.

2.6 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe: ASTM D 1785, Schedule 40.

G. Molded HDPE: Reusable, HDPE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.7 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated or rough brass.

D. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

E. One-Piece, Floor-Plate Type: Cast-iron floor plate.

F. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.8 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type with spring clips.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated or rough-brass finish.
g. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
h. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

2. Existing Piping: Use the following:

a. Insulated Piping: Split-plate, stamped-steel type with concealed or exposed-rivet hinge and spring clips.
b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
c. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and set screw.
d. Bare Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed or exposed-rivet hinge and set screw or spring clips.
e. Bare Piping in Equipment Rooms: Split-plate, stamped-steel type with set screw or spring clips.
f. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.

M. Sleeves are not required for core-drilled holes.

N. Permanent sleeves are not required for holes formed by removable PE sleeves.

O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

P. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

Q. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

R. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section "Through-Penetration Firestop Systems" for materials.

S. Verify final equipment locations for roughing-in.

T. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. HDPE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.6 CONCRETE BASES (EQUIPMENT PADS)

A. Concrete Bases: Anchor equipment to concrete base (3000 psi concrete) according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1.

3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.9 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 15050

SECTION 15060 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following hangers and supports for mechanical system piping and equipment:

1. Steel pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Pipe positioning systems.
5. Equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Steel pipe hangers and supports.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

C. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

B. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.

2.5 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for piping that is subject to scratching.

F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F (49 to 232 deg C) pipes, NPS 4 to NPS 16 (DN 100 to DN 400), requiring up to 4 inches (100 mm) of insulation.
3. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24 (DN 15 to DN 600), if little or no insulation is required.
4. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS ***6***, to allow off-center closure for hanger installation before pipe erection.
5. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8 (DN 15 to DN 200).
6. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36 (DN 100 to DN 900), with steel pipe base stanchion support and cast-iron floor flange.

7. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30 (DN 25 to DN 750), from 2 rods if longitudinal movement caused by expansion and contraction might occur.

G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500).

H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
4. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
5. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
6. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.

K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).

L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

N. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

O. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.2 HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

M. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

1. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm)

3.6 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 painting Sections**.**

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 15060

SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Common electrical installation requirements.

1.3 DEFINITIONS

A. ATS: Acceptance Testing Specifications.

B. EPDM: Ethylene-propylene diene monomer rubber.

C. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

A. Test Equipment Suitability and Calibration: Comply with NETA ATS, "Suitability of Test Equipment" and "Test Instrument Calibration."

1.6 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.

4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch (1.3- or 3.5-mm) thickness as indicated and of length to suit application.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Rectangular Sleeve Minimum Metal Thickness:

1. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side greater than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches (1270 mm) and 1 or more sides equal to, or greater than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.

G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.

K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

3.3 FIELD QUALITY CONTROL

A. Inspect installed sleeve and sleeve-seal installations.

END OF SECTION 16050