EVERGREEN ARCHITECTS

SPECIFICATIONS

Express / Food / Gas

Fort Meade, Maryland

AAFES Project: 0206-09-000001

Solicitation Set

August 24, 2012

STATE OF OHIO
EVERGREEN ARCHITECTS
TODD D. MARTIN
10108
REGISTERED ARCHITECT

EXCHANGE
ARMY & AIR FORCE EXCHANGE SERVICE

SPECIFICATIONS INDEX

EXPRESS / FOOD / GAS
FORT MEADE, MARYLAND
AAFES PROJECT #0206-09-000001

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SECTION INDEX PAGE(S)

DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS
SECTION 00404 - SUBSTITUTION SHEET ..... 1 - 2

DIVISION 1 - GENERAL REQUIREMENTS
SECTION 01100 - SUMMARY OF WORK ..... 1 - 6
SECTION 01110 - AAFES FURNISHED AND INSTALLED EQUIPMENT ..... 1 - 2
SECTION 01120 - AAFES FURNISHED/CONTRACTOR INSTALLED EQUIPMENT ..... 1 - 2
SECTION 01150 - SPECIAL REQUIREMENTS OF THE INSTALLATION ..... 1 - 2
SECTION 01200 - PRICE AND PAYMENT PROCEDURES ..... 1 - 2
SECTION 01230 - BID OPTION ..... 1 - 2
SECTION 01300 - ADMINISTRATIVE REQUIREMENTS ..... 1 - 6
SECTION 01310 - SUBMITTALS ..... 1 - 8
SECTION 01340 - SAFETY REGULATIONS AND CODES ..... 1 - 8
SECTION 01350 - SAFETY POLICIES AND PROCEDURES ..... 1 - 6
SECTION 01352 - LEED REQUIREMENTS ..... 1 - 10
SECTION 01360 - ENVIRONMENTAL PROTECTION ..... 1 - 6
SECTION 01370 - EROSION AND SEDIMENT CONTROL ..... 1 - 8
SECTION 01400 - QUALITY CONTROL ..... 1 - 2
SECTION 01410 - TESTING SERVICES ..... 1 - 2
SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS ..... 1 - 4
SECTION 01510 - TEMPORARY UTILITIES ..... 1 - 4
SECTION 01570 - CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT ..... 1 - 10
SECTION 01580 - TEMPORARY PROJECT IDENTIFICATION AND SIGNS ..... 1 - 4
SECTION 01590 - FIELD OFFICES AND SHEDS ..... 1 - 2
SECTION 01600 - MATERIAL AND EQUIPMENT ..... 1 - 6
SECTION 01710 - CUTTING AND PATCHING ..... 1 - 2
SECTION 01720 - CLEANING ..... 1 - 2
SECTION 01740 - STARTING OF SYSTEMS ..... 1 - 2
SECTION 01750 - PROJECT CLOSEOUT ..... 1 - 2
SECTION 01760 - PROJECT RECORD DOCUMENTS ..... 1 - 2
SECTION 01770 - OPERATION AND MAINTENANCE DATA ..... 1 - 4
SECTION 01810 - COMMISSIONING ..... 1 - 4

DIVISION 2 - SITEWORK
SECTION 02050 - GEOTECHNICAL REPORT ..... 1 - 46
SECTION 02055 - GROUND PENETRATING RADAR (GPR) REPORT ..... 1 - 22
SECTION 02100 - SITE PREPARATION ..... 1 - 4
SECTION 02111 - SELECTIVE SITE DEMOLITION ..... 1 - 2
SECTION 02211 - ROUGH GRADING ..... 1 - 4
SECTION 02300 - EARTHWORK ..... 1 - 8
SECTION 02360 - TERMITE CONTROL ..... 1 - 6
SECTION 02505 - MANHOLE AND COVERS ..... 1 - 4
SECTION 02510 - WATER DISTRIBUTION ..... 1 - 64
SECTION 02530 - SANITARY SEWERAGE ..... 1 - 48
SECTION 02722 - SITE STORM SEWER ..... 1 - 4
SECTION 02740 - BITUMINOUS PAVING ..... 1 - 6
SECTION 02750 - SITE CONCRETE WORK ..... 1 - 6
SECTION 02820 - CHAIN LINK FENCES AND GATES ..... 1 - 4
SECTION 02870 - SITE FURNISHINGS ..... 1 - 2
SECTION 02923 - LANDSCAPE GRADING ..... 1 - 2
SECTION 02936 - SEEDING ..... 1 - 4
SECTION 02950 - TREES, PLANTS AND GROUND COVER ..... 1 - 6

DIVISION 3 - CONCRETE
SECTION 03300 - CAST-IN-PLACE CONCRETE ..... 1 - 8
SECTION 03345 - CAST IN PLACE - INTERGRAL COLORED CONCRETE ..... 1 - 16
SECTION 03354 - INTERIOR CONCRETE SLAB REPAIRS AND JOINT FILLER REPLACEMENT ..... 1 - 8
SECTION 03357 - NEW INTEGRAL COLORED POLISHED CONCRETE FLOOR FINISH ..... 1 - 6

DIVISION 4 - MASONRY
SECTION 04300 - MASONRY ASSEMBLIES ..... 1 - 6
SECTION 04900 - MASONRY CLEANING ..... 1 - 2

DIVISION 5 - METALS
SECTION 05120 - STRUCTURAL STEEL ..... 1 - 4
SECTION 05210 - METAL JOISTS ..... 1 - 4
SECTION 05310 - STEEL ROOF DECK ..... 1 - 2
SECTION 05400 - COLD FORMED METAL FRAMING ..... 1 - 4
SECTION 05500 - METAL FABRICATIONS ..... 1 - 4

DIVISION 6 - WOOD AND PLASTIC
SECTION 06100 - ROUGH CARPENTRY ..... 1 - 4
SECTION 06200 - FINISH CARPENTRY ..... 1 - 4
SECTION 06400 - CUSTOM CASEWORK ..... 1 - 4
SECTION 06620 - PLASTIC FABRICATIONS ..... 1 - 2

DIVISION 7 - THERMAL AND MOISTURE PROTECTION
SECTION 07210 - BUILDING INSULATION ..... 1 - 4
SECTION 07424 - COMPOSITE WALL PANELS ..... 1 - 6
SECTION 07535 - SINGLE-PLY ROOFING - MECHANICALLY ATTACHED ..... 1 - 4
SECTION 07620 - SHEET METAL FLASHING AND TRIM ..... 1 - 4
SECTION 07900 - JOINT SEALERS ..... 1 - 4

DIVISION 8 - DOORS AND WINDOWS
SECTION 08120 - METAL FRAMES ..... 1 - 2
SECTION 08130 - METAL DOORS ..... 1 - 4

SECTION 08210 - FLUSH WOOD DOORS ..... 1 - 4
SECTION 08310 - ACCESS DOORS ..... 1 - 2
SECTION 08330 - OVERHEAD COILING GRILLES ..... 1 - 2
SECTION 08380 - DOUBLE ACTION DOORS ..... 1 - 2
SECTION 08410 - ALUMINUM FRAMING SYSTEMS ..... 1 - 6
SECTION 08425 - AUTOMATIC SLIDING ENTRY DOORS - BLAST RESISTANT ..... 1 - 8
SECTION 08710 - DOOR HARDWARE ..... 1 - 8
SECTION 08800 - GLAZING ..... 1 - 4

DIVISION 9 - FINISHES
SECTION 09260 - GYPSUM BOARD SYSTEMS ..... 1 - 4
SECTION 09300 - TILE ..... 1 - 4
SECTION 09510 - SUSPENDED ACOUSTICAL CEILINGS ..... 1 - 4
SECTION 09650 - RESILIENT FLOORING ..... 1 - 2
SECTION 09680 - TILE CARPETING ..... 1 - 4
SECTION 09720 - WALL COVERING ..... 1 - 4
SECTION 09900 - PAINTING ..... 1 - 8

DIVISION 10 - SPECIALTIES
SECTION 10100 - VISUAL DISPLAY BOARDS ..... 1 - 2
SECTION 10260 - WALL AND CORNER GUARDS ..... 1 - 2
SECTION 10440 - WALL AND DOOR SIGNS ..... 1 - 2
SECTION 10500 - METAL WARDROBE LOCKERS ..... 1 - 2
SECTION 10520 - FIRE PROTECTION SPECIALTIES ..... 1 - 2
SECTION 10670 - STORAGE SHELVING ..... 1 - 2
SECTION 10710 - METAL SUN SHADES ..... 1 - 2
SECTION 10800 - WASHROOM ACCESSORIES ..... 1 - 4

DIVISION 11 - EQUIPMENT
..... NOT APPLICABLE

DIVISION 12 - FURNISHINGS
..... NOT APPLICABLE

DIVISION 13 - SPECIAL CONSTRUCTION
SECTION 13048 - CANOPY ..... 1 - 4
SECTION 13050 - GASOLINE DISPENSING AND UNDERGROUND STORAGE TANK SYSTEMS. 1 - 24
SECTION 13720 - INTRUSION DETECTION ..... 1 - 10
SECTION 13851 - FIRE ALARM ..... 1 - 14
SECTION 13853 - MASS NOTIFICATION SYSTEM ..... 1 - 8
SECTION 13915 - WET PIPE SPRINKLER SYSTEM ..... 1 - 12

DIVISION 14 - CONVEYING SYSTEMS
..... NOT APPLICABLE

DIVISION 15 - MECHANICAL
SECTION 15010 - GENERAL PROVISIONS ..... 1 - 4
SECTION 15013 - CLEANING, TESTING, AND ADJUSTING ..... 1 - 2
SECTION 15050 - BASIC MATERIALS AND METHODS ..... 1 - 12
SECTION 15067 - TESTING PIPING SYSTEMS ..... 1 - 2
SECTION 15076 - IDENTIFICATION FOR PLUMBING AND HVAC PIPING EQUIPMENT ..... 1 - 6
SECTION 15250 - INSULATION ..... 1 - 4
SECTION 15400 - PLUMBING ..... 1 - 6
SECTION 15450 - PLUMBING FIXTURES AND TRIM ..... 1 - 4
SECTION 15488 - FUEL GAS PIPING ..... 1 - 6
SECTION 15530 - REFRIGERANT PIPING ..... 1 - 6

SECTION 15782 - ROOFTOP UNITS ..... 1 - 6
SECTION 15815 - METAL DUCTS ..... 1 - 4
SECTION 15820 - DUCT ACCESSORIES ..... 1 - 4
SECTION 15851 - ENERGY RECOVERY VENTILATORS ..... 1 - 4
SECTION 15853 - POWER VENTILATIONS ..... 1 - 4
SECTION 15855 - DIFFUSERS, REGISTERS, AND GRILLES ..... 1 - 2
SECTION 15861 - AIR FILTERS ..... 1 - 2
SECTION 15990 - TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS ..... 1 - 2

DIVISION 16 - ELECTRICAL
SECTION 16111 - CONDUIT ..... 1 - 4
SECTION 16118 - DUCT BANK ..... 1 - 4
SECTION 16123 - BUILDING WIRE AND CABLE ..... 1 - 4
SECTION 16130 - BOXES ..... 1 - 4
SECTION 16141 - WIRING DEVICES ..... 1 - 4
SECTION 16150 - MANUFACTURED WIRING SYSTEMS ..... 1 - 2
SECTION 16160 - CABINETS AND ENCLOSURES ..... 1 - 2
SECTION 16170 - GROUNDING AND BONDING ..... 1 - 2
SECTION 16190 - SUPPORTING DEVICES ..... 1 - 2
SECTION 16195 - ELECTRICAL IDENTIFICATION ..... 1 - 2
SECTION 16426 - DISTRIBUTION SWITCHBOARDS ..... 1 - 4
SECTION 16441 - ENCLOSED SWITCHES ..... 1 - 2
SECTION 16470 - PANELBOARDS ..... 1 - 4
SECTION 16477 - FUSES ..... 1 - 2
SECTION 16481 - ENCLOSED MOTOR CONTROLLERS ..... 1 - 4
SECTION 16485 - ENCLOSED CONTACTORS ..... 1 - 2
SECTION 16510 - INTERIOR LUMINAIRES ..... 1 - 4
SECTION 16530 - SITE LIGHTING ..... 1 - 4
SECTION 16685 - TRANSIENT VOLTAGE SURGE SUPPRESSORS (TVSS) ..... 1 - 4
SECTION 16741 - TELEPHONE SERVICE, RACEWAYS AND WIRING ..... 1 - 4
SECTION 16901 - ELECTRICAL SENSING AND MEASUREMENT ..... 1 - 2
SECTION 16902 - ELECTRIC CONTROLS ..... 1 - 2
SECTION 16904 - OCCUPANCY SENSORS ..... 1 - 2
SECTION 16950 - TESTING ..... 1 - 2

END OF SPECIFICATION INDEX

SECTION 00404 - PRODUCT SUBSTITUTION

PART 1 - GENERAL

1.1 CONTRACTING OFFICERS APPROVAL

A. The Contract is based on materials and methods described in the Contract Document.

B. The Contracting Officer will consider proposals for substitution of materials, equipment and methods only when such proposals are accompanied by full and complete technical data and all other information required by the Contracting Officer to evaluate the proposed substitution. All request for product substitution must be submitted to the Contracting Officer no later than ten (10) calendar days prior to Solicitation due date.

C. Do not substitute materials or equipment, unless such substitution has been specifically approved for this Work by the Contracting Officer.

1.2 “OR EQUAL”

A. Where the phrase “or equal” or “equal as approved in advance by the Contracting Officer”occurs in the Contract Documents, does not assume that material and equipment will be approved as equal by the Contracting Officer unless the item has been specifically approved for this work by the Contracting Officer.

B. The decision of the Contracting Officer shall be final.

1.3 AVAILABILITY OF SPECIFIED ITEMS

A. Verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the Work.

B. In the event specified item or items will not be so available, notify the Contracting Officer no later than 10 days prior to Solicitation due date.

C. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by AAFES.

D. Substitutions may be considered by the Contracting Officer when a Product becomes unavailable through no fault of the Contractor.

1.4 AFTER THE CONTRACT IS AWARDED, NO FURTHER SUBSTITUTIONS WILL BE PERMITTED.

END OF SECTION

SECTION 01100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 STATEMENT OF WORK

A. Scope

1. The work covered by these specifications consists of furnishing all plant, supervision, labor, equipment, licenses, permits, and materials necessary to perform all operations required to construct and complete an Express / Food / Gas in accordance with these specifications and the applicable drawings, and subject to the terms and conditions of the contract.

B. Bid Options

1. For additional information, see specification Section 01230 - BID OPTION.

C. Location

1. The work to be performed is located at Ft. Meade, Maryland.

D. General Provisions

1. The Contractor is advised to take note of the following General Provisions of the Contract: Cleaning up; Materials and Workmanship; Accident Prevention; Protection of Existing Vegetation, Structures, Utilities and Improvements; Operation and Storage Areas; Site Investigation; Permits and Responsibilities.

2. Copies of Exhibit A: General Provisions are contained in solicitation documentation.

1.2 SPECIAL REQUIREMENTS OF THE INSTALLATION

A. No streets shall be blocked without Installation headquarters approval.

B. Contractor shall immediately clean up any debris tracked on to the Installation's streets resulting from this construction operation.

C. Construction areas including equipment storage areas shall be kept clean and neat.

D. No burning is permitted on the Installation.

E. For additional information, see specification SECTION 01150 - REQUIREMENTS OF THE INSTALLATION.

1.3 DRAWINGS AND SPECIFICATIONS

A. The General Contractor will be provided with 1 set of full size set of drawings and specifications, and 1 CD / DVD with drawings and specifications.

1.4 LAYING OUT WORK

A. Layout

1. Dimensions and elevations indicated in layout of work shall be verified by the General Contractor. Discrepancies between Drawings, Specifications, and Existing Conditions shall be referred to the Contracting Officer in writing for adjustment before work affected is performed. Failure to make such notifications shall place responsibility upon the Contractor to carry out work in a satisfactory and workmanlike manner.

B. The Contractor shall be held responsible for the location and elevation of all the construction contemplated by the construction documents.

C. Prior to commencing work, the Contractor shall carefully compare and check all Civil, Gasoline Dispensing, Architectural, Structural, Mechanical, and Electrical drawings, each with the other, that in any way affect the locations or elevation of the work to be executed by the Contractor, and should any discrepancy be found, the Contractor shall immediately report the same to the Contracting Officer for verifications and adjustment. Any duplication of work made necessary by failure or neglect on the Contractor's part to comply with this function shall be done at his sole expense.

D. Field Dimensions

1. The drawings accompanying these specifications indicate generally the design and arrangement of all apparatus, fixtures, accessories, etc. necessary to complete the work

required. The exact location or arrangement of equipment is subject to minor changes necessitated by field conditions and shall be made as required without additional cost to AAFES. Measurements shall be verified by actual observations at the construction site, and the Contractor shall be responsible for all work fitting into place in a satisfactory and workmanlike manner meeting the approval of the Contracting Officer.

1.5 EXISTING OVERHEAD OR UNDERGROUND WORK

A. Carefully check the site where this project is to be erected and observe any overhead wires and equipment. Any such work shall be moved, replaced, or protected, as required, whether or not shown or specified.

B. Attention is directed to the existence of pipe and other underground improvements which are shown on the drawings. All reasonable precautions shall be taken to preserve and protect all such improvements shown on the drawings.

C. Locations of underground lines shown on the drawings are based on the best available sources and are to be regarded as approximate only. Exercise extreme care in locating and identifying these lines before excavating in adjacent areas.

1.6 INTERRUPTION OF EXISTING UTILITIES SERVICES

A. The Contractor shall perform the work under this Contract with a minimum of outage time for all utilities. Interruption shall be approved on an individual utility and occurrence basis. In some cases, the Contractor may be required to perform the work while the existing utility is in service. The existing utility services may be interrupted only when approved by the Contracting Officer. When it is necessary to interrupt the existing utilities, the Contractor shall notify the Contracting Officer and facilities engineer in writing at least fifteen (15) days in advance of the time he desires the existing service to be interrupted. The interruption time shall be kept to a minimum. Depending upon the activities at the facility which require continuous service from the existing utility, an interruption may not be subject to schedule at the time desired by the Contractor. In such cases the interruption may have to be scheduled at a time of minimum requirement of demand for the utility. The amount of time requested by the Contractor for interruption of existing utility services shall be as approved by the Contracting Officer.

B. See specification SECTION 01150 - REQUIREMENTS OF THE INSTALLATION for additional Excavation Work Procedural Requirements.

1.7 EXCAVATION

A. Prior to commencing any excavation work the Contractor shall obtain a valid Public Works Dig Permit in person at Bldg. 2012, Room 008. It shall be the Contractor's responsibility to obtain the necessary signatures and coordination for the permit. Allow a minimum of fifteen (15) days for permit approval. After the permit is received, the Contractor shall notify Public Works 48 hours prior to starting excavation work.

B. See specification SECTION 01150 - REQUIREMENTS OF THE INSTALLATION for additional Excavation Work Procedural Requirements.

1.8 WELDING PERMIT

A. Prior to commencing any welding, the Contractor shall obtain a welding permit from Fire Department. Allow a minimum of thirty (30) days for permit approval.

1.9 BARRICADES AND WARNING DEVICES

A. The Contractor shall provide barricades and lighting devices, in accordance with Manual for Uniform Traffic Control Devices by Department of Transportation, Latest Edition, at all points of excavation and construction in vehicle traffic areas.

1.10 PROTECTION FOR OPEN FLAME DEVICES

A. When open flame and/or spark producing devices, i.e., acetylene oxygen welding equipment, electric arc welding, etc., are employed for job accomplishment, the following procedures are mandatory:

1. Inspect all surroundings and equipment to insure that combustible substances are not present

in any area where contact of metal at a temperature above the flashpoint of any compound is possible.

2. Ensure that no open containers or spills of combustible substances are present.
3. Ensure that ignition is not possible by conduction, convection, radiation, or dispersion of molten metal.
4. Proper protection equipment and practices will be used, i.e., fireproof blankets, wetting of surrounding area, removal of combustible materials where practicable, earth filled backing and portable fire extinguishers of proper type on hand.
5. When the above devices are being used notify the Installation Fire Department 24 hours ahead of usage.

1.11 FIRE PROTECTION

A. The Contractor shall at all times maintain good housekeeping practices to reduce the risk of fire damage. All scrap materials, rubbish, and trash shall be removed daily from in and about the building and shall not be permitted to be scattered on adjacent property.

B. Suitable storage space shall be provided 50 feet minimum outside the building area for storing flammable materials and paints; no storage will be permitted in the building. Excess flammable liquids being used inside the building shall be kept in closed metal containers and removed from the building during unused periods.

C. The Contractor shall provide a fire extinguisher at each location where cutting and/or welding is being performed. Where electric or gas welding or cutting is done, interposed shields of incombustible material shall be used to protect against fire damage due to sparks and hot metal.

D. When temporary heating devices are used, a watchman shall be present to cover all periods when other workmen are not on the premises.

E. The Contractor shall provide fire extinguishers in accordance with the recommendations of NFPA Nos. 10 and 241. However, in all cases a minimum of four (4) fire extinguishers shall be available for each building.

F. Fire Codes: The Contractor shall obey all requirements of the National Fire Codes, Army Fire Regulations and Installation Fire Regulations, as they relate to his work on the Installation.

1.12 WORK BY OTHERS

A. Work not included: Except for such auxiliary work as is shown or specified or is necessary as a part of the construction, the following work is not included in the Contract:
1. Any work shown, but marked "NOT IN CONTRACT" (N.I.C.).
2. Any work indicated to be furnished and installed by AAFES.

1.13 EQUIPMENT

A. See specification SECTION 01110: AAFES FURNISHED AND INSTALLED EQUIPMENT, and drawings for (AF/AI).

B. See specification SECTION 01120: AAFES FURNISHED CONTRACTOR INSTALLED EQUIPMENT and Drawings for (AF/CI).

C. Refer to the Army & Air Force Exchange Service General Provisions: Other Contracts, AAFES - Furnished Property.

1.14 LINING OF JOINTS IN FINISH MATERIALS

A. It shall be the responsibility of the Contractor to make certain in the installation of jointed floor, wall, and ceiling materials that:
1. The joints line through in a straight line and in both directions wherever possible.
2. The joints relate to all openings and breaks in the structure and be symmetrically placed wherever possible. This includes heating registers, light fixtures, equipment, etc.

B. If, because of the non-related sizes of the various materials and locations of openings, etc., it is not possible to accomplish the above, the Contractor shall meet with the Architect to determine the most satisfactory arrangement.

C. The Contractor shall establish center lines for all trades.

1.15 INTEGRATING WORK

A. All streets, buildings, and other improvements shall be protected from damage.

B. Contractor's operations shall be confined to the immediate vicinity of the project work and shall not in any way interfere with or obstruct the ingress or egress to and from street or adjacent property.

C. If new work is to be connected to existing work, special care shall be exercised not to disturb or damage the existing work more than necessary. All damaged work shall be replaced, repaired, and restored to its original condition at no cost to AAFES.

1.16 HEADROOM UNDER PIPES

A. All horizontal runs of plumbing and heating pipes and/or electrical conduit suspended from ceilings shall provide for a maximum headroom clearance. In no case shall this clearance be less than 7'-0" without written consent from the Contracting Officer.

B. Where piping or conduit is left exposed within a room, the same shall run true to plumb, horizontal or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.

1.17 PATCHING GOVERNMENT-OWNED FACILITIES

A. Government-owned structures, facilities, streets, curbs, walks, etc., that are damaged or removed due to required excavations or other construction work, shall be patched, repaired or replaced, and be left in their original state of repair by the Contractor, to the satisfaction of the Architect and of authorities having jurisdiction thereover.

1.18 LOCATION OF EQUIPMENT AND PIPING

A. Drawings showing location of equipment, piping, ductwork, etc., are diagrammatic and job conditions shall not always permit their installation in the location shown.

B. When job conditions prohibit installation of equipment, piping, ductwork, etc. in location shown, it shall be brought to the Contracting Officer's attention immediately and the relocation determined in a joint conference.
   1. The Contractor will be held responsible for the relocation of any items installed without first obtaining the Contracting Officer's approval.
   2. The Contractor shall remove and relocate non-approved items at his own expense if so directed by the Contracting Officer.

1.19 OVERLOADING

A. The Contractor shall be held responsible if overloading occurs to any part or parts of structures beyond their safe calculated carrying capacities by placing of materials, equipment, tools, machinery, or any other item thereon.

B. No loads shall be placed on floors or roofs before they have attained their permanent and safe strength.

1.20 STANDARDS

A. Any material specified by reference to the number, symbol, or title of a specific standard such as Commercial Standard, a Federal Specification, a trade association standard, or other similar standard shall comply with the requirements in the latest revision thereof, and any amendment or supplement thereto, in effect on the date of invitation for proposals, except as limited to type, class, or grade, or modified in such reference, and except as otherwise indicated.

B. The standard referred to, except as modified in the specifications, shall have full force and effect as though printed in these specifications. These standards are not furnished to bidders for the reason that the manufacturers and trades involved are assumed to be familiar with their requirements.
   1. Where Federal Specifications are referred to as a measure of quality and standard, they refer to Federal Specifications established by the Procurement Division of the United States Government and are available from the Superintendent of Documents, U.S. Government Printing Office.
   2. Where Federal Specification numbers are used, they refer to the latest edition including

amendments thereto.

3. Where Commercial Standards are referred to as a measure of quality, standard, and method of fabrication, they refer to Commercial Standards issued by the U.S. Department of Commerce.
4. Where ASTM Serial Numbers are used, they refer to the latest tentative specifications, standards specifications, standards methods, or standard method of testing issued by the American Society for Testing and Materials.

1.21 CERTIFICATE OF CONFORMANCE

A. Except where tests and/or inspections in connection with structural materials are specified or required by applicable laws, rules, and regulations, manufacturer's certificate covering conformance with the requirements of the above mentioned Federal Specifications and Commercial Standards may be acceptable in lieu of such items.

B. Certificates of Conformance shall be furnished to the Contracting Officer for all items so specified.

1.22 OCCUPANCY BY AAFES

A. AAFES shall reserve the right and privilege of partial occupancy during and prior to the absolute completion of the total work.

B. Access shall be allowed at all times to AAFES and its own Contractors in the endeavor.

1.23 REFERENCES

A. All references to the word "Government" in the specifications shall mean Army and Air Force Exchange Service (AAFES) except guarantees which shall be “Government”.

B. Wherever the word "provide" is used in the Contract Documents as a directive, it shall be interpreted as meaning "provide and install completely and ready for use".

C. Wherever the term “Not in Mechanical Contract” (NIMC) or the term “Not in Electrical Contract” (NIEC) is used in the specifications and on the drawings, it shall be interpreted to mean that the work is not a part of the particular sub-trade but is included under some other trade of the Contract.

D. Wherever the term “Not in Contract” (NIC) is used, it shall be interpreted to mean that the item of work is not a part of the Contract, except as may be otherwise noted.

E. Definitions:
1. Vendor: Person or persons selling any material item.
2. Installation: The Base, Post, or facility on which the structure is being built.
3. Architect-Engineer: The person or firm responsible for preparing the working drawings and specifications.
4. AAFES: Army and Air Force Exchange Service.
5. Inspection Agency: Project Inspector contracted by AAFES.
6. CO: Contracting Officer.
7. GC: General Contractor.

1.24 TOXIC MATERIALS

A. Removal or disposal of toxic materials or asbestos is not included in this contract. If the Contractor encounters such materials, he shall immediately notify the Contracting Officer.

1.25 ORDER OF PRECEDENCE

A. In the event of inconsistencies within or between the Contract Documents, the Contractor shall furnish and install the better quality or greater quantity of work, and shall comply with the more strict requirement.

B. Should there appear to be any discrepancy between the scale and detail drawings, or between the scale of the drawings and the figures on same, the latter in each case is to be followed.

END OF SECTION

SECTION 01110 - AAFES FURNISHED AND INSTALLED EQUIPMENT

PART 1 - GENERAL

1.1 AAFES FURNISHED AND INSTALLED PROPERTY (AF/AI)

A. Property: Property is indicated on the fixture plan in the drawings.

B. Schedule: Contractor shall schedule early completion of designated areas for beneficial occupancy by AAFES for their use prior to completion of the entire project.

C. AAFES will furnish and install equipment as indicated on Fixture Plan in the drawings.

D. Contractor's Duties:
1. Provide access for AAFES personnel.
2. Coordinate work and cooperate with the installers of the property so that installation can be accomplished in accordance with the construction schedule.
3. Provide mechanical and electrical connections to equipment and building systems where indicated on the drawings and in the specification.
4. Provide security of designated areas.

E. AAFES Duties:
1. Inspect designated area prior to use and issue statement of acceptance of area for installation of property.
2. Make final mechanical and electrical connections between property and building systems where indicated on the drawings and/or in the specifications.
3. Provide custodial services for designated areas during use after beneficial occupancy.

1.2 DELIVERY DATE CHANGES

A. Requests by Contractor to change designated delivery dates shall be made in writing at least thirty (30) days in advance of the designated delivery date. If the Contractor is not ready to accept delivery of AAFES furnished property, the Contractor shall be responsible for storage and redelivery cost. Should AAFES be unable to effect the change, or should the Contractor fail to submit his request within the time stated above, the Contractor's obligation under this contract and as stated herein shall not be relieved and further, the Contractor will have no basis upon which he can file a claim under these conditions.

1.3 AAFES ACTIVITIES AFFECTING PROGRESS OF WORK

A. Construction in each area at date scheduled for its use and possession by AAFES shall be sufficiently complete, in accordance with Contract Documents, so that AAFES may occupy the area for the use for which it is intended. Comply with Contract Clauses titled Inspection, and Use and Possession Prior to Completion.

B. Inspection: Prior to acceptance by AAFES of an area for beneficial occupancy, the Contracting Officer will conduct an inspection of the specific area. A list of deficiencies will be provided to the Contractor.

C. Acceptance: If the Contracting Officer determines the specific area is sufficiently complete for beneficial occupancy by AAFES, the area will be accepted in writing with the exception of the deficiencies listed. The deficiencies listed shall be completed or corrected prior to final acceptance at the completion of the project.

D. Damage: Damage resulting from AAFES' use will not be considered the Contractor's responsibility.

E. Refer to clause entitled Final Inspection and Acceptance of the Army & Air Force Exchange Service General Provisions.

1.4 ITEMS FURNISHED AND INSTALLED BY AAFES

A. See Furniture / Fixture / Equipment Plan.

END OF SECTION

SECTION 01120 - AAFES FURNISHED / CONTRACTOR INSTALLED EQUIPMENT

PART 1 - GENERAL

1.1 AAFES FURNISHED/CONTRACTOR INSTALLED EQUIPMENT (AF/CI):

A. AAFES furnished / Contractor installed equipment shall be handled in accordance with the "Army and Air Force Exchange Service General Provisions" clause entitled AAFES Furnished Property.

B. AAFES Furnished Equipment: AAFES will furnish the equipment indicated for installation by the Contractor, as indicated on the drawings.

C. Contractor's Duties:
1. Designate required delivery date for each product in Progress Chart.
2. Notify the Contracting Officer in writing at least sixty (60) days in advance of the date that AAFES furnished equipment and furnishings will be needed.
3. Shop drawings indicating dimensional locations of all plumbing and electrical rough-ins will be furnished by AAFES.
4. The equipment will be received at the job site by a representative of AAFES who will jointly, with the Contractor, verify condition and quantities. The representative will then affect receipted transfer of custody of the equipment to the Contractor.
5. Unload, handle, store (on-site), protect, uncrate, assemble, install, set in final position, align, join, level, and make all utility connections to all items of equipment. Installation shall be performed in accordance with the specifications, equipment plans, and schedules shown on the Drawings and the rough-in drawings provided by AAFES.
6. Construct all openings, furnish and install required sleeves and furnish and install all reinforcing, miscellaneous supports, angles, plates, anchors, and bolts necessary to secure AAFES furnished equipment in place.
7. Repair or replace items damaged as a result of Contractor's operations.
8. Apply finish indicated, if any.
9. The installation shall be complete in all respects, including mechanical and electrical hook ups, and put into good operating condition.

D. AAFES Duties:
1. Deliver all AAFES furnished items to the job site.
2. Schedule delivery date with supplier in accordance with Contractor prepared Progress Chart.
3. Provide Contractor with installation drawings and instructions.
4. Provide Contractor with shop drawings indicating dimensional locations of all plumbing and electrical rough-ins.

1.2 DELIVERY DATE CHANGES:

A. Requests by Contractor to change designated delivery dates shall be made in writing at least sixty (60) days in advance of the designated delivery date. If the Contractor is not ready to accept delivery of AAFES furnished equipment the Contractor shall be responsible for storage and delivery cost. Should AAFES be unable to effect the change, or should the Contractor fail to submit his request within the time stated above, the Contractor's obligation under his contract and as stated herein shall not be relieved and further, the Contractor will have no basis upon which he can file a claim under these conditions.

END OF SECTION

SECTION 01150 - SPECIAL REQUIREMENTS OF THE INSTALLATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Permits.

B. Work Week.

C. Interruption of Utility Services.

D. Close Out Submittals and Work Sheets.

E. Contractor Post Identification Credentials.

1.2 PERMITS

A. Excavation Notification: Prior to excavating contact Public Works to obtain a Public Works Dig Permit.

B. Prior to cutting or welding (open flame) contact Fire Department.

C. The contractor shall obtain any other permits and licenses necessary for work on this project.

1.3 WORK WEEK

A. The Contractor shall generally observe the same regular work week being observed by the Ft. Meade Public Works, which is 8:00 a.m. to 5:00 p.m., Monday through Friday, with Federal Holidays excluded. The government shall be given 48 hours advance written notice when deviations are desired. This will allow assignment of additional inspection forces when the contracting officer determines that they are reasonably available. If such force is reasonably available, the contracting officer may authorize the contractor to perform work during periods other than normal duty hours/days; however, if inspectors are required to perform in excess of their normal duty hours/days solely for the benefit of the contractor, the actual cost of inspection at overtime rates will be charged to the contractor and will be deducted from the final payment of the contract amount. The contractor shall coordinate with the installation Military Police prior to performing work after normal duty hours.

1.4 INTERRUPTION OF UTILITY SERVICES

A. Planned interruptions of utility services electrical power, water, natural gas, sanitary and storm sewer shall be detailed and coordinated by the contractor. Requests for interruptions which involve Post facilities other than in this contract shall be submitted in writing by the contractor to the contracting officer at least ten (10) working days before the planned outage. If the outage affects only the facility in this contract, the request shall be submitted at least five (5) working days before the planned outage. The contractor shall not interrupt service(s) until approval has been granted. Requests shall include facility/facilities affected, date of scheduled outage, and duration. Requests for interruption of service(s) will not be approved until all equipment and materials required for that particular phase of work are on the job site.

1.5 CLOSEOUT SUBMITTAL:

A. Prior to or in conjunction with the Final Inspection, the Contractor shall submit the following:

1. Record Work Documents. One set of the contract drawings which record any: filed changes of dimensions and details that may have occurred; changes by contract modifications and change orders; and details not on the original contract drawings. One set of specifications with each section marked to record; the manufacturer, trade name, catalog number and supplier of products which were actually installed. These documents are one of the requirements for final payment.

2. Operation and Maintenance Data: Four sets bound in 8-1/2” x 11” three-ring slide binders with durable plastic covers.

a. Provide a separate volume for each system, with a table of contents and index tabs for each volume.

b. Part 1. Directory: listing names, addresses, and telephone numbers of Prime Contractor and Subcontractors.

c. Part 2. Operation and Maintenance instructions, arranged by system. For each system, give names, addresses, and telephone numbers of subcontractors and

suppliers. List:
(1). Major equipment items.
(2). Parts list.
(3). Operating instructions.
(4). Equipment maintenance instructions.
(5). Shop drawings and product data.
(6). Warranties/Guarantees.

B. Time of Submittals. For equipment of component parts of equipment put into service during progress of construction:
1. Submit documents within 10 days after inspection and acceptance.
2. Otherwise, make submittals within 10 days after date of Final Inspection, prior to request for final payment.

C. For items of work, where acceptance is delayed materially beyond date of Final Inspection, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

D. See specification SECTION 01770 - OPERATION AND MAINTENANCE DATA.

1.6 CONTRACTOR POST IDENTIFICATION CREDENTIALS

A. The procedure for obtaining Post identification passes for contractor personnel to work on any Army Post shall be as follows:
1. Contractor shall submit a written request on company letterhead stationary, if available, to the Ft. Meade Authority having jurisdiction specifying:
a. Contract number.
b. Location of work site.
c. Date entry to the Installation must begin and contemplated termination date of entry.
d. Names of contractor and subcontractor employee requiring access to the Post.
e. The name of the individual who will submit the Request of Identification Credentials for each employee for whom identification credentials are needed.
2. The Ft. Meade Authority having jurisdiction shall:
a. Endorse the request.
b. Attach a copy of the contract cover page and any other pages that provide performance information, such as the need for and duration of access to the work site.
c. Forward this request to the Military Police, Pass and Identification Office of the Post where the work is to be performed.
3. The Contractor will be required to complete and submit a Request for Identification Credentials, for each of the firm's employees and for each subcontractor employee who must have access to the Post.
4. The Contractor shall also request Visitor/Vehicle Pass or DD Form 2220, DoD Registered Vehicle, for the vehicle decals when the Request for Identification Credentials is submitted. To obtain the vehicle decal from the Military Police, Pass and Identification Office, the Contractor shall produce:
a. A valid driver's license.
b. Proof of financial responsibility or insurance.
c. Current vehicle registration.

B. Contractor employees, at all times while on a military installation, shall wear visible contractor-provided identification either as a part of, or attached to, their outer clothing. The identification shall clearly identify the individual as being a contractor employee.

C. During performance of the contract, the Contractor shall be responsible for obtaining required identification for newly assigned personnel, and for prompt return of credentials and vehicle registration decals to the Military Police, Pass and Identification Office, for any employee who no longer requires access to the work site.

D. At the termination or completion of the contract, or upon expiration of credentials (if any such expirations are specified), the Contractor must be sure that all Post identification credentials and vehicle registration decals for all Contractor and subcontractor employees are returned to the Military Police, Pass and Identification Office.

END OF SECTION

SECTION 01200 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 GENERAL

A. All price and payment procedures shall be in accordance with AAFES General Provisions (Contract for Construction). Should there be a conflict between the requirements of this specification and the requirements of the General Provisions, the General Provisions shall govern.

1.2 SCHEDULE OF VALUES

A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702, unless other forms are authorized in writing by the Contracting Officer.

B. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify site mobilization and project closeout.

C. Revise schedule to list approved Change Orders (added to the contract by amendment) with each Application for Payment.

1.3 APPLICATIONS FOR PAYMENT

A. Submit three copies of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702, unless other forms are authorized in writing by the Contracting Officer. Each request for payment shall include the certification contained in Exhibit A, General Provisions, Para 45b(2)(b).

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

C. Payment Period: Contractor may submit no more than one request for progress payment each month.

D. On Site and Offsite stored products payments shall be made only upon approval of the Contracting Officer, as described in General Provisions, entitled “Payments” and the following:

1. Off-Site storage of material payments:
   a. Exchange must inventory the material stored.
   b. Need copies of manufacturers’ invoices.
   c. Ownership of material must be transferred to the Exchange.
   d. Material must be insured against loss, thief, damage, e.g.
   e. Material must be properly stored against damage from weather, e.g.
   f. Material must be segregated from other stored materials and identified as Exchange property.
   g. Pictures of material and sign identifying material as Exchange property must be provided.
   h. Need clarification that material will not be removed from this location until delivered to the job site.
   i. Need certification that material supplier and contractor understand they are still responsible for the stored material.
2. On-Site storage of material payments:
   a. Exchange must inventory the material stored.
   b. Need copies of manufacturers’ invoices.
   c. Ownership of material must be transferred to the Exchange.
   d. Material must be insured against loss, thief, damage, e.g.
   e. Material must be properly stored against damage from weather, e.g.
   f. Need certification that material will not be removed from the job site.
   g. Pictures of materiel must be provided.
   h. Material must be insured against loss, thief, damage, e.g. May be covered under Builders’ Risk insurance. However, must have documentation from insurance carrier that is covered.

1.4 CHANGE PROCEDURES

A. Refer to AAFES General Provisions for change procedures.

1.5 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Architect and the AAFES Project Manager, it is not practical to remove and replace the Work, the Contracting Officer will direct appropriate remedy or adjust payment.

C. The defective Work may remain, but the cost will be adjusted at discretion of the Contracting Officer.

D. Defective Work will be partially repaired to instructions of Architect, AAFES Project Manager and the cost will be adjusted at discretion of the Contracting Officer.

E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.

F. Authority of the Contracting Officer, AAFES Project Manager, and Architect to assess defects and identify payment adjustments, is final.

G. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from transporting vehicle.
   4. Products placed beyond lines and levels of required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected products.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01230 - BID OPTIONS

PART 1 - GENERAL

1.1 DEFINITIONS

A. Options: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each option is the net addition to or deduction from the Contract Sum to incorporate option into the Work. No other adjustments are made to the Contract Sum.

1.2 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the option into Project.

1. Include as part of each option, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of the options.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each option. Indicate if options have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to options.

C. Execute accepted options under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Options is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each option.

1.3 SCHEDULE OF OPTIONS

A. Base Bid: The work covered by these specifications specifications consists of furnishing all plant, supervision, labor, equipment, licenses, permits, and materials necessary to perform all operations required to construct and complete an Express / Food / Gas in accordance with these specifications and the applicable drawings, and subject to the terms and conditions of the contract.

B. Bid Option #1: Expedited construction schedule of 180 calendar days.

C. Bid Option #2: As separate line item on bid form include a complete cost to provide and install duress / intrusion detection system as referenced in the drawings and specifications.

END OF SECTION

SECTION 01300 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Project Management
2. Project Meetings
3. Project Coordination
4. Progress Schedules
5. Construction Photographs

1.2 PROJECT MANAGEMENT

A. Job Superintendent
1. The General Contractor and each prime sub-contractor shall have a qualified and competent superintendent on the project at all times when work is being done. Immediately after the award of the contract, the General Contractor and each prime sub-contractor shall submit an outline experience record of his qualifications. The Contracting Officer (or designated representative) will notify each contractor of his approval or disapproval. Until completion and acceptance of the work, contractor shall not change or remove the approved Superintendent except with the consent of the Contracting Officer.
2. If the Job Superintendent fails to perform to the satisfaction of the Contracting Officer (or designated representative), the Contractor shall replace him with a qualified superintendent.

1.3 PROJECT MEETINGS

A. Pre-Construction Meeting
1. The Contracting Officer shall schedule and preside at the Pre-Construction Meeting.
2. Attendance Required:
a. Contracting Officer and other Headquarters AAFES representatives.
b. Local and regional AAFES representatives.
c. Installation representatives (Engineering, Fire Marshall, Security, etc.)
1) Civil Engineering or DPW Representative.
2) Fire Marshall.
3) Base / Post Security Representative.
4) Other Base / Post Representatives as required.
d. General Contractor
e. Major sub-contractors
3. Agenda:
a. Execute Notice to Proceed.
b. Distribute Contract Documents.
c. Submission of list of sub-contractors.
d. Review AAFES Pre-Construction Checklist and contract requirements.
e. Discuss Schedule.
f. Discuss critical sequencing.
g. Designation of responsible personnel.
h. Explain procedures for processing field decisions and change orders.
i. Explain procedures for submission of applications for payment.
j. Explain shop drawing submittal procedure.
k. Discuss procedures for maintaining record documents.
l. Discuss fire and safety procedures.
m. Discuss security procedures.
n. Discuss accident prevention and reports.
o. Discuss housekeeping procedures.
p. Discuss the use of the Installation's property/premises.
1) Identify construction office and storage trailer locations.
2) Identify location of parking for construction personnel.
q. Discuss major equipment deliveries.
r. Discuss other issues pertinent to completing the contract.
4. Meeting minutes:

a. Minutes will be taken by the Architect and distributed to AAFES, the Contractor, and the Installation's Point of Contact.

B. Monthly Progress Meetings
1. The Contracting Officer shall schedule the monthly progress meetings.
2. The Contractor shall preside at all monthly progress meetings.
3. The Contractor shall make all physical arrangements for the progress meetings, prepare an agenda, and distribute copies of the agenda to all of the participants.
4. The progress meetings shall be held at the construction office, or at another location as indicated in the meeting notice.
5. Attendance Required:
   a. Contractor's project manager.
   b. Contractor's superintendent.
   c. Major sub-contractors and suppliers (as pertinent to the agenda).
   d. AAFES representative (AAFES' option).
   e. Representatives of Governmental or other regulatory agencies (as pertinent to the agenda).
6. Agenda:
   a. Review minutes of previous meetings.
   b. Progress and Schedule
      1) Review progress schedule.
      2) Review progress of work.
      3) Review projected progress of work.
      4) Identify problems that impede planned progress.
      5) Review corrective measures required to regain projected schedules.
   c. Material and Equipment
      1) Review submittal schedule and status of submittals.
      2) Review off-site fabrication and delivery schedules.
   d. Deficiencies
      1) Review field observations, problems and decisions.
      2) Review maintenance of quality and work standards.
   e. Requests for Information
   f. Progress Payments/Applications
   g. Changes and Modifications
      1) Requests for Proposal
      2) Review the effect of proposed changes on progress schedule and coordination.
   h. Action Items
   i. Review other business relating to the Work.
7. Meeting Minutes:
   a. The Architect shall record the meeting minutes and distribute copies to the AAFES Contracting Officer in addition to all of the meeting participants. Meeting minutes shall be distributed within five (5) business days of the progress meeting.

C. Pre-Installation Meetings
1. When required in individual specification sections, the Contractor shall schedule and preside at a Pre-Installation Meeting at the project site prior to commencing work of the section.
2. Require attendance of parties directly affecting, or affected by, work of the specific section.
3. Notify Contracting Officer of the date, time, and location of the Pre-Installation Meeting.
4. Coordinate schedule of the Pre-Installation Meeting to coincide with the next monthly progress meeting date.
5. Contractor to prepare agenda and preside at meeting:
   a. Review conditions of installation, preparation and installation procedures.
   b. Review coordination with related work.
6. Contractor to record meeting minutes and distribute copies to the AAFES Contracting Officer and the Architect in addition to all of the participants and all parties affected by the decisions made at the meeting. Meeting minutes shall be distributed within five (5) business days after the Pre-Installation Meeting.

1.4 PROJECT COORDINATION

A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure

efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Verify that the utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements, supports, and installation of mechanical and electrical Work which are indicated diagrammatically on Contract Documents. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas conceal pipes, ducts, and wiring within the construction, except as otherwise indicated. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.

F. After AAFES' occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of AAFES' activities.

1.5 PROGRESS SCHEDULE

A. The contractor prepared Construction Progress Chart shall serve as a guide in managing the construction progress.

B. In preparing this system, the scheduling of construction shall be the responsibility of the Contractor.

C. The selection and number of activities shall be subject to the Contracting Officer's approval.

D. Format
1. Prepare schedules as a horizontal bar chart with a separate bar for each major portion of Work or operation, identifying first work day of each week.
2. The format shall be designed to enable the Contracting Officer to evaluate the reasonableness of the proposed schedule, and to determine if the actual construction is on schedule.
3. The unit of time shall be indicated in days.

E. Content
1. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
2. Identify each item by specification section number.
3. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
4. Indicate delivery dates for AAFES furnished products.
5. Indicate all activities of AAFES that will affect progress and contract completion dates. See Specification SECTION 01110 - AAFES FURNISHED AND INSTALLED EQUIPMENT and Specification SECTION 01120 - AAFES FURNISHED AND CONTRACTOR INSTALLED EQUIPMENT.
6. Coordinate content of Progress Schedule with Schedule of Values.

F. Revisions to Schedules
1. Clearly indicate progress of each activity to date of submittal, and projected completion date of each activity.
2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes which could affect the schedule.
3. Provide narrative report, with each submittal, describing work accomplished during the previous period, the work scheduled for the next period and anticipated problem areas and delays, and impact on the Schedule. Report corrective action taken, or proposed.

G. Submittals
1. Submit, through the Contracting Officer, a preliminary schedule defining the contractor's proposed operations for the first sixty (60) days of the contract, within **TEN (10) DAYS AFTER DATE OF NOTICE TO PROCEED**. The Contractor's general approach for the balance of the project shall also be indicated. Cost of the activities expected to be completed or partially completed before submission and approval of the complete progress schedule shall be included.
2. Upon approval of the preliminary schedule by the Contracting Officer, and within **THIRTY (30)**

CALENDER DAYS AFTER THE NOTICE TO PROCEED, the contractor shall submit the complete Progress Schedule.

3. Submit revised Progress Schedules with each monthly Application for Payment.
4. Submit the number of opaque reproductions which Contractor requires, plus four (4) copies, which will be retained by Contracting Officer.
5. Application for Payment will not be considered complete until the Contracting Officer receives the updated Progress Schedule.

H. Distribution

1. Distribute copies of reviewed Progress Schedules to Project site file, Subcontractors, suppliers, and other concerned parties.
2. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

1.6 ADVERSE WEATHER

A. Information and Data

1. Information and data furnished or referred to in the weather table is furnished for the Contractor's information.

B. Contract Time Limits

1. The contract time limits include estimated normal weather conditions that are shown in the table listed herein. Any time extension granted under this provision shall be at no cost to AAFES.

C. Time Extensions for Unusually Severe Weather

1. This provision specifies the procedure for the determination of time extensions for unusually severe weather affecting exterior work in accordance with the Contract. The following chart defines the monthly anticipated adverse weather for the contract period and is based on NOAA data for the geographic location of the project.

WEATHER TABLE FOR INSTALLATION

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MAX PRECIPITATION IN INCHES	7.48	7.16	8.64	6.55	8.71	9.95	7.38	10.91	11.50	8.09	7.05	6.77
MIN PRECIPITATION IN INCHES	.49	.56	.96	.39	.37	.84	.85	.91	.58	.08	.31	.70
MEAN NORMAL PRECIP IN INCHES	3.47	3.02	3.93	3.00	3.89	3.43	3.85	3.74	3.98	3.16	3.12	3.35
DAYS PRECIP 0.5" OR MORE	3	2	3	2	3	2	3	3	2	2	3	2
DAYS BELOW 32° F	7	4	1	0	0	0	0	0	0	0	0	3
DAYS ABOVE 90° F	0	0	0	0	2	6	12	7	3	0	0	0

2. This listing of anticipated adverse weather will constitute the base line monthly weather time evaluations.
3. Each month throughout the contract actual adverse weather days will be recorded on a calendar basis (including weekends and holidays) and compared to the monthly anticipated adverse weather in this listing.
   a. The term "actual adverse weather days" shall include days impacted by actual adverse weather.
   b. The number of actual adverse weather days affecting exterior work shall be calculated chronologically from the first to the last day in each month.
   c. Adverse weather days must prevent work for 50 percent or more of the contractor's work day and delay work critical to the timely completion of the project.
4. If the number of actual adverse weather days exceeds the number of days anticipated in the

above listing, then the Contracting Officer will determine the time extension for the Contractor.

a. The Contracting Officer will convert any qualifying delays to calendar days and issue a modification in accordance with the contract. Any time extension granted under this provision shall be at no cost to AAFES.

1.7 CONSTRUCTION PHOTOGRAPHS

A. Provide photographs of the site and construction throughout the progress of Work.

B. Take photographs prior to each Application for Payment that illustrate the following:
1. Site clearing.
2. Excavations.
3. Foundations.
4. Structural framing.
5. Enclosure of building.
6. Final completion.
7. Work concealed from view between monthly inspections.

C. Digital Photographs
1. 1600 x 1200 x 24 bit true color minimum resolution in .jpg file format.
2. Quantity (at each monthly submittal):
a. Disks: Two CD's
3. Provide two sets of CD's of all digital photograph files at project closeout. Photographs shall be located in separate monthly folders.

D. Technique
1. Provide factual presentation.
2. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

E. Views
1. Provide photographs of the pertinent work and work that will be concealed from view or completed during the documentation period.
2. Provide non-aerial photographs from four cardinal views at each specified time until Date of Substantial Completion.
3. Provide photographs from four cardinal views of the interior of the building after the building is enclosed.
4. Consult with Architect and Contracting Officer for instructions on additional views required.

F. Submittals
1. Deliver two sets of prints inserted into plastic archival photograph sleeves with each Application for Payment.
a. Application for Payment will not be considered complete until the Contracting Officer has received the construction photographs.

PART 2 - PRODUCTS

(Not Used).

PART 3 - EXECUTION

(Not Used).

END OF SECTION

SECTION 01310 - SUBMITTALS

PART 1 - GENERAL

1.1 GENERAL

A. Coordinate submittal preparation with performance of construction activities and with purchasing or fabricating, delivery, other submittals and related activities. Transmit in advance of performance of related activities to avoid delay.

B. Coordinate transmittal of different submittals for related elements so processing will not be delayed by the need to review concurrently for coordination. The Architect / Engineer reserves the right to withhold action on a submittal requiring coordination until related submittals are received.

C. Allow 15 calendar days for initial review of submittal items. Allow more time if processing must be delayed for coordination with other submittals. The Architect will advise the Contractor when a submittal will be delayed for coordination.

D. As part of the progress schedule for the project, the General Contractor shall prepare a comprehensive schedule indicating shop drawing, sample and technical data submission dates.

E. Refer to AAFES General Provisions for additional submittal requirements.

1.2 SUBMITTAL PROCEDURES

A. Each submittal shall include a numbered transmittal form. Transmittal shall include notification of any Deviations from the Contract Documents.

B. Sequentially number the transmittal forms. Submit revised submittals with original number and a sequential alphabetic suffix.

C. Identify project title and number, date of submission, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number on the transmittal form.

D. Apply and sign or initial the Contractor's stamp, certifying that the submittal has been reviewed and approved based upon verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the Project and in accordance with the Submittal Schedule.

F. Coordinate submission of related items.

G. Transmit all submittals to the Architect.

H. For each submittal for review, allow a minimum of 15 days excluding delivery time to and from the Architect.

I. Shipping: Submittals will be returned to the Contractor via UPS ground delivery. Expenses for Next Day or 2nd Day delivery shall be the responsibility of the Contractor.

J. Identify variations from Contract Documents and Product or System limitations which may be detrimental to successful performance of the completed Work. Failure to identify such variations will not relieve the Contractor of the responsibility for completing the work in full compliance with the Contract Documents even though such submittals are approved by the Architect.

K. Contractor shall check the product/technical data and indicate with an approved stamp that the Drawings have been checked prior to submission to the Architect. Do not forward information to Architect that is incomplete or that does not conform to drawings and specifications. Information pertinent to the project shall be circled, highlighted, underlined, or otherwise made to stand out, to clearly indicate to the Architect only pertinent information; similarly, non-conforming or non-pertinent information shall be crossed out or indicated as N.A. (not applicable). Information received by Architect not meeting this criteria will be rejected without further review, and returned for proper clarification.

L. Provide space for Contractor and Architect's review stamps.

M. When revised for resubmission, identify all changes made since previous submission.

N. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability

to comply with the requirements.

O. Prior to approval of the material/product submitted, the Contractor shall include with the submittal a written certification that the material/product contains no asbestos. This Certificate is mandatory before approval will be issued.

1.3 SUSTAINABLE PROJECT SUBMITTALS

A. For each submittal, the following information shall be provided. For each submittal, the following information shall be provided. Include written documentation stating that the submittal meets the affirmative procurement requirements or if the material is exempt.
   1. Recycled Content
      a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   2. Local/Regional Materials
      b. Indicate location of manufacturing facility; indicate distance between manufacturing facility and project site.
      c. Indicate location of extraction, harvesting, and recovery and the project site.

1.4 SHOP DRAWINGS

A. Shop Drawings For Review:
   1. Submit to the Contracting Officer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
   2. Submit and distribute in accordance with the submittal procedures article above and for record documents purposes described in SECTION 01760 - PROJECT RECORD DOCUMENTS.

B. Shop Drawings shall be prepared by qualified detailers.

C. Minimum sheet size for shop drawings shall be 8-1/2” x 11".

D. Shop Drawings shall be original drawings prepared by the Contractor, Subcontractor, Supplier, or Distributor. Xerographic reproductions of the details included in the contract documents shall not be submitted as shop drawings.

E. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.5 PRODUCT DATA

A. Product Data For Review:
   1. Submit to the Contracting Officer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
   2. Submit and distribute in accordance with the submittal procedures article above and for record documents purposes described in SECTION 01760 - PROJECT RECORD DOCUMENTS.

B. Number of copies required for review will be discussed at the pre-construction meeting.

C. Product data that relates to shop drawings or samples must be submitted with the respective shop drawings or samples.

D. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.6 SAMPLES

A. Samples For Review:
   1. Submit to the Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

B. Samples For Selection:
   1. Submit to the Architect for aesthetic, color, or finish selection.
   2. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for selection by the Architect.
   3. Submit samples of finishes from the manufacturer’s full range of custom colors if indicated or

selected in the product specification section.

C. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

D. Include identification on each sample, with full project information, manufacturer's name, product number, and finish name or number.

E. All materials requiring color selection shall be submitted at one time to allow for proper coordination and selection of finishes. Prepare separate submittals for interior materials and exterior materials.

F. Reviewed samples which may be used in the Work are indicated in individual specification sections.

G. Samples will not be used for testing purposes unless specifically stated in the specification section.

1.7 MOCK-UPS

A. Assemble and erect samples and mock-ups in accordance with specification section requirements for specified items. Mock-up shall be complete in its construction, to fully indicate its final appearance, condition, operation and function. Where applicable, include anchorage details, flashings, seals and adjacent surfaces or materials. Finishes shall indicate the intended color, texture, material and thickness. The mock-up shall not be removed until directed by the Architect.

B. See individual specification sections for required mock-ups.

1.8 INSTALLATION INSTRUCTIONS

A. Where indicated in the individual specifications, submit manufacturer's written installation instructions for review by the Architect.

B. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to the Architect.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.9 DESIGN DATA

A. Submit design data, calculations, mix designs, etc. for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

1.10 TEST REPORTS

A. Where required by individual specification sections, submit manufacturer's test reports for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

1.11 CERTIFICATES

A. When specified in individual specification sections submit to Architect certification by the manufacturer, installation/application subcontractor, or the Contractor.

B. Indicate that the material or Product conforms to or exceeds the specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on the material or Product, but must be acceptable to the Contracting Officer.

1.12 MANUFACTURER'S FIELD REPORTS

A. Submit Manufacturer's Field Reports for the Contracting Officer's benefit as contract administrator.

B. Submit Manufacturer's Field Reports in triplicate within 30 days of observation to the Contracting Officer for information.

C. Submit Manufacturer's Field Reports to the Architect for information and for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

1.13 OPERATING AND MAINTENANCE DATA

A. See individual specification sections and SECTION 01770 OPERATION AND MAINTENANCE DATA for operation and maintenance data submittal requirements.

1.14 WARRANTIES

A. See individual specification sections and SECTION 01750 PROJECT CLOSE-OUT for warranty submittal requirements.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 SUBMITTAL SCHEDULE

B. Submittal Schedule is provided only as a guideline for the Contractor's convenience. The Contractor shall be responsible for scheduling all submittals in a manner that will expedite the project.

C. The Contractor is responsible for the timely submittal of all complete and coordinated product data, shop drawings, and samples. No allowance will be made for time lost due to disapproved, delinquent or incomplete submittals by the Contractor.

D. All submittals requiring color selection/coordination of adjacent materials shall be submitted at the same time.

E. The Contractor shall carefully review the specifications for additional requirements and include the additional items in the contractor prepared submittal schedule. The following schedule does not relieve the Contractor from complying with all specification requirements.

Section	Title	Sustainable Product Data	Shop Drawings	Product Data	Sample / Mock-up	Installation Instructions	Schedule	Design Data / Calculations	Test Reports	Certification	Contr. Qualifications	Pre-Installation Conf.	Mfr. Field Report	Operating/Maintenance Data	Warranty
DIVISION 1 - GENERAL REQUIREMENTS															
01300	Administrative Requirements		■				■								
01350	Safety Policies & Procedures										■				
01370	Erosion & Sediment Control									■					
01400	Quality Control												■		
01410	Testing Services						■		■						
01570	Construction & Demolition Waste Management						■								
01580	Temporary Project Identification & Signs				■										
01710	Cutting & Patching						■								
01740	Starting of Systems					■	■		■		■				
01750	Project Closeout													■	■
01760	Project Record Documents									■					
01770	Operation & Maintenance Data		■	■					■					■	■
DIVISION 2 - SITE CONSTRUCTION															
02300	Earthwork				■										
02505	Manholes & Covers		■	■						■					
02510	Water Distribution			■			■		■	■				■	
02530	Sanitary Sewerage		■	■				■		■					
02722	Site Storm Sewerage System			■		■			■	■					
02740	Bituminous Paving	■		■			■		■	■					
02750	Site Concrete Work			■			■			■					
02870	Site Furnishings		■	■		■									
02920	Seeding			■					■	■				■	
02950	Trees Plants & Groundcover			■						■				■	
DIVISION 3 - CONCRETE															
03300	Cast-in-Place Concrete	■	■	■				■							
03345	Cast-in-Place Integral Colored Concrete	■		■	■		■		■		■				
03357	New Integral Colored Polished Concrete Floor Finish	■		■	■		■		■		■				
DIVISION 4 - MASONRY															
04300	Masonry Assemblies	■	■	■	■										
04900	Masonry Cleaning	■		■		■									
DIVISION 5 - METALS															
05120	Structural Steel	■	■							■					
05310	Steel Roof Deck	■	■	■		■				■					
05400	Cold Formed Metal Framing	■	■	■											
05500	Metal Fabrications	■	■	■											

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DIVISION 6 - WOOD & PLASTICS															
06100	Rough Carpentry	■		■						■					
06200	Finish Carpentry	■	■		■					■					
06400	Custom Casework	■	■	■	■										
06620	Plastic Fabrication	■	■	■	■									■	
DIVISION 7 - THERMAL & MOISTURE PROTECTION															
07210	Building Insulation	■		■											
07424	Composite Wall Panels	■	■	■	■			■	■					■	
07535	Single-Ply Roofing - Mechanically Attached	■	■	■	■	■				■					
07620	Sheet Metal Flashing & Trim	■	■		■										
07900	Joint Sealers	■			■	■									
DIVISION 8 – DOORS & WINDOWS															
08120	Metal Frames	■	■	■		■				■					
08130	Metal Doors	■	■	■		■				■					
08210	Flush Wood Doors	■		■	■					■					
08310	Access Doors	■	■	■		■									
08380	Double Action Door	■	■	■	■	■									
08410	Aluminum Framing Systems	■	■	■	■			■		■					■
08425	Automatic Entrance Doors Sliding	■	■	■	■			■		■				■	■
08710	Door Hardware	■	■	■		■	■					■		■	
08770	Fire Department Key Box	■	■	■											
08800	Glazing	■		■						■					
DIVISION 9 - FINISHES															
09260	Gypsum Board Systems	■		■											
09300	Tile	■		■	■									■	
09510	Suspended Acoustical Ceiling	■		■	■	■									
09650	Resilient Flooring	■		■	■	■									
09900	Painting	■		■	■	■									
DIVISION 10 - SPECIALTIES															
10100	Visual Display Boards	■		■	■										
10260	Wall & Corner Guards	■		■		■									
10440	Wall & Door Signs	■	■		■										
10500	Metal Wardrobe Lockers	■	■	■	■	■									
10535	Aluminum Entrance Canopy	■	■	■	■										
10710	Metal Sun Shades		■	■	■			■							■
10800	Washroom Accessories	■	■	■		■									
DIVISION 11 - EQUIPMENT															
Not Used															
DIVISION 12 - FURNISHINGS															
Not Used															

Section	Title	Sustainable Product Data	Shop Drawings	Product Data	Sample / Mock-up	Installation Instructions	Schedule	Design Data / Calculations	Test Reports	Certification	Contr. Qualifications	Pre-Installation Conf.	Mfr. Field Report	Operating/Maintenance Data	Warranty
DIVISION 13 – SPECIAL CONSTRUCTION															
13048	Canopy		■	■	■			■							
13050	Gasoline Dispensing & Underground Storage Tank Systems		■	■		■	■		■					■	
13720	Intrusion Detection		■	■		■	■	■	■		■			■	■
13851	Fire Alarm		■	■				■	■	■	■			■	■
13853	Mass Notification System		■	■				■	■	■	■			■	■
13915	Sprinkler Systems - Fire Protection		■	■				■	■	■	■			■	■
DIVISION 14 – CONVEYING SYSTEMS															
Not Used															
DIVISION 15 - MECHANICAL															
15010	General Provisions		■	■						■					
15050	Basic Materials & Methods		■	■						■					
15067	Testing Piping Systems		■						■					■	
15250	Insulation	■	■	■			■								
15400	Plumbing	■	■	■						■				■	
15450	Plumbing Fixtures & Trim	■	■	■											
15530	Refrigerant Piping	■	■	■						■	■			■	
15815	Metal Ducts	■	■	■		■			■	■		■		■	
15820	Duct Accessories	■	■	■		■			■	■					
15851	Energy Recovery Ventilators		■	■		■				■				■	
15853	Power Ventilators		■	■		■				■				■	
15855	Diffusers, Registers, & Grilles		■	■	■	■	■								
15861	Air Filters	■		■											
15990	Testing, Adjusting, & Balancing of HVAC Systems	■							■						
DIVISION 16 - ELECTRICAL															
16111	Conduit			■											
16118	Duct Bank		■	■		■								■	
16121	Medium Voltage Cable			■	■	■			■		■			■	
16123	Building Wire & Cable			■		■			■		■			■	
16130	Boxes		■	■										■	
16141	Wiring Devices			■		■									
16150	Manufactured Wiring Systems		■	■		■		■						■	
16160	Cabinets & Enclosures			■		■								■	
16170	Grounding & Bonding			■		■			■					■	
16190	Supporting Devices		■	■		■	■							■	
16195	Electrical Identification		■	■		■	■							■	
16321	Pad Mounted Distribution Transformers		■	■		■			■	■			■	■	

Section	Title	Sustainable Product Data	Shop Drawings	Product Data	Sample / Mock-up	Installation Instructions	Schedule	Design Data / Calculations	Test Reports	Certification	Contr. Qualifications	Pre-Installation Conf.	Mfr. Field Report	Operating/Maintenance Data	Warranty
16441	Enclosed Switches		■	■											
16470	Panelboards		■			■								■	
16481	Enclosed Motor Controllers			■		■			■						
16485	Enclosed Cotractors		■	■		■								■	
16510	Interior Luminaires			■	■	■								■	■
16530	Site Lighting		■	■					■					■	■
16685	Transient Voltage Surge Supressors (TVSS)		■	■					■	■					
16741	Telephone Service, Raceways & Wiring			■	■				■	■			■		
16901	Electrical Sensing & Measurement			■		■									
16902	Electrical Controls			■		■									
16904	Occupancy Sensors		■	■		■								■	
16950	Testing								■						

END OF SECTION

SECTION 01340 - SAFETY REGULATIONS AND CODES

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. Reference Standards.
B. Licenses and Permits
C. Safety.
D. Fire Safety.
E. Affirmative Procurement Program
F. Industrial Ventilation
G. Use of Ionizing Radiation (IR).
H. Use of Lasers.
I. Use of Radioactive Materials
J. Use of Radio Frequency (RF) Radiation.
K. Use of Ultraviolet (UV) Radiation.
L. Protection of Nesting Birds
M. Historical or Cultural Artifacts
N. Ozone Depleting Substances.
O. Lead Base Paint.
P. Cleaning & Debris Control
Q. Nuisance Dumping & Polluting Activities
R. Stormwater Pollution Prevention
S. Excavation at IRP Sites
T. Contaminated Soil
U. Suspected Hazardous Materials
V. Oil-Filled or Impregnated Electrical Components
W. Hazardous Waste Testing
X. Hazardous Material Inventory
Y. Spill Response and Reporting
Z. Waste Disposal and Environmental Protection.

1.2 REFERENCE STANDARDS

A. Federal, State and Local Codes and Ordinances take precedence over these Specifications and Drawings where conflicts occur, unless the Drawings or Specifications call for more stringent requirements. Notify the Contracting Officer in writing of conflicts.

B. Comply with all applicable laws, building and construction codes, OSHA Safety and Health Regulations and applicable requirements of any governmental agency under whose jurisdiction this Work is being performed.

C. Obtain a copy of standards referenced in the various Specification Sections. Maintain a copy at the jobsite during execution of Work to which the standard applies.

D. Construction that is not governed by the contract specifications will be governed by the more stringent provisions of the latest published edition or statute adopted edition, of the following applicable codes, regulations and standards.

ADA	Americans With Disabilities Act Accessibility Guidelines
AFR	Air Force Regulations
ASME	American Society of Mechanical Engineers
CFR	Code of Federal Regulations
FAR	Federal Acquisition Regulations
IBC	International Building Code
IMC	International Mechanical Code
IPC	International Plumbing Code
NEC	National Electrical Code
NFPA	National Fire Code
OSHA	Occupational Safety and Health Act

Other applicable codes and standards as applicable or as referenced by the individual specification Sections.

1.3 LICENSES AND PERMITS

A. The Contractor shall obtain and maintain current for the duration of this Contract, all required Federal, State and local licenses and permits. All associated fees and taxes shall be paid by the Contractor without additional cost to the Government.

B. Obtain from base security all required vehicle and entry permits.

C. Obtain from the Contracting Officer any additional Installation required permits. Current permit requirements shall be provided to the Contractor at the preconstruction conference.

1.4 SAFETY

A. Comply with all Federal and State regulations concerning safety of personnel and equipment. All Contractor personnel shall wear hard hats and steel toe safety shoes while on the project site. In addition, all personnel shall wear hearing protection (ear muffs or ear plugs) when inside the power plant, excluding office areas, restrooms, break rooms and other "quiet" areas.

B. Ensure that lock out, tag out procedures are established and used as directed by 29 CFR 1910.145. Comply with the lock out, tag out procedures in use by CH&PP personnel. Ensure that contractor's personnel on site are trained on the government's procedures.

C. Comply with all safety, traffic and protection requirements in effect on Installation. Government will brief the Contractor on these requirements at the preconstruction conference.

D. Work areas in this Project may be classified as "permit-required confined spaces" or "non-permit required confined spaces." The Contractor's Certified Industrial Hygienist will determine the confined space status of the Project areas. Regulations and procedures for entry into "permit-required confined spaces" are contained in 29 CFR 1910.146 and 8 AAC 61.010.14. The Contractor is responsible for ensuring the safety of his employees in confined spaces according to these regulations.

E. Confined Space Permit:

1. Provisions for confined space are outlined in 29CFR 1910.146 and ANSIZ117.1 1989 and shall be followed throughout Project.

2. Installation Contact for information regarding confined Space issues is Ground Safety - contact information will be provided at pre-construction meeting. However, the Contractor shall process any permits required for confined space through his own safety Manager and Permit Space Program.

F. Provide safety barriers around open excavations, openings in floors and other hazards created by the Contractor's activities.

G. The Contracting Officer may direct the Contractor to cease activities which, in their opinion, are unsafe.

1.5 FIRE SAFETY

A. Comply with all fire safety and protection requirements in effect on Installation. Government will brief the Contractor on these requirements at the preconstruction conference.

B. Prior to beginning any welding, use of open flame device, or any activity that produces sparks, obtain a "hot work permit" from Installation Fire Department. The permit shall be **renewed each day** welding or open flame devices will be used.

C. If the contract work requires numerous days of hot work, the Contractor may elect to have one of his on-site personnel designated as a Permit Authorizing Individual (PAI). The Contractor's PAI may issue hot work permits at the work site, thus avoiding the requirement for daily permits issued by the Fire Department.

D. The Contractor's PAI shall be the on-site superintendent, a foreman, the Contractor's Safety Manager, or other individual with sufficient knowledge and experience to recognize unsafe work practices or conditions and having authority to stop work immediately if such unsafe practices or conditions are observed. To be designated as a PAI, a person must schedule and successfully complete PAI certification training offered by the Base Fire Department. PAI certification training is estimated to last 60 to 90 minutes.

E. Fire Department personnel may periodically visit the site to ensure the Contractor is complying with fire safety requirements. A PAI's certification may be revoked if the PAI has failed to issue permits on days when hot work is performed, or if unsafe practices or conditions are observed.

F. Questions concerning these requirements may be directed to Installation Chief, - contact information will be provided at pre-construction meeting. Questions during solicitation must be submitted to contracting officer ten (10) days prior to solicitation due date.

G. The Contractor shall notify the Fire Department at - contact information will be provided at pre-construction meeting, a minimum of 48 hours before, and again immediately prior to, temporarily closing any street or paved building access, interrupting water service to any fire hydrant or interrupting the operation of any fire detection, alarm or suppression system. The fire Department shall be immediately notified upon reopening closed areas, restoration of water service to any fire hydrant, or reactivation of any detection, alarm or suppression system. This notification requirement is in addition to other contract requirements.

H. Provide a 10 lb, ABC fire extinguisher at all work stations.

I. Report a fire: Dial 911.

1.6 AFFIRMATIVE PROCUREMENT PROGRAM

A. These standards apply to all new construction, demolition, rehabilitation, alteration, modification, repair, and maintenance of existing facilities.

B. In an effort to comply with the affirmative procurement requirements of Section 6002 of the Resource Conservation Recovery Act (RCRA) and Executive Order 13101, the government strongly promotes the use of the recycled and recovered materials and products identified in the Environmental Protection Agency's Comprehensive Procurement Guidelines.

C. Recycled and recovered materials and products must be considered first before any other materials and products will be accepted. Recycled and recovered materials and products must be used throughout the project unless they either do not meet the requirements of this specification, delay the progress of the work, or are cost prohibitive.

D. Examples of these materials and products are detailed below. These are recommended quantities and represent minimum compliance. The actual requirement is to use the maximum amount of recycled material possible, while meeting the performance specifications.

Type	Material	Recycled Material	%
Insulation	Rock wool	Slag	75
	Fiberglass	Glass cullet	20-25
	Loose fill & spray on (cellulose)	Postconsumer paper	75
	Perlite composition board	Postconsumer paper	23
	Plastic rigid foam	Recovered material	9
	Foam-in place	Recovered material	5
	Glass fiber reinforced	Recovered material	6
	Phenolic rigid foam	Recovered material	5
Wall Board	Structural fiberboard		80-100
	Laminated paperboard	Postconsumer paper	100
Carpet	Polyester carpet face fiber	Excludes severe wear applications	25-100
	Playground surfaces	Rubber or plastic	90-100
	Running tracks	Rubber or plastic	90-100
Cement/Concrete	Concrete & cement	Coal fly ash	15-35
	Concrete & cement	Ground granulated blast furnace (GGBF)	25-50
Flooring/Patio	Patio blocks	Plastic or plastic blends	90-100
	Patio blocks	Rubber or rubber blends	90-100
	Floor tiles	Rubber	90-100
	Floor tiles	Plastic	90-100
Landscaping	Paper based hydraulic mulch	Postconsumer paper	100
	Wood based hydraulic mulch	Recoverd wood and/or paper	100
	Compost		100

1.7 INDUSTRIAL VENTILATION

A. Contact the Contracting Officer 10 working days prior to any industrial ventilation systems (systems which control a hazard) being evaluated for acceptance. Advance notification is required by Bioenvironmental Engineering (BE) to allow performance or observation of tests of any new or renovated system prior to initial startup to verify the system will control the hazard. BE will be present for tests of fan speed and rotation, fan motor load, and air flow in all hoods or branches.

1.8 USE OF IONIZING RADIATION (IR)

A. Submit a written request for approval at least 30 calendar days before commencement of activities which require the use of IR generating devices.

B. Submit request to the Base Radiation Safety Officer (RSO) with a courtesy copy to the Contracting Officer. Request shall include:

1. Description/Characteristics:
   a. X-ray unit manufacturer
   b. Model number
   c. Serial number
   d. Maximum kVp, mA, Sec
   e. Ionizing radiation source/emitter (electron tube)

2. The part of the EXCHANGE contract describing work to be done at the base and the inclusive dates of such work.

3. An acknowledgment that the RSO may make initial and periodic checks to ensure the Contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Post or Base personnel.

1.9 USE OF LASERS

A. Submit a written request for approval at least 30 calendar days before commencement of activities which require the use of a laser.

B. Submit request to the RSO with a courtesy copy to the Contracting Officer. Request shall include:

1. Description/Characteristics:
   a. Manufacturer.
   b. Model.
   c. Number of same units.
   d. Serial number(s).
   e. Laser medium.
   f. Mode of operation (i.e. continuous wave (CW), single pulse, multiple pulse).
   g. Maximum exposure time (train length).
   h. Ime (sec) & wave length.
   i. Energy/pulse (J) or CW power (W).
   j. Pulse repetition frequency.
   k. Pulse width.
   l. Beam diameter (at 1/e point).
   m. Beam divergence (at 1/e point).

2. The part of the EXCHANGE contract describing work to be done and the inclusive dates of such work.

3. An acknowledgment that the RSO may make initial and periodic checks to ensure the contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Post or Base personnel.

1.10 USE OF RADIOACTIVE MATERIALS (RAM):

A. Prior to bringing RAM onto Installation property, the Contractor shall obtain permission from the RSO. To obtain approval, forward an application to the RSO, and a courtesy copy to the Contracting Officer at least 30 calendar days before the planned date for commencement of activities on the installation. Requests shall include:

1. A description of the proposed activities on NRC Form 241, Report of Proposed Activities in Non-Agreement States, (the 180-day limitation on the form does not apply to organizations holding an NRC license). Contractors possessing Agreement State Licenses shall also submit an NRC Form 241 to NRC in compliance with 10 CFR 150.21. Contractors requiring more than 180 days of operation per calendar year on the installation shall possess an NRC license.

2. The procedures established to ensure radiological health and safety of Base personnel and the public while on Army or Air Force installations on site and the name of the responsible Contractor representative.

3. A current copy of the applicable NRC, or Agreement State license. Expired licenses are unacceptable. To be valid at the installation, the license must either specifically state the installation by name on the license or state approval for work at temporary job sites anywhere in the United States where the NRC or Agreement State maintains jurisdiction. DOE or DOE prime contractors must provide, in lieu of a license, written certification of their exemption from NRC licensing requirements and cite the applicable exemption of 10 CFR.

4. The part of the EXCHANGE contract describing work to be done and the inclusive dates of such work

5. An acknowledgment that the Base RSO may make periodic checks to ensure the Contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Army or Air Force personnel and prevent potential contamination of Government property.

1.11 USE OF RADIO FREQUENCY (RF) RADIATION

A. Prior to using equipment generating RF Radiation in excess of seven watts peak power and a frequency of 1000 MHz or greater on Installation must submit a written request for approval at least 30 calendar days before commencement of activities which require the use of the RF generating device.

B. Submit request to the RSO, with a courtesy copy to the Contracting Officer. Submittal shall include:
1. Description.
2. Nomenclature.
3. Location of emitters.
4. Quantity.
5. Frequency (Mhz).
6. Pulse width (microsec.).
7. Pulse repetition freq. (pps).
8. Peak power (kW).
9. Antenna size (feet--horizontal/vertical).
10. Antenna band width (degrees-- horizontal/vertical).
11. Antenna gain (dB).
12. Scan rate (rpm).

C. The part of the EXCHANGE contract describing work to be done at the base and the inclusive dates of such work.

D. An acknowledgment that the RSO may make initial and periodic checks to ensure the Contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Post or Base personnel.

1.12 USE OF ULTRAVIOLET (UV) RADIATION

A. Submit a written request for approval at least 30 calendar days before commencement of activities which require the use of UV generating devices on Installation.

B. Submit request to the RSO, with a courtesy copy to the Contracting Officer. Request shall include:

1. The part of the EXCHANGE contract describing work to be done at the base and the inclusive dates of such work.

2. An acknowledgment that the RSO may make initial and periodic checks to ensure the Contractor is following applicable radiological health and safety practices which prevent unnecessary exposures to Post or Base personnel.

1.13 PROTECTION OF NESTING BIRDS

A. Federal law prohibits disturbing bird nests containing eggs or birds too young to fly. Harassment of birds to force them to abandon an occupied nest is also illegal. If the Contractor removes nests or harasses birds in violation of federal and state law, the Contractor is responsible for any charges filed by U.S. Fish and Wildlife Service or State of where Installation is located and is the liable party.

B. If an occupied bird nest is discovered, the contractor shall cease activities in the vicinity of the bird nest until the young birds are able to fly and leave the nest under their own power.

C. Cliff swallow nests are usually the greatest threat to construction projects. As a general rule, cliff swallows can begin nest construction any time between 10 May and 21 July.

D. The Government is responsible for removing new nests in the vicinity of the work area prior to Notice to Proceed.

E. The Contractor shall be responsible for control of new nest construction after issuance of NTP. The contractor shall survey the work area **daily** for new nest construction. To avoid project delays, the contractor shall remove all nests discovered before the nests have been completed and occupied.

F. The contractor shall be responsible for any increased cost or delay resulting from a nest constructed and occupied in the work area after NTP has been issued.

1.14 DISCOVERY OF HISTORICAL OR CULTURAL ARTIFACTS

A. Should any historical artifacts or cultural resources be unearthed, stop excavating and immediately notify the Contracting Officer.

1.15 OZONE DEPLETING SUBSTANCES

A. No ozone depleting substances (refrigerants or any other compounds) shall be used in any capacity on this project unless specifically approved by the HazMart.

1.16 LEAD BASE PAINT

A. No paint with a lead content of 0.06 percent or greater shall be used in any capacity on this project unless specifically approved by the HazMart.

1.17 CLEANING AND DEBRIS CONTROL

A. During the term of this Contract, the Contractor shall remove any materials and equipment that are not required for the completion of the work as promptly as possible. All debris shall be removed from the site and legally disposed. The Contractor shall take particular care to eliminate any hazards created by his operations.

B. The Contractor is responsible for any damage caused by his debris without additional cost to the Government.

C. The Contractor shall maintain at all times during his work at this Project Site a strict windblown debris control program. This program shall ensure no windblown debris or other debris from his work shall contaminate or interfere with any access to or operation of any facility or any parking area, road or street.

1.18 NUISANCE DUMPING AND POLLUTING ACTIVITIES

A. Polluting, dumping, or discharging of any harmful, nuisance, or regulated materials (such as concrete truck washout, vehicle maintenance fluids, residue from saw cutting operations, solid waste or hazardous substances) into building drains, site drains, streams, waterways, holding ponds or to the ground surface is not permitted. The contractor shall be responsible for any and all damages resulting from dumping or discharges. Further, the Contractor shall conduct activities in such a fashion to avoid creating any legal nuisance, including but not limited to, suppression of noise and dust, control of erosion, and implementation of other measures as necessary to minimize off site impacts of work activities.

B. Fugitive Dust emissions (airborne dust generated by vehicles operating on unpaved surfaces, transfer or transport of dust producing materials, etc.) shall be controlled at the construction site, along haul

routes and at staging areas. Water spraying shall be conducted as necessary to minimize fugitive dust generation.

1.19 STORMWATER POLLUTION PREVENTION

A. Prior to clearing, grading or excavating, the Contractor will be provided an approved Erosion and Sediment Control Plan. The Land Disturbance Activity Permit (LDAP) shall be obtained from the on base civil engineering apartment. The LDAP will take 2-3 weeks once filed to the base. Contact the Base civil engineering department for the additional installation requirements.

B. If contaminated ground water is encountered, the contractor must notify **Installation** immediately via the 24/7 spill phone - contact information will be provided at pre-construction meeting.

1.20 CONTAMINATED SOIL

A. If unexpected contaminated soil is encountered while performing work, stop work immediately and contact the Contracting officer. Do not resume work until approved by the Contracting Officer.

1.21 SUSPECTED HAZARDOUS MATERIALS

A. Any suspect hazardous materials encountered during demolition or construction shall immediately be brought to the attention of the Contracting Officer's representative. Work shall not resume until the Contracting Officer is satisfied that the materials are not hazardous. Should they be found to be hazardous, the contractor shall immediately take steps to contain the material, so further damage and contamination does not occur. The contractor shall then submit a proposal for removal.

1.22 OIL-FILLED OR IMPREGNATED ELECTRICAL COMPONENTS

A. Notify (Post or Base Environmental Safety Office and phone number) before demolition or installation of any oil-filled electrical equipment (for example: transformers and regulators). All transformers (both PCB and non-PCB-containing) and light ballasts (unless labeled "No PCBs") shall be disposed through the Installation Hazardous Material and Waste Handling facility.

1.23 HAZARDOUS WASTE TESTING

A. The Contractor shall subject a representative sample of each type of hazardous waste, or potentially hazardous waste, generated to TCLP (Toxic Characteristic Leaching Procedure) testing. Sampling and testing for appropriate metals, and volatile and semi-volatile chemicals shall be performed by an independent test agency that is regularly engaged in the sampling and testing of hazardous materials and waste. Provide the test results to Post or Base Hazardous Waste Facility before transferring the waste to the facility. Refer to the attached Waste Disposal and Borrow Pit Worksheet for additional hazardous waste handling requirements.

1.24 HAZARDOUS MATERIAL INVENTORY

A. Contractor must submit an inventory of all hazardous materials to be used to include quantities. Inventory must be updated at completion of the project to indicate quantities used, spilled, and disposed of, etc.

B. The Contractor shall provide the Hazardous Materials Pharmacy (HazMart) a list and quantity of all hazardous materials that the Contractor intends to bring onto Government property. The Contractor shall provide the HazMart with copies of all MSDSs and an inventory for each Hazardous chemical listed in OSHA Hazard Communication Standard 29 CFR 1910.1200 intended to be used. Each MSDS shall be on file prior to use of the chemical, and shall be maintained for all chemicals. Once the hazardous material is used, its quantity of use shall be reported to the HazMart along with the disposition of the container.

C. Submit a completed Hazardous and Related Material Identification Form, and an MSDS for all materials listed on the form and brought on Base, to the (office and phone).

D. If hazardous materials are not in their original container, the container containing the substance must be labeled.

1.25 SPILL RESPONSE AND REPORTING

A. Spills of hazardous waste, hazardous materials or non-regulated substances such as oils, antifreeze, grease, latex paint, hydraulic fluid, etc. shall immediately be reported to Installation Personnel - contact information will be provided at pre-construction meeting, for reporting purposes to local, state and federal agencies and proper clean-up action. If a spill occurs after normal working hours, or on a weekend or holiday, report spills to the Installation Fire Department and request they contact Installation Personnel.

B. The contractor is encouraged to have a supply of absorbent pads on-site to aid in immediate clean-up of smaller spills, such as oil, coolant or hydraulic fluid leaks from vehicles or equipment.

C. Spill notification placards are to be placed on the job site (CEV or DPW) will provide format and required locations prior to construction.

D. The contractor shall develop a spill plan. The format for the plan will be provided by (CEV or DPW) prior to construction.

1.26 WASTE DISPOSAL AND ENVIRONMENTAL PROTECTION

A. The Contractor shall comply, and ensure that all subcontractors comply, with all Federal, State, local laws, and regulations, ordinances and standards related to environmental pollution control and abatement in effect and the specific requirements stated elsewhere in the Contract Documents.

B. All hazardous wastes as defined in 40 CFR, Part 261, shall be collected and disposed of in accordance with 40 CFR, Parts 260-268. The Contractor is responsible for properly storing, marking, labeling, securing and transporting hazardous wastes. All hazardous wastes shall be collected in contractor furnished DOT/UN approved containers and taken to Installation Hazardous Waste Facility for disposal. Call the Hazardous Waste Facility prior to transporting wastes to the facility to coordinate delivery of the waste materials. The Contractor shall not store hazardous waste on base for more than 30 days.

C. Any previously unidentified suspected hazardous materials encountered during performance of the work of the contract shall immediately be brought to the attention of the Contracting Officer.

D. All general construction wastes, other than those specifically allowed, or required, to be disposed of on-base shall be legally disposed at an off-base sanitary landfill.

E. Comply with the requirements of “Installation Waste Disposal” immediately following this Section.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION - (Not Used)

END OF SECTION

SECTION 01350 - SAFETY POLICIES AND PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Contractor required health and safety plan.
   1. Contractor is responsible for reading the Risk Assessment Plan and following the directions therein.
   2. Contractor must maintain OSHA permissible exposure limits related by the risk assessment: That is, 25 ppm (170 mg/cubic meter) during any 8 hour work shift for a 40-hour week

B. Samples of the “Construction Hazard Plan” and “Safety Plan” attached at the end of the section.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
   1. OSHA 1910 R.E.G. - 29CFR, OSHA 1910.120
   2. U.S. Army Corps of Engineers Publication. – EM 385-1-1: Safety and Health Requirements Manual (Most current version).

1.3 SUBMITTALS

A. Submittals for EXCHANGE approval - The following items shall be submitted for EXCHANGE approval:
   1. Designation of Safety Representative: The Contractor shall designate in writing a qualified employee OSHA Trained under 1910.120 responsible for the overall supervision of all accident prevention activities. Duties shall include ensuring applicable safety requirements are incorporated into work methods and inspecting the job site to ensure that safety measures and instructions are actually being applied. This person shall be on site at all times that work is in progress.
   2. The Contractor shall be trained/certified in OSHA 1910.120 procedures. All other employees performing site work will meet OSHA 1910 training requirements for their job capacity.

B. Submittals for Information Only - The following items shall be Contractor certified:
   1. Job Hazard Analysis: Contractor shall develop a job hazard analysis for presentation at the pre-construction conference. The Contractor's job hazard analysis shall list potential hazards that could arise during the course of the work.
   2. Job Safety and Health Plan.
      a. The Contractor shall develop a Job Safety and Health Plan for presentation at the Pre-construction conference. The Contractor's Safety Plan shall make whatever provisions are necessary to conduct his work in accordance with current OSHA standards.
      b. The safety and health plan must specifically address the excavation portion of construction and will be specific to perchloroethylene (tetrachloroethylene) (PCE), and incorporate decontamination procedures for personnel and equipment, continuous vapor monitoring, a prohibition against eating in proximity to the site, and a prohibition against the smoking of tobacco products in the proximity to the site.
      c. The following are minimum requirements for the health and safety plan:
         1. The Contractor is responsible for all compounds and degradation products addressed by the Risk Assessment Plan.
         2. Specialized Designs: Specialized designs will be provided when the situation requires. Examples of such designs include, but are not limited to, vapor barriers in areas of known vapor hazard.
         3. Safety Plans: Safety Plans will be the responsibility of the Contractor for construction areas identified by the installation and/or EXCHANGE as areas of known hazards only. These plans are required by 29 CFR 1910 and are the responsibility of the Contractor. This requirement will be coordinated through the Health and Safety Program of the military installation by the Contractor.
         4. Minimum Requirements for the Health and Safety Plan are as follows:

            (a) Must be kept on site, and must be written.
            (b) Will contain a hazard analysis (safety and health risk) for each site task and

operation (to be supplied by the installation).

(c) Will include employee training (per paragraph (3) of 1910.120).

(d) Will include personal protective equipment to be used by employees for each of the site tasks and operations (paragraph (g) (5) of 1910.120).

(e) Will include provision for medical surveillance (paragraph (f) of 1910.120).

(f) Will include the frequency and types of air monitoring, personal monitoring, environmental sampling techniques, instruments to be used (their maintenance and calibration).

(g) Will include a site control program (per paragraph (d) of 1910.120) to be coordinated with the installation.

(h) Will include a decontamination procedure (per paragraph (k) of 1910.120).

(i) Will include an emergency response plan (per paragraph (1) of 1910.120).

(j) Will include a confined space entry procedure (per 1910.146, 147 or program equivalent).

(k) Will include provision for spill containment (per paragraph (j) of 1910.120).

(l) Will include pre-entry briefings (prior to each site task activity) for all employees involved in the task, supervision, or emergency response.

(m) Written verification of adherence to the "plan" by a Safety and Health Supervisor is required (the supervisor must meet the 1910.120 training requirements for supervisors).

(n) Deficiencies will be corrected immediately upon discovery and after consultation with the EXCHANGE Contracting Officer and Installation Safety Office.

d. Hazard Response Plan: The unplanned or non-predicted discovery of such hazards as transite pipe, contaminated soils, and other possible hazards will be addressed within an Emergency Response Plan (EMR) by all contractors. This requirement will be coordinated through the Health and Safety Program of the military installation by the contractor (sample provided).

e. Material Safety Data Sheets will be maintained at the site for all hazardous materials in use.

1.4 MONTHLY SAFETY MEETINGS

A. The Installation will schedule subsequent safety meetings with Contractor and subcontractor personnel on a monthly basis. The Owner's representative and installation will attend periodically. Minutes of safety meetings shall be prepared and signed by the Contractor. Concurrence signed by Inspection Section and the original submitted to the Contracting Officer for inclusion in the contract file.

1.5 ACCIDENT REPORTING AND RECORD KEEPING

A. Accident reporting and record keeping shall be in accordance with Base requirements. Telephonic reports of injuries or property damage will be made as soon as possible after the incident and will be followed by a copy of an Accident Report.

1.6 LIFE OF CONTRACT REQUIREMENTS

A. The Contractor shall comply with all provisions of this section during the life of the contract.

1.7 HEAD PROTECTION (HARD HATS)

A. All work sites under this contract are designated Hard Hat Areas. The Contractor shall post the area and shall ensure that all personnel, vendors and visitors use hard hats while within the limits of the work site.

END OF SECTION

SAMPLE

SAFETY PLAN

1. APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification and are referred to in the text by the basic designation only.

1.1 US ARMY CORPS OF ENGINEERS:

EM 385-1-1 U.S. Army Corps of Engineers Safety and Health Requirements Manual

1.2 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA):

NFPA 70-1993 National Electric Code (NEC)

1.3 SOCIETY OF AUTOMOTIVE ENGINEERS (SAE):

J 994-85 Alarm, Backup, Electric-Performance, Test, and Application, Recommended Practice.

2. GENERAL: Work safety is of paramount importance. The Contractor shall comply with the Contract Clause in the Solicitation entitled ACCIDENT PREVENTION, including the U.S. Army Corps of Engineers Safety and Health Requirements Manual referred to therein in addition to the provisions of this specification.

3. SAFETY PROGRAM: The U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, and all subsequent revisions referred to in the Contract Clause ACCIDENT PREVENTION of this contract, are hereby supplemented as follows:

a. The Contractor shall designate an employee responsible for overall supervision of accident prevention activities. Such duties shall include:

1. Assuring applicable safety requirements are incorporated in work methods
2. Inspecting the work to ensure that safety measure and instructions are actually applied.

The proposed safety supervisor's name and qualifications shall be submitted in writing for approval to the Contracting Officer's Representative. This individual must have prior experience as a safety engineer or be able to demonstrate his/her familiarity and understanding of the safety requirements over a prescribed trial period. The safety engineer shall have the authority to act on behalf of the Contractor's general management to take whatever action is necessary to assure compliance with safety requirements. The safety supervisor is required to be on the site when work is being performed.

b. Prior to commencement of any work at a job site, a preconstruction safety meeting shall be held between the Contractor and the Corps of Engineers Area/Resident Engineer to discuss the Contractor's safety program and in particular to review the following submittals:

1. Contracts Accident Prevention Plan: An acceptable accident prevention plan, written by the prime contractor for the specific work and implementing in detail the pertinent requirements of EM 385-1-1, shall be submitted for Government approval.

2. Activity Phase Hazard Analysis Plan: Prior to beginning each major phase of work, an activity hazard analysis (phase plan) shall be prepared by the Contractor for that phase of work and submitted to the Contracting Officer's Representative for approval. A phase is defined as an operation involving a type of work presenting hazards not experienced in previous operations or where a new subcontractor or work crew is to perform work. The analysis shall address the hazards for each activity performed in the phase and shall present the procedures and safeguards necessary to eliminate the hazards or reduce the risk to an acceptable level.

C. Subsequent jobsite safety meetings shall be held as follows:

1. A safety meeting shall be held at least once a month for all supervisors on the project to review past activities, to plan ahead for new or changed operations and to establish safe working procedures to anticipated hazards. An outline report of each monthly meeting shall be submitted to the Contracting Officer's Representative.

2. At least one safety meeting shall be conducted weekly, or whenever new crews begin work, by the appropriate field supervisors or foreman for all workers. An outline report of the meeting giving date, time, attendance, subjects discussed and who conducted it shall be maintained and copies furnished the designated authority on request.

4. ACCIDENTS: Chargeable accidents are to be investigated by both Contractor personnel and the Contracting Officer.

4.1 ACCIDENT REPORTING, ENG FORM 3394: Section I, paragraph 01.D, of EM 385-1-1 and the Contract Clause entitled ACCIDENT PREVENTION are amended as follows: The prime Contractor shall report on Eng Form 3394, supplied by the Contracting Officer, all injuries to his employees or subcontractors that result in lost time and all damage to property and/or equipment in excess of $2,000 per incident. Verbal notification of such accident shall be made to the Contracting Officer within 24 hours. A written report on the above noted form shall be submitted to the Contracting Officer within 72 hours following such accidents. The written report shall include the following:

a. A description of the circumstances leading up to the accident, the cause of accident, and corrective measures taken to prevent recurrence.

b. A description of the injury and name and location of the medical facility giving examination and treatment.

c. A statement as to whether or not the employee was permitted to return to work after examination and treatment by the doctor, and if not, an estimate or statement of the number of days lost from work. If there have been days lost from work, state whether or not the employee has been re-examined and declared fit to resume work as of the date of the report.

4.2 OSHA Requirements:

4.2.1 OSHA Log: A copy of the Contractors' OSHA Log of Injuries shall be forwarded monthly to the Contracting Officer.

4.2.2 OSHA Inspections: Contractors shall immediately notify the Contracting Officer when an OSHA Compliance Official (Federal or State Representative) presents his/her credentials and informs the Contractor that the workplace will be inspected for OSHA compliance. Contractors shall also notify the Contracting Officer upon determination that an exit interview will take place upon completion of the OSHA inspection. (NABSA).

5. SUBMITTALS FOR GOVERNMENT APPROVAL: Submittals shall be in accordance with Section 01305 CONTRACTOR SUBMITTTAL PROCEDURES. All required submittals of items specified in this section shall be for information only, except for those items including, but not limited to, the following which shall be submitted for Government approval:

a. Written designation of safety representative.

b. Written project specific accident prevention plan.

c. Written activity phase hazard analysis plan.

END OF SAMPLE SAFETY PLAN

SAMPLE

CONSTRUCTION HAZARD PLAN

TO BE ACCOMPLISHED BY THE GENERAL CONTRACTOR FOR CONSTRUCTION
AND POSTED IN ALL CONSTRUCTION TRAILERS

SHOULD AN UNPREDICTED DISCOVERY OF A HAZARDOUS MATERIAL OR CONDITION BE MADE DURING CONSTRUCTION THE FOLLOWING SEQUENCE OF ACTIONS IS REQUIRED WHEN THERE IS NO IMMEDIATE THREAT TO LIFE OR PROPERTY

ITEM	FIRST ACTION	NOTIFY	TELEPHONE #
Transite Pipe	Cease Activity in area of discovery	1. BCE 2. AAFES Contracting Officer and/or CME 3. AAFES Environmental Engineer when Unable to Contact 1, 2	
Contaminated Soil	Cease Activity in area of discovery cover with plastic	Same as above	
Buried Munitions	Cease Activity	Same as above	
UST	Same as above	Same as above	
Other			

Should there be an immediate threat to life or property, the emergency response plan for the installation, which is to be on file at the construction site, is to be followed in every detail. An example of this procedure is the rupture of a fuel line, liquid or natural gas.

END OF SAMPLE CONSTRUCTION HAZARD PLAN

SECTION 01352 – LEED REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to work of this Section.

1.2 SECTION INCLUDES

A. General requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED-Certified certification based on LEED-NC, Version 2.2.

B. Other LEED prerequisites and credits needed to obtain LEED certification depend on material selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.

C. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depent on Architect's design and other aspects of Project that are not part of the Work of the Contract.

1.3 RELATED WORK OF OTHER SECTIONS

A. Coordinate work of this Section with work of other sections, including Division-1 Sections, as required to properly execute the work and as necessary to maintain satisfactory progress of the work.
   1. Divisions 1 through 16 Sections for LEED requirements specific to the Work of each of those Sections. These requirements may or may not include reference to LEED.

1.4 DEFINITIONS

A. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-0 1-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-FSC-accredited certification body.

B. LEED: Leadership in Energy & Environmental Design.

C. Rapidly Renewable Materials: Materials made from plants that are typically harvested within a 10-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.

D. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site. If only a fraction of a product or material is extracted / harvested / recovered and manufactured locally, then only that percentage)by weight) shall contribute to the regional value.

E. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.
   1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
   2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

1.5 SUBMITTALS

A. General: Submit additional LEED submittal requirements included in other sections of the Specifications.

B. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance

with indicated LEED requirements.

C. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:
   1. Furniture.
   2. Plumbing.
   3. Mechanical.
   4. Electrical.
   5. Specialty items such as elevators and equipment.
   6. Wood-based construction materials.

D. LEED Action Plans: Provide preliminary submittals within seven (7) days of date established for commencement of the Work indicating how the following requirements will be met:
   1. Credit MR 2.1: Waste management plan complying with Division 1 Section “Construction Waste Management.”
   2. Credit MR 4.1: List of proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
   3. Credit MR 5.1: List of proposed regional materials. Identify each regional material, including its source, cost and the fraction by weight that is considered regional.
   4. Credit MR 7: List of proposed certified wood products. Indicate each product containing certified wood, including its source and cost of certified wood products.
   5. Credit EQ 3.1: Construction indoor-air-quality management plan.

E. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:
   1. Credit MR 2.1: Waste reduction progress reports complying with Division 1 Section “Construction Waste Management.”
   2. Credit MR 4.1: Recycled content.
   3. Credit MR 5.1: Regional materials.
   4. Credit MR 7: Certified wood products.

F. LEED Documentation Submittals:
   1. Credit EA 5: Product data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy-consumption performance over a period of time of not less than one year of post-construction occupancy.
   2. Credit MR 2.1: Comply with Division 1 Section “Construction Waste Management.”
   3. Credit MR 4.1: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   4. Credit MR 5.1: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   5. Credit MR 7: Product data and chain-of-custody certificates for products containing certified wood. Include statement indicating cost for each certified wood product.
   6. Credit EQ 3.1:
      a. Construction indoor-air-quality management plan.
      b. Product data for temporary filtration media.
      c. Product data for filtration media used during occupancy.
      d. Construction Documentation: Six (6) photographs at three (3) different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.
   7. Credit EQ 3.2:
      a. Signed statement describing the building air flush-out procedures includeing the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
      b. Product data for filtration media used during flush-out and during occupancy.
      c. Report from testing and inspecting agency indicating results of indoor-air-quality

testing and documentation showing compliance with indoor-air-quality testing procedures and requirements.

8. Credit EQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
9. Credit EQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
10. Credit EQ 4.4: Product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin.

1.6 QUALITY ASSURANCE

A. LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

2.1 RECYCLED CONTENT OF MATERIALS

A. Credit MR 4.1: Provide building materials with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 10 percent of cost of materials used for Project.
   1. Cost of post-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
   2. Cost of pre-consumer recycled content of an item shall be determined by dividing weight of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
   3. Do not include mechanical and electrical components, and specialty items such as elevators and equipment in the calculation.

2.2 REGIONAL MATERIALS

2.3 CERTIFIED WOOD

A. Credit MR 7: Provide a minimum of 50 percent (by cost) of wood-based materials that are produced from wood obtained from forests certified by and FSC-accredited certification body to comply with FSC STD-0 1-001, “FSC Principles and Criteria for Forest Stewardship.”
   1. Wood-based materials include, but are not limited to, the following materials when made from wood, engineered wood products, or wood-based panel products:
      a. Rough carpentry.
      b. Miscellaneous carpentry.
      c. Finish carpentry.
      d. Architectural woodwork.
      e. Wood paneling.
      f. Wood veneer wall covering.
      g. Wood flooring.
      h. Wood cabinets.
      i. Furniture.

2.4 LOW-EMITTING MATERIALS

A. Credit EQ 4.1: For field applications that are inside the weatherproofing system, use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D:
   1. Wood Glues: 30 g/L
   2. Metal to Metal Adhesives: 30 g/L
   3. Adhesives for Porous Materials (Except Wood): 50 g/L
   4. Subfloor Adhesives: 50 g/L
   5. Plastic Foam Adhesives: 50 g/L
   6. Carpet Adhesives: 50 g/L

7. Carpet Pad Adhesives: 50 g/L
8. VCT and Asphalt Tile Adhesives: 50 g/L
9. Cove Base Adhesives: 50 g/L
10. Gypsum Board and Panel Adhesives: 50 g/L
11. Rubber Floor Adhesives: 60 g/L
12. Ceramic Tile Adhesives: 65 g/L
13. Multipurpose Construction Adhesives: 70 g/L
14. Fiberglass Adhesives: 80 g/L
15. Contact Adhesive: 80 g/L
16. Structural Glazing Adhesives: 100 g/L
17. Wood Flooring Adhesive: 100 g/L
18. Structural Wood Member Adhesive: 140 g/L
19. Special Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, Teflon, ultra-high molecular weight polyethylene, rubber or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L
20. Top and Trim Adhesive: 250 g/L
21. Plastic Cement Welding Compounds: 250 g/L
22. ABS Welding Compounds: 325 g/L
23. CPVC Welding Compounds: 490 g/L
24. PVC Welding Compounds: 510 g/L
25. Adhesive Primer for Plastic: 550 g/L
26. Sheet Applied Rubber Lining Adhesive: 850 g/L
27. Aerosol Adhesive, General Purpose Mist Spray: 65 percent by weight.
28. Aerosol Adhesive, General Purpose Web Spray: 55 percent by weight.
29. Special Purpose Aerosol Adhesive (All Types): 70 percent by weight.
30. Other Adhesives: 250 g/L
31. Architectural Sealants: 250 g/L
32. Nonmembrane Roof Sealants: 300 g/L
33. Single-Ply Roof Membrane Sealants: 450 g/L
34. Other Sealants: 420 g/L
35. Sealant Primers for Nonporous Substrates: 250 g/L
36. Sealant Primers for Porous Substrates: 775 g/L
37. Modified Bituminous Sealant Primers: 500 g/L
38. Other Sealant Primers: 750 g/L

B. Credit EQ 4.2: For field applications that are inside the weatherproofing system, use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59 Subpart D.
1. Flat Paints, Coatings, and Primers: VOC not more than 50 g/L.
2. Nonflat Paints, Coatings, and Primers: VOC not more than 150 g/L.
3. Anticorrosive and Antitrust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
4. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
5. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
6. Floor Coatings: VOC not more than 100 g/L.
7. Shellacs, Clear: VOC not more than 730 g/L.
8. Shellacs, Pigmented: VOC not more than 550 g/L.
9. Stains: VOC not more than 250 g/L.

C. Credit EQ 4.4: Do not use composite wood or agrifiber products or adhesives that contain urea-formaldehyde resin.

PART 3 - EXECUTION

3.1 MEASUREMENT AND VERIFICATION

A. Credit EA 5: Implement measurement and verification plan consistent with Option D: Calibrated Simulation, Savings Estimation Method 2 in the EVO's "International Performance Measurement and Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction," and as further defined by the following:
1. MEP Engineer.

B. If not already in place, install metering equipment to measure energy usage. Monitor, record, and

trend log measurements.

C. Evaluate energy performance and efficiency by comparing actual to predicted performance.

D. Measurement and verification period shall cover at least one (1) year of post-construction occupancy.

3.2 CONSTRUCTION WASTE MANAGEMENT

A. Credit MR 2.1: Comply with Division 1 Section “Construction Waste Management.”

3.3 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

A. Credit EQ 3.1: Comply with SMACNA’s IAQ Guideline for Occupied Buildings Under Construction.”
   1. If Owner authorizes use of permanent heating, cooling, and ventilation systems during construction period as specified in Division 1 Section “Temporary Facilities and Controls,” install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
   2. Replace all air filters immediately prior to occupancy.

B. Credit EQ 3.2: Comply with one of the following requirements:
   1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 deg F and a relative humidity no higher than 60 percent.
   2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. of outdoor air per sp. ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft. / sq. ft. of outside air has been delivered to the space.
   3. Air quality testing
      a. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA’s “Compendium of Methods for the Determination of Air Pollutants in Indoor Air,” and as additionally detailed in the USGBC’s “LEED-NC: Reference Guide.”
      b. Demonstrate that the contaminant maximum concentrations listed below are not to exceed:
         1) Formaldehyde: 50 ppb.
         2) Particulates (PM 10): 50 micrograms / cu. m.
         3) Total Volatile Organic Compounds (TVOC): 500 micrograms / cu. m.
         4) 4-Phenylcyclohexene (4-PH): 6.5 micrograms / cu. m.
         5) Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.
      c. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting noncomplying building areas, take samples from same locations as in the first test.
      d. Air-sample testing shall be conducted as follows:
         1) All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
         2) Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Nonfixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
         3) Number of sampling locations will vary depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sp. ft. or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.

4) Air samples shall be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

END OF SECTION

LEED for New Construction v 2.2
Registered Project Checklist

Project Name: AAFES Shoppette

Project Address: Fort Meade, Maryland

Yes	?	No		
34		33	Project Totals (Pre-Certification Estimates)	69 Points
SILVER			**Certified**: 26-32 points **Silver**: 33-38 points **Gold**: 39-51 points **Platinum**: 52-69 points	

Yes	?	No			
7		7	Sustainable Sites		14 Points
Yes			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
		1	Credit 2	**Development Density & Community Connectivity**	1
		1	Credit 3	**Brownfield Redevelopment**	1
		1	Credit 4.1	**Alternative Transportation**, Public Transportation	1
		1	Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	**Alternative Transportation**, Low-Emitting & Fuel Efficient Vehicles	1
		1	Credit 4.4	**Alternative Transportation**, Parking Capacity	1
		1	Credit 5.1	**Site Development**, Protect or Restore Habitat	1
1			Credit 5.2	**Site Development**, Maximize Open Space	1
1			Credit 6.1	**Stormwater Design**, Quantity Control	1
1			Credit 6.2	**Stormwater Design**, Quality Control	1
1			Credit 7.1	**Heat Island Effect**, Non-Roof	1
1			Credit 7.2	**Heat Island Effect**, Roof	1
		1	Credit 8	**Light Pollution Reduction**	1

Yes	?	No			
4		1	Water Efficiency		5 Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
		1	Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1

LEED for New Construction v 2.2
Registered Project Checklist

Yes	?	No			
5		12	Energy & Atmosphere		17 Points
Yes			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Yes			Prereq 1	**Minimum Energy Performance**	Required
Yes			Prereq 1	**Fundamental Refrigerant Management**	Required

***Note for EAc1:** All LEED for New Construction projects registered after June 26, 2007 are required to achieve at least two (2) points.

5		5	Credit 1	**Optimize Energy Performance**	1 to 10
			Credit 1.1	10.5% New Buildings / 3.5% Existing Building Renovations	1
			Credit 1.2	14% New Buildings / 7% Existing Building Renovations	2
			Credit 1.3	17.5% New Buildings / 10.5% Existing Building Renovations	3
			Credit 1.4	21% New Buildings / 14% Existing Building Renovations	4
		-->	Credit 1.5	24.5% New Buildings / 17.5% Existing Building Renovations	5
			Credit 1.6	28% New Buildings / 21% Existing Building Renovations	6
			Credit 1.7	31.5% New Buildings / 24.5% Existing Building Renovations	7
			Credit 1.8	35% New Buildings / 28% Existing Building Renovations	8
			Credit 1.9	38.5% New Buildings / 31.5% Existing Building Renovations	9
			Credit 1.10	42% New Buildings / 35% Existing Building Renovations	10
		3	Credit 2	**On-Site Renewable Energy**	1 to 3
			Credit 2.1	2.5% Renewable Energy	1
			Credit 2.2	7.5% Renewable Energy	2
			Credit 2.3	12.5% Renewable Energy	3
		1	Credit 3	**Enhanced Commissioning**	1
		1	Credit 4	**Enhanced Refrigerant Management**	1
		1	Credit 5	**Measurement & Verification**	1
		1	Credit 6	**Green Power**	1

LEED for New Construction v 2.2
Registered Project Checklist

Yes	?	No			
7		6	Materials & Resources		13 Points
Yes			Prereq 1	**Storage & Collection of Recyclables**	Required
		1	Credit 1.1	**Building Reuse,** Maintain 75% of Existing Walls, Floors & Roof	1
		1	Credit 1.2	**Building Reuse,** Maintain 95% of Existing Walls, Floors & Roof	1
		1	Credit 1.3	**Building Reuse,** Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
1			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
		1	Credit 3.1	**Materials Reuse**, 5%	1
		1	Credit 3.2	**Materials Reuse**, 10%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + 1/2 pre-consumer)	1
1			Credit 4.2	**Recycled Content**, 20% (post-consumer + 1/2 pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured	1
1			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured	1
		1	Credit 6	**Rapidly Renewable Materials**	1
1			Credit 7	**Certified Wood**	1

Yes	?	No			
8		7	Indoor Environmental Quality		15 Points
Yes			Prereq 1	**Minimum IAQ Performance**	Required
Yes			Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Required
		1	Credit 1	**Outdoor Air Delivery Monitoring**	1
		1	Credit 2	**Increased Ventilation**	1
1			Credit 3.1	**Construction IAQ Management Plan,** During Construction	1
		1	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
		1	Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems**, Lighting	1
1			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
		1	Credit 7.1	**Thermal Comfort,** Design	1
		1	Credit 7.2	**Thermal Comfort,** Verification	1
		1	Credit 8.1	**Daylight & Views,** Daylight 75% of Spaces	1
1			Credit 8.2	**Daylight & Views,** Views for 90% of Spaces	1

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LEED for New Construction v 2.2
Registered Project Checklist

Yes	?	No			
3			Innovation & Design Process		5 Points
1			Credit 1.1	**Innovation in Design:** Green House Keeping Program	1
1			Credit 1.2	**Innovation in Design:** Reduce Toxic materials	1
			Credit 1.3	**Innovation in Design:** Provide Specific Title	1
			Credit 1.4	**Innovation in Design:** Provide Specific Title	1
1			Credit 2	**LEED® Accredited Professional**	1

SECTION 01360 - ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 SCOPE

A. The work covered by this section consists of furnishing all labor, materials, and equipment and performing all work required for the prevention of environmental degradation during and as a result of construction operations under this contract. These requirements are in addition to any environmental protection requirements elsewhere in these specifications. For the purpose of this specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents, not naturally occurring at the site, which adversely affect human health or welfare; unfavorably alter ecological balances important to human life; affect other species of importance to humans; or degrade the utility of the environment for aesthetic and recreational purposes. The control of environmental pollution by the contractor requires consideration of air, water, and land, and involves noise control, solid waste management and management of radiant energy and radioactive materials, as well as other pollutants. This section also requires the protection of cultural and historic resources.

B. Contractor shall coordinate the work of this section with the work called for under the various sections of Division 2.

1.2 CONTRACTOR'S GENERAL ENVIRONMENTAL COMPLIANCE OBLIGATIONS.

A. Work under this contract is to be performed on a government facility. All environmental rules applying to contractor operations elsewhere will also apply on the government facility. Contractor (and any subcontractor, agent or representative) shall comply with all applicable Federal, State, and local laws and regulations providing for environmental protection and pollution control and abatement. These include but are not limited to: the Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation and Liability Act, Toxic Substances Control Act, Federal Insecticide Fungicide and Rodenticide Act, Coastal Zone Management Act, Endangered Species Act, National Historic Preservation Act, Safe Drinking Water Act, Emergency Planning and Community Right-to-Know Act, Oil Pollution Act, Archeological Resources Protection Act, and Pollution Prevention Act. Contractor has the duty to determine for itself where such laws and regulations apply. Although the Contractor may request assistance from the Contracting Officer in delineating applicable environmental laws and regulations, Contractor has an independent responsibility to make its own determination and to do so in a timely fashion.

1.3 FINES OR PENALTIES FOR ENVIRONMENTAL NON-COMPLIANCE.

A. The Contractor shall be responsible for paying any fines or penalties assessed against AAFES or the installation or the Army or the Air Force for violations of environmental laws or regulations resulting from acts or omissions of the contractor or its employees, subcontractors, or agents. This obligation is in addition to any fines or penalties that may be assessed against the contractor for the same conduct. Contractor may either reimburse these fines or penalties through the Contracting Officer or with the consent of the Contracting Officer, the Contractor may pay such fines or penalties directly to the regulatory agency or agencies concerned.

1.4 CONTRACTOR'S LIABILITY FOR ENVIRONMENTAL DAMAGES

A. Contractor agrees to hold harmless and indemnify AAFES (which includes the Army, Air Force, or other Department of Defense component, as appropriate) for any and all damages of any kind resulting from environmentally harmful activities by the contractor, contractor's employees or agents or subcontractors. "Damages" includes but is not limited to personal injury, property damage (including diminution of value), or death, environmental restoration and response costs, natural resource damages, expert witness and attorney's fees, and reimbursement of any and all expenses incurred to obtain permits as a result of Contractor's failure to identify or obtain permits for itself or AAFES.

1.5 CONTACTS WITH ENVIRONMENTAL REGULATORY OFFICIALS.

A. Contractor shall immediately advise the Contracting Officer and the installation Environmental Division of the content of all contacts with federal, state, or local environmental regulators, before, during, and after the performance of this contract concerning the performance of this contract.

PART 2 - PERMITS

2.1 PERMITS FOR EQUIPMENT USED BY CONTRACTOR IN PERFORMING AAFES CONTRACTS.

A. For equipment used in the performance of this contract, Contractor shall obtain in Contractor's name and at no additional expense to AAFES, all permits, and coordination's, certifications or other regulatory authorization necessary to perform and complete the work required by this contract under applicable environmental laws and regulations. "Applicable environmental laws and regulations" includes but is not limited to: the Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Toxic Substances Control Act, Federal Insecticide Fungicide and Rodenticide Act, Coastal Zone Management Act, Endangered Species Act, National Historic Preservation Act, Safe Drinking Water Act, Emergency Planning and Community Right-to-Know Act, Oil Pollution Act, and Pollution Prevention Act and State, County, and Local laws and regulations on the same subjects.

2.2 PERMITS NEEDED FOR CONSTRUCTION, EXCAVATION, MODIFICATION, RENOVATION, DEMOLITION, INSTALLATION, OR OTHER ALTERATION OF BUILDINGS, STRUCTURES, EQUIPMENT, INSTALLATIONS, REAL PROPERTY OR SYSTEMS

A. Contractor shall identify all Federal, State, County, or local, permits, coordination's, certifications or other regulatory authorization requirements under all applicable environmental laws and regulations as defined in above. Contractor shall then prepare and submit in draft all applicable permit applications, coordination's, notices, or other required filings, together with all supporting data to the contracting officer for review. Permit applications or notifications or other documents that must be submitted by AAFES will be submitted by AAFES, and any documents that must be submitted by the contractor will be returned after review to the contractor for submission. No work requiring permit or other written authorization shall proceed before the Contractor has the permit or authorization or a copy thereof in its possession.

PART 3 - MATERIALS

3.1 RECYCLED MATERIALS.

A. Materials used in this contract shall be, to the greatest extent practicable and consistent with financial prudence, made of recycled materials or of materials that are recyclable. Where construction debris such as concrete or asphalt or wood can be recycled, this alternative will be considered.

3.2 ASBESTOS

A. Asbestos will not be used or included in this project.

3.3 POLYCHLORINATED BIPHENYL'S (PCBs)

A. PCBs will not be used or included in this project.

3.4 LEAD-BASED PAINT

A. Lead-based paint will not be used included in this project.

3.5 OZONE-DEPLETING SUBSTANCES.

A. "Class I substance," as used in this clause, means any substance designated as class I by the Environmental Protection Agency (EPA)(40 CFR Part 82), including but not limited to chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform. Where demolition work occurs, no Class I Ozone Depleting Substances are allowed to leave the installation and become the property of the contractor.

B. "Class II substance," as used in this clause, means any substance designated as class II by EPA (40 CFR Part 82), including but not limited to, hydro chlorofluorocarbons.

C. As required by 42 USC 7671j(b), c, and (d) and 40 CFR Part 82, Subpart E, the Contractor shall label products which contain class I or class II ozone-depleting substances or are manufactured with a process that uses class I or class II ozone-depleting substances, or containers of class I or class II ozone-depleting substances, as follows:

1. "WARNING: Contains (or manufactured with, if applicable)
2. _____*_____, (a) substance(s) which harm(s) public health
3. and the environment by destroying ozone in the upper atmosphere."
4. *The Contractor shall insert the name of the substance(s).

D. The contractor shall comply with the applicable requirements of Sections 608 and 609 of the Clean Air Act (42 USC 7671g, National Recycling and Emission Reduction Program and 7671h, Servicing of Motor Vehicle Air Conditioners) as each or both apply to the contract.

3.6 PESTICIDES

A. Except as may be specified elsewhere in this contract, Contractor will not use or apply pesticides (such as herbicides or weed killers, insecticides, or rodenticides) without the specific written prior approval of the Contracting Officer.

PART 4 - EXECUTION (WORK PRACTICES)

4.1 GENERAL: SITE DISTURBANCE DURING CONSTRUCTION ACTIVITIES.

A. Contractor shall use industry recognized best management practices to avoid creation of fugitive dust emissions and to avoid and control storm water runoff from the construction site and any temporary roads that may be used for access to it. Water sprinkling may be used to control dust. Contractor shall perform all work under this contract in such a manner that no pollutants of any kind are released into ditches, storm drains, streams, lakes, or other surface waters on or connected to the site.

4.2 PROTECTION OF WATER RESOURCES

A. General: The General Contractor shall not pollute storm drainage, streams, lakes, or reservoirs with fuels, oils, bitumen, calcium chloride, acids, construction wastes or other harmful materials or pollutants. It is the responsibility of the General Contractor to determine and comply with all applicable federal, state, regional, municipal, and other regulations.

B. Spillage: The General Contractor shall take special measures to prevent chemicals, fuels, oils, greases, bituminous materials, waste washings, herbicides, cement, and surface drainage from entering public waters. In the event of a spill, the contractor must make all required notifications to federal, state or local authorities and will notify the Contracting Officer immediately.

C. Washing and Curing Water: Water used in aggregate processing, concrete curing, foundation, and concrete lift clean-up and other waste water shall not be allowed to enter the storm drainage system.

4.3 PROTECTION OF LAND RESOURCES

A. General: It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this contract be preserved in their present condition or be restored to a condition after completion of construction that will appear to the natural and not detract from the appearance of the project. The General Contractor shall limit his construction activities to areas defined by the Drawings or Specifications.

B. Prevention of Landscape Defacement: Except in areas marked on the plans to be cleared, the General Contractor shall not deface, remove, cut, injure or destroy trees or shrubs without specific written authority. Trees designated to be saved shall be protected from either excavation or filling within the root zone. No ropes, cables, or guys shall be fastened or attached to any existing trees for anchorage unless specifically authorized by the Contracting Officer. The General Contractor shall in any event be responsible for any damage resulting from such use.

C. Restoration of Landscape Damage: Any trees or other landscape features scarred or damaged by the General Contractor's equipment or operations shall be restored as nearly as possible to the original condition at the General Contractor's expense. The Contracting Officer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of under requirements for site clearing (Section 02111). All scars made on trees not designated on the plans to be removed by equipment construction operations, or by the removal of limbs larger than 1-inch in diameter shall be coated immediately with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced landscape personnel. Tree trimming with axes shall not be permitted. Trees that are to remain, either

within or outside established clearing limits, that are subsequently damaged by the General Contractor and are beyond saving in the opinion of the Contracting Officer, shall be immediately removed and replaced with a nursery grown tree of the same species.

4.4 CONTROL OF AIR EMISSIONS.

A. Contractor's actions shall conform to all federal, state, and local requirements for the control of air emissions during work under this contract. Trucks leaving the site will be brushed or washed to remove all practicable amounts of dust or other material that may become airborne. Contractor will ensure that all internal construction vehicles and equipment used will have the lowest practicable emissions characteristics and be maintained in optimum operating condition for the reduction of air emissions. Where use of electric motors instead of internal combustion engines is feasible, electric motors will be used during construction.

PART 5 - WASTE DISPOSAL

5.1 POLLUTION PREVENTION & WASTE DISPOSAL

A. The contractor should use prior planning to find those materials that will minimize the creation of waste in general and hazardous waste in particular. Recycling should be considered and implemented at every practicable stage of the project.

5.2 WASTE DISPOSAL

A. Pollution Prevention: The contractor should use prior planning to find those materials and work practices that will minimize the creation of waste in general and hazardous waste in particular.

B. Hazardous Waste Generation, Handling, and Disposal. Work done under this contract is to be performed on a government facility. According to rules and procedures of the United States Environmental Protection Agency, the federal facility is required to have a generator identification number under the Resource Conservation and Recovery Act (RCRA) and to be responsible for wastes (as defined under RCRA) produced, managed, stored, disposed on, or transported from the facility. Accordingly, Contractor will, to the greatest extent practicable, use materials, processes, and techniques that will avoid the creation of hazardous waste. Contractor shall prepare and follow a written waste management and disposal plan for all hazardous wastes generated on the site. Prior to generation of any hazardous wastes, contractor will coordinate planned activities regarding hazardous materials and hazardous waste with the Contracting Officer. Contractor shall submit a written waste management plan, through the contracting officer, to installation environmental office. Contractor shall follow this plan once it has been approved by the contracting officer. Under no circumstances will contractor bring onto the site hazardous waste that has been generated elsewhere. All hazardous waste will be properly disposed of by the Contractor in accordance with all federal, state, and local requirements.

C. Disposal of Non-RCRA Wastes.

1. All non-hazardous wastes generated on the site as a result of this contract must be disposed of properly, in accordance with all federal, state and local requirements. Materials will be recycled whenever practicable. Prior to creation of such wastes, the Contractor shall submit to the installation environmental management function,

D. Construction Debris.

1. Debris from demolition of existing structures will ordinarily be removed to a location on the installation, as designated by the installation authorities.
2. If a location on the installation is not available, other sections in this contract may require the contractor to remove clean construction debris from the site to a location of the contractor's choosing off the installation. (Site soil or other site media are not covered by this paragraph.) Debris will be recycled or disposed of in accordance with all applicable federal, state and local rules. Such debris must be free of all contamination, including but not limited to, lead paint, asbestos, and insecticides. Prior to removal of any construction debris, that debris must be certified by the installation to be free of contamination and of no value to the United States, and this certification must be provided to the contracting officer. To expedite work, this may be accomplished by a telecopier or other suitable electronic means, however, the original certification form must be provided to the contracting officer. No form is prescribed for this certification so long as all necessary information is provided and the document is signed by an

authorized installation representative. However, an example is provided at the end and this form may be used. All construction debris removed from the installation must be covered by a certification. The contractor must arrange with the installation POC whether all debris will be covered by one certification or if several certifications will be required.

E. Consolidated Waste Disposal Plans: Contractor may, at contractor's option, submit for approval as specified above one consolidated plan for handling hazardous and non-hazardous wastes.

F. Earthwork and Removal of Potentially Contaminated Media:

1. Unless otherwise specified elsewhere in this contract, the site has been inspected and is, consistent with best professional judgment, free of environmental contamination or pollution. However, work under this contract will be performed on a military installation, where the history of prior military and industrial activities is not necessarily completely known. The following provisions prohibit the removal from the installation of soil or other materials found on site and are included, in an abundance of caution, for the protection of AAFES, the installation, and the contractor.
2. Notwithstanding any other clause in this contract, including but not limited to all standard site work general provisions (02010-02900); no media by-product resulting from site preparation, construction or excavation shall be moved off the post, base, or installation where the construction is occurring. If the construction is off the post, base or installation, no media by-product shall be moved off the construction site.
3. The contractor shall: (1) leave the media in place at the site, subject to appropriate erosion control; or (2) haul the media to and place it at a location on the installation that has been designated either in this contract or in writing by the contracting officer; and (3) if unforeseen difficulties arise, such as excessive quantity of media is generated, the contractor shall advise the contracting officer and shall not remove media from the site without written authorization from the contracting officer.

G. DEFINITIONS

1. Media - Any soil, water, or air, moved, disturbed or released from a site.

The terms hazardous, waste, pollutant, contaminate, substance have the same meanings and usage here as they commonly do in CERCLA, RCRA, FWPCA, CAA, TSCA, and SDWA respectively."

INSTALLATION CERTIFICATION FOR CLEAN CONSTRUCTION DEBRIS TO BE REMOVED FROM AAFES PROJECT SITE

As representative of _____ (insert name of installation), I am authorized to certify, and hereby do so certify, that the construction debris to be removed from the AAFES project site at _____ _____ (describe project and list address, for example Main Exchange Project, 111 Road A, X installation) has been inspected and is of no value to the United States and is free of all contamination, including but not limited to: lead paint, asbestos, PCBs, and pesticides.

CERTIFICATION:

Signed: _____ Date: _____

Printed Name, Rank or Grade, and Duty Title: _____

ORIGINAL OF THIS FORM MUST BE PROVIDED TO CONTRACTING OFFICER

PART 6 - UNEXPECTED SITE CONDITIONS

6.1 CONTAMINATED SOIL OR GROUNDWATER.

Unless otherwise specified elsewhere in this contract, site has been inspected and is, consistent with best professional judgment, free of environmental contamination or pollution. However, unexpected conditions can always arise. Contractor or subcontractor personnel may encounter soil or groundwater that is suspected to be contaminated, either because of odors, colors, free liquids, unexpected construction debris, or other suspicious conditions. Should this occur, contractor will immediately notify the Contracting Officer and the installation environmental office and take necessary initial measures to protect workers, the site, and other personnel.

6.2 UNEXPECTED ARTIFACTS OR RELICS

Should contractor employees in the course of site preparation or other work on this contract find unexpected historic or archeological remains, such as bones, arrow points, pottery remnants, foundations, or other evidence of previous uses of the site, contractor will cease further site-disturbing activity and immediately notify the Contracting Officer and installation environmental office.

END OF SECTION

SECTION 01370 – EROSION AND SEDIMENT CONTROL

PART 1 – GENERAL

1.01 SUMMARY

A. The work includes the provision of temporary erosion control measures to prevent the pollution of air, water, and land within the project limits and in areas outside the project limits where work is accomplished in conjunction with the project.

B. Installation of temporary erosion control features shall be coordinated with the construction of permanent erosion control features to assure effective and continuous control of erosion and pollution.

C. Provide and maintain erosion control measures in accordance with the Maryland Standards and Specifications for Soil Erosion and Sediment Control.

D. This work shall consist of complete ground preparation and establishment of a permanent cover of grass on all open earth areas and all disturbed areas within the limits of construction. The work shall conform to this specification and shall be carefully coordinated with the site grading operations and erosion control work shown on the drawings and/or as covered in the specifications.

E. Related Sections
1. Section 01360 - Environmental Protection.
2. Section 02100 - Site Preparation.
3. Section 02211 - Rough Grading.
4. Section 02910 - Landscape Grading.
5. Section 02920 – Lawns and Grasses

1.02 REGULATORY REQUIREMENTS

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

AGRICULTURAL MARKETING SERVICE (AMS)

AMS Seed Act (1995) Federal Seed Act Regulations Part 201

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 602 (1995a) Agricultural Liming Materials

ASTM D 977 (1998) Emulsified Asphalt

MARYLAND DEPARTMENT OF THE ENVIRONMENT, Water Management Administration

1.03 SUBMITTALS

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-07 Certificates

Seed;

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

Seed. Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.

SD-11 Closeout Submittals

Records and Test Data, Quality Control; FIO

1.04 REQUIRED DOCUMENTS:

The Contractor will be provided an approved Erosion and Sediment Control Plan. The Land Disturbance Activity Permit (LDAP) shall be obtained from the on base civil engineering apartment. The LDAP will take 2-3 weeks once filed to the base. Contact the Base civil engineering department for the additional installation requirements.

1.05 DELIVERY, INSPECTION, STORAGE, AND HANDLING

A. Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

B. Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

C. Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected. Other materials shall be inspected for compliance with specified requirements. Open soil amendment containers or wet soil amendments shall be rejected. Unacceptable materials shall be removed from the job site.

D. Storage

Materials shall be stored in designated areas. Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants.

E. Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

F. Time Limitation

Hydroseeding time limitation for holding seed in the slurry shall be a maximum 24 hours.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with the Maryland Standards and Specifications for Soil Erosion and Sediment Control., latest edition.

PART 2 - PRODUCTS

2.01 SILT FENCE

As specified in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control Section E-15.0

2.02 DUST SUPPRESSORS

A. Clean Water.

B. As specified in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control Section H-30.0

2.03 STABILIZED CONSTRUCTION ENTRANCE

As specified in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control Section F-17.0

2.04 TREE PROTECTION

As specified in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control Section G-23.0

2.05 Vegetative Stabilization

As specified in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control Section G-20.0

2.06 Sediment Trapping Devices

As specified in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control Section B-9.0

2.07 SOIL AMENDMENTS

Soil amendments shall consist of lime and fertilizer meeting the following requirements.

2.08 LIME

Lime shall be agricultural grade, dolomitic limestone meeting requirements of ASTM C 602.

2.09 FERTILIZER

Fertilizer shall be commercial grade, free flowing, uniform in composition and shall conform to applicable state regulations. Granular fertilizer shall bear the manufacturer's guaranteed statement of analysis. Granular fertilizer shall contain a minimum percentage by weight of 10 percent nitrogen, 20 percent phosphoric acid, and 20 percent potash. When slow release nitrogen forms are used in the fertilizer mixture, they shall be derived from sulfur-coated urea, urea formaldehyde, plastic or polymer-coated prills, or isobutylene diurea. Upon approval by the Contracting Officer, a different analysis of fertilizer may be used, provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis.

2.10 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.11 STRAW

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.12 HAY

Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.

2.13 WOOD CELLULOSE FIBER

Wood cellulose fiber mulch shall be used only in hydroseeding applications. It shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 4.5 to 6.0.

2.14 ASPHALT ADHESIVE

Asphalt adhesive shall conform to the following: Emulsified asphalt, conforming to ASTM D 977, Grade SS-1.

2.15 WATER

Water shall be the responsibility of the Contractor, unless otherwise noted. Water shall not contain elements toxic to plant life.

2.16 SURFACE EROSION CONTROL MATERIAL

Surface erosion control material shall conform to the following:

2.17 SURFACE EROSION CONTROL STRAW OR EXCELSIOR BLANKET

A. Straw Net Blanket

Straw blanket material manufactured for erosion control purposes. It shall be produced of 100% agriculture straw. It shall have a consistent thickness with the straw evenly distributed over the entire area of the mat. The top and bottom sides shall be covered with lightweight photodegradable polypropylene netting having an approximate 1/2 inch x 1/2 inch mesh. The blanket shall be sewn together with cotton thread. Each blanket roll shall be 6.5 feet in width, and 83.5 feet in length and weight 30 pounds (+ or - 10%)

B. EXCELSIOR BLANKET

Blanket shall be machine produced mat of wood excelsior formed from a web of interlocking wood fibers; covered on one side with either knitted straw blanket-like mat construction; covered with biodegradable plastic mesh; or interwoven biodegradable thread, plastic netting, or twisted kraft paper cord netting.

C. SURFACE EROSION CONTROL COCONUT FIBER BLANKET

Coconut fiber erosion control blanket material manufactured for erosion control purposes. It shall be produced of 100% coconut fiber. It shall have a consistent thickness with the straw evenly distributed over the entire area of the mat. The top and bottom sides shall be covered with lightweight photodegradable polypropylene netting having an approximate 1/2 inch x 1/2 inch mesh. The blanket shall be sewn together with cotton thread. Each blanket roll shall be 6.5 feet in width, and 83.5 feet in length and weight 30 pounds (+ or - 10%)

D. Erosion Control Material Anchors

Erosion control anchors shall be as recommended by the manufacturer.

PART 3 - EXECUTION

3.01 SILT FENCE

A Install posts at the spacing indicated, and at an angle between 2 degrees and 20 degrees towards the potential silt load area.

B. Do not attach filter fabric to existing trees.

C. Secure fabric to the post as indicated

D. Embed the filter fabric into the ground.

E. Splice filter fabric at joints.

3.02 INSTALLING SEED TIME AND CONDITIONS

A. Seeding Time

Seed shall be installed from March 1 through August 31 for summer establishment; and from September 1 through February 28 for winter establishment, in accordance with paragraph SEED.

B. Seeding Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.

3.03 SITE PREPARATION

A. Finished Grade

The Contractor shall verify that finished grades are as indicated on drawings, and that smooth grading and compaction requirements have been completed prior to the commencement of the seeding operation.

B. Application of Soil Amendments

1. Applying Lime

Lime materials shall be ground limestone (hydrated or burnt lime may be substituted) which contains at least 50% total oxides (calcium oxide plus magnesium oxide). Limestone shall be ground to such fineness that at least 50% will pass through a #100 mesh sieve and 98-100% will pass through a #20 mesh sieve.

2. Applying Fertilizer

The application rate shall be 425 pounds per acre, or 10 pounds per 1000 square feet. Fertilizer shall be incorporated into the soil to a minimum of 2 inches and a maximum of 4 inches or may be incorporated as part of the tillage or hydroseeding operation. An additional 425 pounds per acre, or 10 pounds per 1000 square feet, shall be applied when permanent grass is one inch tall. When slow release nitrogen forms are used in the fertilizer mixture, a single application of 850 pounds per acre may be incorporated into the soil to a maximum 4-inch depth or may be incorporated as part of the tillage or hydroseeding operation.

C. Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 4-inch depth. On slopes 3-horizontal-to-1-vertical and steeper, the soil shall be tilled to a minimum 2-inch depth by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Existing dirt trails and open areas which are to be planted with pines shall be tilled for the top 12 inches. Lime and fertilizer may be applied during this procedure.

D. Prepared Surface

1. Preparation

The prepared surface shall be a maximum 1-inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris.

2. Turf Area Debris

Debris and stones over a minimum 5/8 inch in any dimension shall be removed from the surface.

3. Erosion Control Area Debris

Debris and stones over a minimum 3 inches in any dimension shall be removed from the surface.

4. Protection

Areas with the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.04 INSTALLATION

Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

A. Installing Seed

Seeding method shall be Broadcast Seeding, and Drill Seeding. Seeding procedure shall ensure even coverage. Gravity feed applicators, which drop seed directly from a hopper onto the prepared soil, shall not be used because of the difficulty in achieving even coverage, unless otherwise approved. If used, absorbent polymer powder shall be mixed with the dry seed at the rate recommended by the manufacturer.

1. Broadcast Seeding

Seed shall be uniformly broadcast at the rate shown in paragraph SEED, using broadcast seeders. Seed shall not be broadcast by hand. Half the total rate of seed application shall be broadcast in 1 direction, with the remainder of the seed rate broadcast at 90 degrees from the first direction. Seed shall be covered a maximum 1/4 inch depth by disk harrow, cultipacker, or other approved device.

2. Drill Seeding

Seed shall be uniformly drilled to a maximum 1/4 inch depth and at the rate shown in paragraph SEED, using equipment having drills a maximum 5 inches distance apart. Row markers shall be used with the drill seeder. Half the total rate of seed application shall be drilled in 1 direction, with the remainder of the seed rate drilled at 90 degrees from the first direction. The drilling equipment shall be maintained with half full seed boxes during the seeding operations.

B. Hydroseeding

Seed shall be mixed to ensure broadcast at the rates shown in paragraph SEED. Seed and fertilizer shall be added to water and thoroughly mixed to meet the rates specified, or fertilizer may be applied separately in accordance with paragraph SITE PREPARATION. The time period for the seed to be held in the slurry shall be a maximum 24 hours. After the seed, fertilizer, and water have been thoroughly mixed to produce a homogeneous

slurry, one third of the wood cellulose and tackifier, at the rates recommended by the manufacturer, shall be added to two thirds of the seed, fertilizer and water slurry and applied. The remaining two thirds of the mulch and tackifier shall be mixed with the remaining one third of the seed slurry and applied in a second application. Slurry shall be uniformly applied under pressure over the entire area. The hydroseeded area shall not be rolled. Lime shall not be applied with a hydroseeder, but only in accordance with paragraph LIME.

C. Mulching

1. Hay or Straw Mulch

Straw mulch shall be spread uniformly at the rate of 2 tons per acre. Hay mulch shall be spread uniformly at the rate of 3 tons per acre. Mulch shall be spread by hand, blower-type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface, with no bare spot larger than a quarter. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading.

2. Mechanical Anchor

Mechanical anchor shall be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment.

3. Asphalt Adhesive Tackifier

Asphalt adhesive tackifier shall be uniformly sprayed at a rate between 10 to 13 gallons per 1000 square feet. Sunlight shall not be completely excluded from penetrating to the ground surface.

4. Wood Cellulose Fiber

Wood cellulose fiber shall be applied as part of the hydroseeding operation. The mulch shall be mixed and applied in accordance with the manufacturer's recommendations or 2000 pounds per acre, whichever is greater.

D. Watering Seed

Watering shall be started immediately after completing the seeding of an area. Water shall be applied to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 1-inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.05 SURFACE EROSION CONTROL

A. Surface Erosion Control Material

Where indicated or as directed, surface erosion control material shall be installed in accordance with manufacturer's instructions. Placement of the material shall be accomplished without damage to installed material or without deviation to finished grade.

B. Temporary Seeding

Bare or disturbed areas that will be left over 15 days, or areas where directed during contract delays affecting the seeding operation, shall be seeded in accordance with temporary seed species and rates listed under paragraph SEED.

3.06 RESTORATION AND CLEAN UP

A. Restoration

Existing turf areas, pavements, and facilities that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense.

B. Clean Up

Excess and waste material shall be removed from the seeded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.07 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the seeding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed.

3.08 SEED ESTABLISHMENT PERIOD

A. Quality Control

During construction, an established system of quality control shall be maintained. To assure compliance with contract requirements and the maintenance of records of all materials, equipment, and construction operations, quality control shall include but not be limited to the following:

Seeding -- Specified species planted at proper rates; preparation of planting bed as to thoroughness of tillage, leveling and depth of planting.

Mulching -- Types and rates of application.

Satisfactory stand of grass -- Coverage of the planted species at the end of the specified growth period, and the maintenance procedures, including supplemental fertilization.

A copy of all records and test data required herein, and the records of corrective action taken, shall be furnished the Contracting Officer.

B. Satisfactory Stand of Grass Plants, Turf or Erosion Control Area

A stand of turf is considered acceptable when the new growing sprouts of permanent grass are visible at the surface showing not less than 40 seedlings of permanent grass at least 2 inches long in each square foot, where no gaps larger than 2 inches in diameter occur anywhere in the seeded area, and where the total bare spots do not exceed 2 percent of the total seeded area. Permanent grass is defined as Common Bermuda or Centipede.

C. Maintenance During Establishment Period

Maintenance of the seeded areas shall include protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; mowing; watering; and post-fertilization.

1. Mowing

a. Turf Areas: Turf areas shall be mowed to a minimum 3-inch height when the turf is a maximum 4 inches high. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

b. Erosion Control Areas: Erosion control areas shall be mowed to a minimum 4 inch height when the plants are a maximum 8 inches high.

Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

2. Post-Fertilization

After the permanent grass has been accepted, and between the dates of April 15 and October 15, apply 425 pounds of fertilizer per acre.

3. Repair or Reinstall

Unsatisfactory stand of grass plants and mulch shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

4. Warranty

There is no 1-year warranty for maintenance after acceptance of grass.

END OF SECTION

SECTION 01400 - QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Quality Assurance - Control of Installation.
2. Tolerances
3. References and Standards.
4. Mock-up.
5. Testing Services.
6. Manufacturers' Field Services.

1.2 QUALITY ASSURANCE - CONTROL OF INSTALLATION

A. The Contractor shall monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. If the manufacturer’s instructions conflict with Contract Documents, request clarification from Contracting Officer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. If manufacturers' tolerances conflict with Contract Documents, request clarification from Contracting Officer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES AND STANDARDS

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Notice to Proceed, except where a specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. Neither contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Contracting Officer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.5 MOCK-UP

A. Accepted mock-ups shall be a comparison standard for the remaining Work. Review the individual Sections for specific mock-up requirements.

B. Where a mock-up has been accepted by the Contracting Officer (or designated representative) and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by the Contracting Officer (or designated representative).

1.6 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to the Contracting Officer thirty (30) days in advance of required observations.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. Refer to Specification SECTION 01300 - SUBMITTALS, Manufacturers' Field Reports article.

PART 2 - PRODUCTS

(Not Used).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

SECTION 01410 - TESTING SERVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes the following:
1. Selection and Payment.
2. Qualification of Testing Agency.
3. Testing Agency Responsibilities.
4. Limitations of Authority of the Testing Agency.
5. Contractor's Responsibilities.
6. Schedule of Tests.

1.2 SELECTION AND PAYMENT

A. The General Contractor shall employ directly independent firm(s) to perform field and laboratory tests. The Contractor shall cooperate fully with and furnish materials, facilities, and attendants in the field to such firm(s) for the said services. The Contracting Officer reserves the right to include any additional field and/or laboratory testing(s) of any kind, not specified in the said program but deemed necessary.

B. Testing Agency shall review the drawings and specifications and shall work with the General Contractor to prepare a schedule of testing for this project. Testing work shall not begin until this schedule has been approved by the Contracting Officer (or designated representative).

1.3 QUALIFICATION OF TESTING AGENCY

A. Testing Agency shall meet the basic requirements of ASTM E329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as used in Construction."

B. Laboratory and staff shall be authorized to operate in State in which the project is located.

1.4 TESTING AGENCY RESPONSIBILITIES

A. Test samples of mixes submitted by the Contractor.

B. Provide qualified personnel at site.

C. Cooperate with Architect and Contractor in performance of services.

D. Perform specified sampling and testing of materials and methods of construction in accordance with specified standards.

E. Ascertain compliance of materials and mixes with requirements of Contract Documents.

F. Promptly notify the Architect and Contractor of observed irregularities, deficiencies, or non-conformance of work or materials.

G. Perform additional tests required by the Architect.

H. Promptly provide the AAFES Project Manager with one (1) copy of each written test report, the Architect with one (1) copy of each written test report, and the Contractor with one (1) copy of each test report. Each report shall include:
1. Date issued.
2. Project title and AAFES project number.
3. Testing Laboratory name, address and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling or inspection.
6. Record of temperature at the time of sampling.
7. Date of test.
8. Identification of product and specification section for which the test was performed.
9. Location of sample or test in the project.
10. Type of inspection or test.
11. Results of tests and compliance with Contract Documents.
12. Interpretation of test results, when requested by the Contracting Officer.

1.5 LIMITATIONS OF AUTHORITY OF THE TESTING AGENCY

A. Testing Agency or laboratory may not release, revoke, alter, or enlarge on the requirements of the Contract Documents.

B. Testing Agency or laboratory may not approve or accept any portion of the Work.

C. Testing Agency or laboratory may not perform any duties of the Contractor.

D. Testing Agency or laboratory has no authority to stop the Work.

1.6 CONTRACTOR'S RESPONSIBILITIES

A. Secure and deliver to the testing agency or laboratory at designated location, adequate quantities of representative samples of materials proposed to be used which require testing.

B. Provide the testing agency with the preliminary design mix proposed to be used for concrete and other products that require control by the testing laboratory.

C. Contractor shall work with the Testing Agency to prepare a schedule of testing required for this project. Schedule shall be submitted to the Architect for approval prior to the starting of any testing work.

D. Provide copies of product test reports as required.

E. Cooperate with the Testing Agency laboratory personnel and provide access to the Work and to manufacturers' facilities.

F. Provide incidental labor and facilities:
   1. To provide access to Work to be tested.
   2. To obtain and handle samples at the site or at the source of the products to be tested.
   3. To facilitate inspections and tests.
   4. To provide storage and curing of test samples.

G. Notify testing agency sufficiently in advance of operations to allow for agency assignment of personnel and scheduling of tests.

H. The contractor shall demolish and reconstruct and/or repair any portion(s) of the completed building structure where testing results indicate substandard construction and/or non-compliance with any requirement(s) of this contract, to the extent deemed necessary and in the manner as may be directed by the Contracting Officer (or designated representative). Such remedial work shall be executed at the expense of the contractor and to the satisfaction of the Contracting Officer (or designated representative).

I. The General Contractor shall employ and pay for the services of an independent qualified testing agency to perform additional sampling and testing required by the Contractor beyond the approved testing schedule. This includes the following conditions:
   1. For the Contractor's convenience.
   2. When initial tests indicate work does not comply with the Contract Documents.
   3. When, in the opinion of the Contracting Officer and Architect, additional tests or inspections are required because of the manner in which the Contractor executes his work. Examples of such tests and inspections are:
      a. Tests of materials substituted for previously approved substituted or specified materials.
      b. Re-tests made necessary by failure of materials to comply the requirements of the specifications.
      c. Load tests made necessary because of portions of the structure not fully meeting requirements of the Contract Documents.

1.7 SCHEDULE OF TESTS

A. The following list is given for the Contractor's convenience only. Refer to individual specifications for specific requirements.
   1. SECTION 02300 EARTHWORK
   2. SECTION 02740 ASPHALT CONCRETE PAVEMENT
   3. SECTION 02750 PORTLAND CEMENT CONCRETE PAVING
   4. SECTION 03300 CAST-IN-PLACE CONCRETE
   5. SECTION 05120 STRUCTURAL STEEL
   6. SECTION 15990 TESTING, ADJUSTING AND BALANCING OF HVAC SYSTEMS

END OF SECTION

SECTION 01500 TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Construction Facilities
   a. Access Roads
   b. Parking
   c. Existing Pavements and Parking Areas
   d. Construction Parking Control
   e. Haul Routes
2. Temporary Controls
   a. Barriers.
   b. Water Control
   c. Enclosures
   d. Construction Fence
   e. Protection of Installed Work
   f. Removal of Mud form Site Vehicles
   g. Removal of Utilities, Facilities, and Controls
   h. Security
   i. Maintenance

1.2 CONSTRUCTION FACILITIES

A. Access Roads
1. Provide and maintain access to fire hydrants, free of obstructions.
2. Designated existing on-site roads may be used for construction traffic.

B. Parking
1. Provide temporary parking areas to accommodate use of construction personnel.
2. When off-site space is not adequate, provide additional on-site parking.
3. Locate construction parking where approved by the Contracting officer.

C. Construction Parking Control
1. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, the Installation's operations, and AAFES' operations.
2. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
3. Prevent parking on or adjacent to access roads or in non-designated areas.

D. Existing Pavements And Parking Areas
1. Use of Undesignated existing streets and driveways for construction traffic is not permitted.
2. Designated areas of existing parking facilities located adjacent to the site on the East side of street shall be used by the construction personnel.
3. Do not allow heavy vehicles or construction equipment in existing or designed parking areas.
4. Avoid traffic loading beyond paving design capacity.
5. Tracked vehicles are not allowed in existing parking areas.

E. Haul Routes
1. Contract Documents indicate haul routes designated by authorities having jurisdiction for use by construction traffic.
2. Confine construction traffic to designated haul routes.
3. Provide traffic control at critical areas of haul routes to regulate traffic and to minimize interference with public traffic.

1.3 TEMPORARY CONTROLS

A. Barriers
1. Provide barriers to prevent unauthorized entry to construction areas and to protect adjacent properties and personnel from damage or injury from construction operations.
2. Provide protection for plants designated to remain. Replace damaged plants at no additional cost to AAFES.

3. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

B. Water Control
1. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
2. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

C. Enclosures
1. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual Specification Sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

D. Construction Fence
1. Fence shall be chain link type with a minimum height of 6 feet. Provide top and bottom tension wire, top and bottom rails, and all associated hardware. At Contractor's option, construction fence may be furnished in panelized units.
2. Provide at least one pedestrian gate and one vehicle gate, located at opposite ends of the site. Gates should be locked with padlocks using the same key, and a key shall be provided to the AAFES General Manager for emergency use only.
3. Fence location should minimize disturbance to existing pavements and utilities.
4. Fence shall be anchored securely to prevent overturning.
5. Fence location shall be the limits of construction, and shall be approved by the Contracting Officer. Provide the fence to enclose the entire site and laydown area.

E. Protection Of Installed Work
1. Protect installed Work and provide special protection where specified in individual Specification Sections.
2. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
3. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
4. Protect finished floors, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
5. Prohibit traffic or storage upon waterproofed or roofed surfaces.
6. Prohibit traffic from entering landscaped areas.

F. Removal Of Mud From Site Vehicles
1. Provide means of removing mud from vehicle wheels before entering the Installation's streets.

G. Removal Of Utilities, Facilities, And Controls
1. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
2. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated on the Contract Documents.
3. Clean and repair damage caused by installation or use of temporary work.
4. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

H. Security
1. Provide security and facilities to protect Work and AAFES' operations from unauthorized entry, vandalism, or theft.
2. Coordinate with requirements of the Installation's security program.

I. Maintenance
1. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, Products, mud, snow, and ice.
2. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified condition.

PART 2 - PRODUCTS

(Not Used).

PART 3 - EXECUTION

(Not Used).

END OF SECTION

SECTION 01510 - TEMPORARY UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Temporary Electricity.
2. Temporary Heating.
3. Temporary Cooling.
4. Temporary Ventilation.
5. Temporary Telephone Service.
6. Temporary Facsimile Service.
7. Temporary Water Service.
8. Temporary Sanitary Facilities.

1.2 REFERENCES

A. United States Green Building Council - LEED-NC Version 2.2

1.3 TEMPORARY ELECTRICITY

A. The Contractor shall furnish and install a complete metered temporary electric service for construction needs throughout the construction period.

B. The cost of electricity consumed during construction, up until Beneficial Occupancy by AAFES shall be paid by the Contractor.

C. The temporary electric service shall originate from the nearest available power pole.

D. The electrical contractor shall be responsible for furnishing and installing all fused cutouts, meter, transformers, primary and secondary conductors, disconnects, and miscellaneous hardware.
1. The temporary electric service shall be a 120/208 volt, 3 phase, 4 wire, 200 amp service for construction operations.
2. Provide a power center, located on the main temporary electric power pole drop, consisting of:
a. Electric meter.
b. Main disconnect.
c. 20 amp, 120 and 208 volt grounded outlets, for use by all trades, each protected by a circuit breaker.

1.4 TEMPORARY HEATING

A. General: The Contractor shall provide, install and maintain temporary heat in the construction areas throughout the construction period to facilitate the progress of work, protect work against cold, dampness, condensation, and to provide suitable ambient temperatures and humidity levels for proper installation and curing of materials.

B. Requirements: The Contractor shall provide and maintain temporary heat meeting the following requirements:
1. As required under each individual Specification Section for proper placement, setting, and curing of materials.
2. Maintain a minimum temperature of 40 degrees F. For twenty-four (24) hours a day during placing, setting, and curing of cementitious materials.
3. Maintain a minimum temperature of 60 degrees F., or as required under each individual specification section, for twenty four (24) hours a day, seven (7) days prior to, and during installation of all finish materials, including but not limited to: resilient flooring and base, paint, wall covering, tile work, acoustic ceilings, and all finish woodwork.
4. Maintain a minimum temperature of 65 degrees F. For twenty four (24) hours a day from the time of placement of interior finish materials until Beneficial Occupancy by AAFES

C. The Contractor shall provide, maintain and pay for temporary heating equipment of adequate capacity

to provide temporary heat meeting the requirements of this section.

D. The Contractor shall pay for the fuel consumed by the temporary equipment.

E. The Contractor may use the new permanent heating system for construction purposes during the finish work stage under the following conditions:
   1. The Contractor shall verify the system is approved for operation, equipment is lubricated and proper filters are in place.
   2. The Contractor shall provide and pay for operation maintenance, and shall provide new filters and replace any damaged or worn parts immediately prior to when the equipment is accepted by AAFES.
   3. The Contractor will be charged for the amount of fuel or energy consumed by the permanent heating equipment. The Contractor shall maintain strict conservation measures to prevent the waste of fuel or energy.

1.5 TEMPORARY COOLING

A. Utilize the new permanent cooling system and/or extend and supplement with temporary cooling devices as needed to maintain specified conditions for construction during the installation of finish materials.

B. The Contractor will be charged for the amount of fuel or energy consumed by the new permanent cooling equipment or temporary cooling equipment. The Contractor shall maintain strict conservation measures to prevent waste of fuel or energy.

C. Prior to operation of permanent equipment for temporary cooling purposes, the contractor shall verify that installation of equipment is approved for operation, equipment is lubricated and filters are in place. The Contractor shall provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

D. Maintain maximum ambient temperature of 80 degrees F (26 degrees C) in areas where construction is in progress, unless indicated otherwise in specifications.

1.6 TEMPORARY VENTILATION

A. Contractor shall establish an IAQ Management plan for the project prior to the start of construction in accordance with LEED-NC Indoor Environmental Quality (EQ) Credit 3.1.

B. The Contractor shall provide adequate ventilation to:
   1. Aid in curing installed materials.
   2. Dissipate humidity.
   3. Ventilate temporary sanitary facilities.
   4. Prevent hazardous accumulations of dust, fumes, mists, vapors, or gases in areas occupied during construction.

C. The Contractor shall employ the use of temporary ventilating equipment, adequately sized, to accomplish the required ventilation and maintain clean air for construction operations.

D. Exhaust materials shall be disposed of in a manner that will not result in harmful exposure to persons.

1.7 TEMPORARY TELEPHONE SERVICE

A. The Contractor shall provide, maintain, and pay for telephone service to field office at time of project mobilization.

B. Overhead or underground lines shall be acceptable.

C. See Specification SECTION 01590 - FIELD OFFICES AND SHEDS for additional requirements.

1.8 TEMPORARY FACSIMILE SERVICE

A. The Contractor shall provide, maintain, and pay for facsimile service and a dedicated telephone line to the field office at time of project mobilization.

B. See Specification SECTION 01590 - FIELD OFFICES AND SHEDS for additional requirements.

1.9 TEMPORARY WATER SERVICE

A. Water shall be furnished from a temporary hose bibb provided, installed, and maintained by the General Contractor on the construction site.

B. Temporary water service shall be provided at time of project mobilization.

C. The Contractor will be charged for the amount of water consumed for construction purposes. The Contractor shall maintain strict conservation measures to prevent waste of water.

D. The Contractor shall be responsible for maintaining strict supervision of the use of existing services and shall:
   1. Enforce compliance with applicable codes and standards.
   2. Enforce sanitary practices.
   3. Prevent abuse of services.
   4. Prevent wasteful use of water.
   5. Protect system from freezing.

1.10 TEMPORARY SANITARY FACILITIES

A. Provide, maintain and pay for required facilities and enclosures for use by construction personnel.

B. Existing facilities may not be used during construction operation.

C. Provide facilities at time of project mobilization.

D. Provide regular maintenance service to maintain facilities in a clean and sanitary condition.

PART 2 - PRODUCTS

(Not Used).

PART 3 - EXECUTION

(Not Used).

END OF SECTION

FORM CWM-1: CONSTRUCTION WASTE IDENTIFICATION							
MATERIAL CATEGORY	**GENERATION POINT**	**EST. QUANTITY OF MATERIALS RECEIVED* (A)**	**EST. WASTE - % (B)**	**TOTAL EST. QUANTITY OF WASTE* (C = A x B)**	**EST. VOLUME CY (CM)**	**EST. WEIGHT TONS (TONNES)**	**REMARKS AND ASSUMPTIONS**
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Paint Cans							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Lumber: Cut-Offs							
Lumber: Warped Pieces							
Plywood or OSB (scraps)							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Insulation							
Roofing							
Joint Sealant Tubes							
Gypsum Board (scraps)							
Carpet and Pad (scraps)							
Piping							
Electrical Conduit							
Other:							

* Insert units of measure.

FORM CWM-3: CONSTRUCTION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Packaging: Cardboard						
Packaging: Boxes						
Packaging: Plastic Sheet or Film						
Packaging: Polystyrene						
Packaging: Pallets or Skids						
Packaging: Crates						
Packaging: Paint Cans						
Packaging: Plastic Pails						
Site-Clearing Waste						
Masonry or CMU						
Lumber: Cut-Offs						
Lumber: Warped Pieces						
Plywood or OSB (scraps)						
Wood Forms						
Wood Waste Chutes						
Wood Trim (cut-offs)						
Metals						
Insulation						
Roofing						
Joint Sealant Tubes						
Gypsum Board (scraps)						
Carpet and Pad (scraps)						
Piping						
Electrical Conduit						
Other:						

FORM CWM-5: COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN								
MATERIALS	**TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)**	**EST. COST OF DISPOSAL (B)**	**TOTAL EST. COST OF DISPOSAL (C = A x B)**	**REVENUE FROM SALVAGED MATERIALS (D)**	**REVENUE FROM RECYCLED MATERIALS (E)**	**LANDFILL TIPPING FEES AVOIDED (F)**	**HANDLING AND TRANSPORTATION COSTS AVOIDED (G)**	**NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)**
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

FORM CWM-7: CONSTRUCTION WASTE REDUCTION PROGRESS REPORT								
MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

SECTION 01570 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous construction waste.
2. Recycling nonhazardous construction waste.
3. Disposing of nonhazardous construction waste.

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

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

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

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

1.3 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

Construction Waste:

a. Masonry and CMU.
b. Lumber.
c. Wood sheet materials.
d. Wood trim.
e. Metals.
f. Roofing.
g. Insulation.
h. Carpet and pad.
i. Gypsum board.
j. Piping.
k. Electrical conduit.
l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper.
2) Cardboard.
3) Boxes.
4) Plastic sheet and film.

5) Polystyrene packaging.
6) Wood crates.
7) Plastic pails.

1.4 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed.

1.5 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste.

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. 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.

F. 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.

G. LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

H. Qualification Data: For waste management coordinator, and refrigerant recovery technician.

I. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED-Accredited Professional, certified by the USGBC, as waste management coordinator.

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

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

D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." 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.

1.7 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist 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 site-clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste. 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 of in landfill or incinerator. Use Form CWM-3 for construction waste. 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 Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

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. Use Form CWM-5 for construction waste. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. 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.

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

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, donated, and sold.

E. Waste Management in Historic Zones or Areas: Hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12 inches or more.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

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

B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

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

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

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.3 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. 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.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container 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.

3.4 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 authorities having jurisdiction.

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. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

D. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.

E. Disposal: Remove waste materials from Owner's property and legally dispose of them.

3.5 ATTACHMENTS

A. Form CWM-1 for construction waste identification.

B. Form CWM-3 for construction waste reduction work plan.

C. Form CWM-5 cost/revenue analysis of construction waste reduction work plan.

D. Form CWM-7 for construction waste

END OF SECTION

SECTION 01580 - TEMPORARY PROJECT IDENTIFICATION SIGNS

PART 1 - GENERAL

1.1 SUMMARY

Work of this Section includes the following:

1. Temporary Project Identification Signs.
2. Maintenance of Temporary Project Identification Signs.
3. Removal of Temporary Project Identification Signs.

1.2 QUALITY ASSURANCE

Design sign and structure to withstand 100 miles/hr wind velocity.

Sign Manufacturer: Experienced professional sign manufacturer with a minimum of three (3) years experience.

Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction period.

1.3 SUBMITTALS

Submit under provision of Specification SECTION 01310 - SUBMITTALS.

Shop Drawing: Submit shop drawing indicating sign content, layout, lettering style, and color.

Samples: Submit color samples for proposed pre-cut self-adhesive lettering and paint for sign background surface.

PART 2 - PRODUCTS

2.1 SIGN MATERIALS

Structure and Framing: New, wood, structurally adequate.

Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, 48 inches x 96 inches.

Rough Hardware: Galvanized.

Paint and Primers: Exterior quality, one coat of primer and two coats paint on all exposed surfaces. Sign background color as indicated on the drawing on page 01580-3.

Lettering: Pre-cut vinyl self-adhesive products, colors as indicated on the drawing on page 01580-3.

2.2 PROJECT IDENTIFICATION SIGN

Provide one (1) painted sign utilizing construction details, design, and content shown on the drawing on page 01580-3.

Locate the project identification sign where indicated on the Contract Documents or where directed by the Contracting Officer or designated representative.

PART 3 - EXECUTION

3.1 INSTALLATION

Install project identification sign within thirty (30) days after Notice to Proceed.

Erect at designated location.

Erect supports and framing on secure foundation, rigidly braced and framed to resist specified wind loads.

Install sign surface plumb and level, with butt joints. Anchor securely.

Paint exposed surfaces of sign, supports, and framing.

3.2 MAINTENANCE

Maintain signs and supports in clean and legible condition.

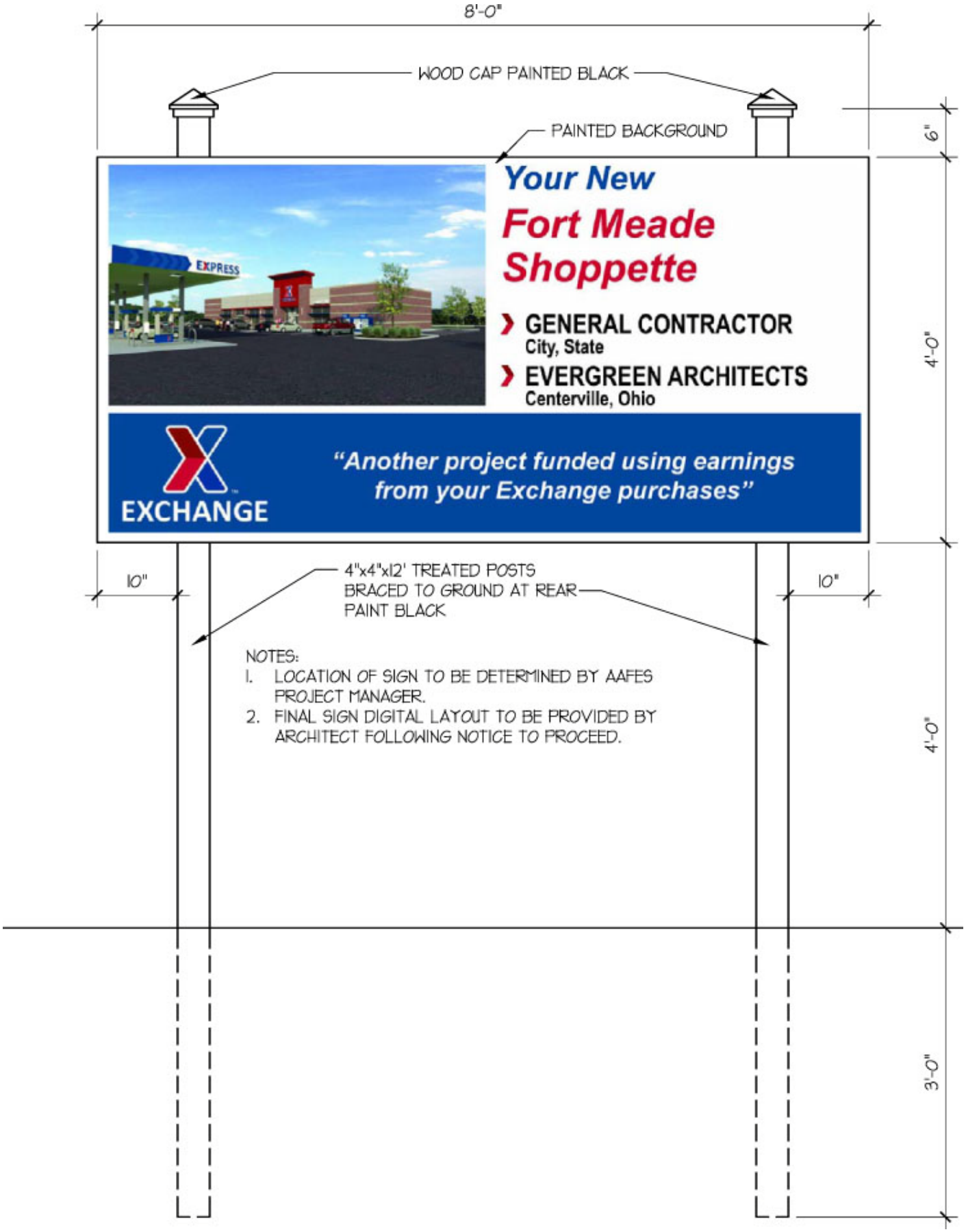
Repair deterioration or damage to structure, framing or sign.

3.3 REMOVAL

Remove signs, framing, supports, and foundations at completion of Project when directed by the Contracting Officer and restore the area to final grade and condition specified.

Re-seed lawn areas adjacent to the location of the temporary project identification signs that were seeded and do not show signs of lawn growth within thirty (30) days of sign removal and lawn restoration operations.

END OF SECTION


8'-0"
WOOD CAP PAINTED BLACK
PAINTED BACKGROUND
6"
Your New
Fort Meade
Shoppette
EXPRESS
GENERAL CONTRACTOR
City, State
EVERGREEN ARCHITECTS
Centerville, Ohio
4'-0"
EXCHANGE
"Another project funded using earnings from your Exchange purchases"
10"
4"x4"x12' TREATED POSTS
BRACED TO GROUND AT REAR
PAINT BLACK
10"
NOTES:
1. LOCATION OF SIGN TO BE DETERMINED BY AAFES PROJECT MANAGER.
2. FINAL SIGN DIGITAL LAYOUT TO BE PROVIDED BY ARCHITECT FOLLOWING NOTICE TO PROCEED.
4'-0"
3'-0"

SECTION 01590 - FIELD OFFICES AND SHEDS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Contractor's Temporary Field Offices and Storage Sheds.
2. Architect's Temporary Field Office
3. Maintenance and Cleaning.
4. Removal of Temporary Field Offices and Storage Sheds.

PART 2 - PRODUCTS

2.1 MATERIALS, EQUIPMENT, AND FURNISHINGS

A. Materials, Equipment, and Furnishings: Serviceable, new or used, adequate for required purpose.

B. In compliance with requirements of regulatory agencies having jurisdiction.

2.2 CONSTRUCTION

A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps, railings, and landings at entrance doors.

B. Construction: Structurally sound, secure, weather tight enclosures for office and storage spaces.

C. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.

D. Exterior Materials: Weather resistant, finished in one color acceptable to the Contracting Officer.

E. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.

F. Lighting for Offices: 50 ft-C at desktop height, exterior lighting at entrance doors.

G. Fire Extinguishers: One 10# standard dry chemical (ABC) type fire extinguisher at each office and each storage area.

H. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.

I. Identification: Provide one sign on each structure to identify occupants and function.
1. Size: 36 inch x 24 inch.
2. Text: Painted by a professional sign painter.
3. Colors: Acceptable to the Contracting Officer.

J. Provide one "Emergency First Aid" sign.

2.3 ENVIRONMENTAL CONTROL

A. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain 68 degrees F heating and 76 degrees F cooling.

B. Storage Spaces: Heating and ventilation as needed to maintain Products in accordance with Contract Documents; adequate lighting for maintenance and inspection of Products.

2.4 CONTRACTOR OFFICE AND FACILITIES

A. Size: For Contractor's needs.

B. See SECTION 01510 TEMPORARY UTILITIES for heating, cooling, electricity, lighting, telephone and facsimile service requirements.

C. Other Furnishings: Contractor's option.

D. Equipment: Six (6) adjustable band protective helmets for visitors, AAFES personnel, consulting Architects, and Consulting Engineers. One 10 inch (250 mm) outdoor weather thermometer. One weather protected bulletin board for posting information required by the contract.

E. First Aid Equipment.

2.5 ARCHITECT'S OFFICE AND FACILITIES

A. Size: For Architect's needs and to provide space for project Progress Meetings. Minimum 200 SF

B. See SECTION 01510 TEMPORARY UTILITIES for heating, cooling, electricity, lighting, telephone and facsimile service requirements.

C. Furnishings in Meeting Area: Conference table and chairs to seat at least twelve persons.

D. Other Furnishings:
1. Filing cabinets for submittal, contract document and record document storage.
2. Desk with chair
3. Plan table with chair

2.6 STORAGE AREAS AND SHEDS

A. Size to meet storage requirements for products of individual Specification Sections, allowing for access and orderly provision for maintenance and for inspection of products.

B. In accordance with requirements of Specification SECTION 01600 - MATERIAL AND EQUIPMENT.

PART 3 - EXECUTION

3.1 PREPARATION

A. Fill and grade sites for temporary structures to provide drainage away from buildings.

3.2 INSTALLATION

A. Install office spaces ready for occupancy prior to commencement of work and a maximum of fourteen (14) days after the date of Notice to Proceed.

B. Employee Residential Occupancy: Not permitted on Installation property.

C. Locate temporary structures to avoid interference with Work.

D. Location of all temporary structures shall be as directed by the Contracting Officer.

E. Preservation of the existing landscape shall be considered in the selection of locations for all temporary structures.

F. Mount fire extinguishers in prominent locations with clear access for use.

G. Mount signs adjacent to entrance doors of appropriate structures.

3.3 MAINTENANCE AND CLEANING

A. Provide weekly cleaning services for offices and periodic cleaning and maintenance for office and storage areas.

B. Maintain approach walks free of mud, water, and snow.

C. Repair or refinish damaged or weathered portions of structures as required to maintain specified condition.

D. Repair or replace defective services and furnishings.

3.4 REMOVAL OF TEMPORARY FIELD OFFICES AND SHEDS

A. At completion of Work and upon Contracting Officer's approval, remove temporary buildings, foundations, utility services, and debris.

B. Restore areas to the satisfaction of the Contracting Officer.

END OF SECTION

SECTION 01600 - MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Products.
2. Transportation and Handling.
3. Storage and Protection.
4. Product Options.
5. Substitutions.
6. Recycled/Recovered Materials

1.2 REFERENCES

A. Environmental Protection Agency
1. Comprehensive Procurement Guidelines

B. United States Army Environmental Center
1. Affirmative Procurement Program

C. U. S. National Archives and Records Administration
1. 40 CFR 247 Comprehensive Procurement Guideline for Products Containing Recovered Materials.

1.3 PRODUCTS

A. Do not use materials and equipment removed from existing Government premises, except as specifically permitted or directed by the Contract Documents.

1.4 TRANSPORTATION AND HANDLING

A. Transport, handle, and store Products in accordance with the Product manufacturer's instructions.

B. Promptly inspect shipments to ensure that the Products comply with the specified requirements, that the quantities are correct, and that the Products are undamaged.

C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.5 STORAGE AND PROTECTION

A. Store and protect Products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to the Product.

D. For exterior storage of fabricated products, place on sloped supports above the ground.

E. Provide bonded off-site storage and protection when the site does not permit on-site storage or protection. Provide the Contracting Officer with access to the off-site storage areas for inspection of the stored materials. Provide Contracting Officer with any other documents that may be required to pay for stored materials.

F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

J. Pipe and conduit stored on site shall be stored in racks or blocked to prevent rolling.

1.6 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description and approved by the Contracting Officer.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions permitted.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

1.7 SUBSTITUTIONS

A. Refer to SECTION 00404 – PRODUCT SUBSTITUTION for substitution requirements.

B. Product substitutions will be considered up to 10 days prior to the solicitation due date. No substitutions will be permitted after contract award. Substitutions are required during the solicitation phase not after the closing date and prior to award.

C. Product substitutions shall comply with the following provisions:
   1. Substitution requests shall be made at least 10 days prior to award of the contract.
   2. If the proposed substitution is rejected by the Contracting Officer, no additional cost will be permitted to furnish the original specified item.

D. Substitutions may be considered by the Contracting Officer when a Product becomes unavailable through no fault of the Contractor.

E. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

F. A request constitutes a representation that the Bidder:
   1. Has investigated the proposed Product and determined that it meets or exceeds the quality level of the specified Product.
   2. Will provide the same warranty for the substitute product as for the specified Product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to AAFES.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.

G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without prior separate written request and approval.

H. Do not substitute materials or equipment unless such substitution has been specifically approved for this Work by the Contracting Officer (or designated representative).

I. Substitution Submittal Procedure:
   1. Submit three (3) copies of request for Substitution for consideration to the Contracting Officer. Limit each request to one proposed Substitution.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed Product equivalence. Burden of proof is on the proposer.
   3. The Contracting Officer will notify the Contractor in writing of decision to accept or reject the request prior to the bid due date.
   4. The decision of the Contracting Officer regarding all substitutions shall be final.

1.8 ENVIRONMENTALLY PREFERABLE PRODUCTS

A. Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing supplier's employees to undue hazards from recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range or recovered or recycled materials. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing EPA designated products and otherwise utilizing recycled and recovered materials in the execution of the work.

B. To the greatest extent possible, provide environmentally preferable products and materials that have a

lesser or reduced effect on the environment considering raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and/or disposal of the product

C. Provide products listed on the EPA Comprehensive Procurement Guidelines to the greatest extent practicable. Refer to individual specification sections for specific recycled content requirements.

D. The following “Affirmative Procurement Reporting Form” shall be submitted with project closeout documents.

PART 2 - PRODUCTS

(Not Used).

PART 3 - EXECUTION

(Not Used).

END OF SECTION

AFFIRMATIVE PROCUREMENT REPORTING FORM

Project Name: _____ Project Number: _____

Contractor Name: _____ License Number: _____

Contractor Address: _____

Product	Total $ value provided	Total $ value w/ recycled content Pre-consumer	Total $ value w/ recycled content Post-consumer	Total $ value w/ biobased content	Exempted indicate 1,2,3,4	Comments
Hydraulic Mulch (paper based)						
Hydraulic Mulch (wood based)						
Compost						
Parking Stops (Concrete w/ fly ash, slag cement or low cement content)						
Parking Stops (Plastic/Rubber)						
Patio Blocks/Rubber						
Patio Blocks/Plastic						
Playground Surfaces						
Concrete w/ fly ash						
Concrete w/ slag cement						
Concrete w/ low cement content						
Plastic lumber						
Building Insulation						
Rock Wool						
Fiberglass						
Loose Fill/Spray On						
Perlite Comp Board						
Plastic Rigid Foam						
Glass Fiber Reinf Foam						
Phenolic Rigid Foam						
Ceramic tile						
Resilient flooring						
Floor Tiles/Rubber						
Floor Tiles/Plastic						
Running Tracks						
Carpet (PET)						
Paint						
Reprocessed Latex Paint White & Light Colors						
Reprocessed Latex Dark Colors						
Consolidated Latex Paint						
Toilet/shower partitions (plastic)						
Other						

CERTIFICATION

I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content.

The following exemptions may apply to the non-procurement of recycled/recovered content materials:

1) The product does not meet appropriate performance standards
2) The product is not available within a reasonable time frame
3) The product is not available competitively (from two or more sources)
4) The product is only available at an unreasonable price (compared with a comparable non-recycled content product.)

Signature: _____ Date: _____

SECTION 01710 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
   1. Requirements and limitations for cutting and patching of Work.

B. Division 15: Mechanical

C. Division 16: Electrical

1.2 SUBMITTALS

A. Submit written request to the Contracting Officer in advance of cutting or alteration which affects:
   1. Structural integrity of any element of the Project.
   2. Integrity of weather exposed or moisture resistant elements.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of AAFES or separate contractor.

B. Include in request:
   1. Identification of Project Name and Project Number.
   2. Location and description of affected Work.
   3. Necessity for cutting or alteration.
   4. Description of proposed Work and Products to be used.
      a. Scope of cutting and patching.
      b. Trades to execute work.
      c. Products proposed to be used.
      d. Extent of refinishing
   5. Alternatives to cutting and patching.
   6. Effect on other work.
   7. Effect on structural integrity of the project.
   8. Effect on work of AAFES or separate contractor.
   9. Written permission of affected separate contractor.
   10. Date and time work will be executed.

C. Submit cost estimate prior to the start of work for cutting and patching requested by the Contracting Officer that is beyond the contract requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Primary Products: Those required for the original installation.

B. Product substitution: For any proposed change in materials, submit request for substitution under provisions of specification Section 01600: Material and Equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing Work, assess conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering work.

C. Maintain excavations free of water.

3.3 CUTTING

A. Execute cutting and fitting including excavation and fill to complete the work.

B. Uncover work to install improperly sequenced work.

C. Remove and replace defective or non-conforming work.

D. Remove samples of installed work for testing when specified or requested by the Contracting Officer.

E. Provide openings in the work for penetration of mechanical and electrical work.

F. Remove work to provide for alteration of work.

G. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

H. Cut rigid materials using masonry saw or core drill. Use of pneumatic tools must be approved.

I. Do not endanger any work by cutting or altering work or any part of the work.

J. Do not cut or alter work of another contractor without written consent of the Contracting Officer.

K. Upon receipt of written instructions from the Contracting Officer, uncover work to provide for Contracting Officer's observation of covered work. All costs associated with cutting/patching to uncover work shall be borne by the Contractor.

3.4 PATCHING

A. Execute patching to complement adjacent Work.

B. Fit products together to integrate with other Work.

C. Work shall be executed utilizing methods that avoid damage to other Work. Provide appropriate surfaces to receive patching and finishing.

D. The original installer shall perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

E. All patching shall be completed utilizing new products. Refer to the appropriate specification sections for product requirements.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. After cutting and/or patching, refinish surfaces to match adjacent finish. For continuous surfaces, refinish to the nearest intersection or natural break point. For an assembly, refinish the entire unit.

END OF SECTION

SECTION 01720 - CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Safety Requirements.
2. Progress Cleaning and Waste Removal.
3. Final Cleaning.

1.2 SAFETY REQUIREMENTS

A. Standards: Maintain project in accordance with the following safety and insurance standards:
1. The Corps of Engineers Manual, EM 385-1-1, latest edition, entitled: "General Safety Requirements", as referred to in Army & Air Force Exchange Service General Provisions, Paragraph: Accident Prevention.

B. OSHA Standards:
1. The Contractor shall be required to comply with OSHA Standards. The OSHA Standards are subject to change, and such changes may affect the Contractor in his performance under the contract. It is the Contractor's responsibility to know such changes, effective dates of changes, and comply with all requirements.

C. Hazards Control:
1. Store volatile wastes in covered metal containers and remove from premises daily.
2. Prevent accumulation of wastes which create hazardous conditions.
3. Provide adequate ventilation during the use of volatile or noxious substances.

D. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
1. Do not burn or bury rubbish and waste materials on the installation.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.
4. Do not dispose of wastes in AAFES' or the Installation's dumpsters.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use only cleaning materials recommended by the manufacturer of the surface to be cleaned.

B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 PROGRESS CLEANING AND WASTE REMOVAL

A. Execute cleaning to ensure that the building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.

B. Maintain site in a clean and orderly condition.

C. Wet down dry materials and rubbish to lay dust and prevent blowing dust.

D. Collect and remove waste materials, debris, and rubbish from the site in a timely manner and legally dispose of at public or private dumping areas off of Government property.

E. Broom and vacuum clean interior areas prior to the start of surface finishing. Continue cleaning to eliminate dust.

F. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.

G. Schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.

H. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

I. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

3.2 FINAL CLEANING

A. Employ professional cleaners for final cleaning.

B. In preparation for substantial completion or occupancy by AAFES, conduct final inspection of sight-exposed interior and exterior surfaces and of concealed spaces.

C. Remove grease, dust, dirt, stains, temporary labels, fingerprints, and other foreign substances from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to shine; finish vacuum carpeted and soft surfaces.

D. Repair, patch, and touch-up marred surfaces to specified finish, to match adjacent surfaces.

E. Clean debris from roofs, gutters, downspouts, and drainage systems.

F. Clean site; broom clean paved areas; rake clean landscaped surfaces.

G. Clean all exterior and interior glass.

H. Replace air conditioning filters if units were operated during construction.

I. Clean ducts, blowers, and coils, if HVAC units were operated without filters during construction.

J. Replace filters of equipment operated during construction.

K. Remove waste and surplus materials, rubbish, construction facilities, tools, equipment, and machinery from the site.

L. Maintain cleaning until project, or portion thereof, is occupied by AAFES under the Substantial Completion provisions of Specification SECTION 01750 - PROJECT CLOSEOUT.

END OF SECTION

SECTION 01740 - STARTING OF SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
   1. Starting Systems.
   2. Demonstration and Instructions.
   3. Testing, Adjusting, and Balancing.
   4. Required Demonstrations.

1.2 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Contracting Officer seven (7) days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable manufacturer's representative and/or Contractors' personnel in accordance with manufacturers' instructions.

G. When specified in individual Specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with Specification SECTION 01300 - SUBMITTALS that equipment or system has been properly installed and is functioning correctly.

1.3 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to AAFES and the Installation’s personnel two weeks prior to date of final inspection.
   1. Attendance rosters shall be completed at each demonstration and training session.
   2. Contractor shall be responsible for video taping all training sessions and demonstrations for inclusion in the operation and maintenance manuals.

B. Demonstrate project equipment by a qualified representative who is knowledgeable about the project.

C. For equipment requiring seasonal operation, perform demonstration for other season within 6 months.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with AAFES and the Installation’s personnel in detail to explain all aspects of operation and maintenance.

E. Demonstrate start-up, operation, control adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time at designated location.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

G. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

1.4 TESTING, ADJUSTING AND BALANCING

A. AAFES will appoint, employ, and pay for services of an independent firm to perform testing, adjusting, and balancing.

B. The independent firm will perform services specified in Specification SECTION 15990 - TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS.

C. Reports will be submitted by the independent firm to the Contracting Officer indicating observations

and results of tests and indicating compliance or non-compliance with the requirements of the Contract Documents.

PART 2 - PRODUCTS

(Not Used).

PART 3 - EXECUTION

3.1 MINIUMUM REQUIRED DEMONSTRATIONS

A. The following list includes the Architectural items that require demonstrations.
   1. Doors
      a. Review operation and adjustment of ceiling and wall access doors.
      b. Review operation and adjustment of overhead coiling grilles.
   2. Hardware
      a. Review lock functions and operation.
      b. Review panic device operation.
   3. Washroom Accessories
      a. Review location and operation of washroom accessories.
      b. Review keying system for washroom accessories.

B. The following list includes Plumbing and Mechanical Items that require demonstrations.
   1. Plumbing
      a. Review location and operation of water heater.
      b. Review location and operation of water temperature controllers.
      c. Review location and operation of hose bibbs.
   2. Mechanical
      a. Review location and operation of thermostats.
      b. Review location of filters and the procedures for changing filters.
      c. Review location and operation of exhaust fans.
      d. Review location and operation of heat pump unit.
      e. Review location and operation of make-up air unit controls.

C. The following list includes the Electrical Items that require demonstrations.
   1. Electrical
      a. Review location of electric panels and areas served by each panel.
      b. Review location of service disconnect.
      c. Review location of telephone equipment.
      d. Review location and operation of fire alarm system.
      e. Review location and operation of time switches/contactors for exterior light fixtures and lighted signs.

END OF SECTION

SECTION 01750 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Substantial Completion.
2. Final Inspections.
3. Project Record Documents.
4. Operation and Maintenance Data.
5. Operation and Maintenance Instruction.
6. Preparation of DD Form 1354 “Transfer and Acceptance of Military Real Property”.
7. Warranty and Extended Warranties.

1.2 SUBSTANTIAL COMPLETION

A. Contractor’s Responsibility:
1. Submit written certification to the Contracting Officer that Contract Documents have been reviewed and that Work is complete in accordance with the Contract Documents and the project, or designated portion of the Project is substantially complete.
2. Submit list of major items to be completed or corrected.

B. Contracting Officer will make an inspection after receipt of Contractor’s certification.

C. Should the Contracting Officer consider that the Work is substantially complete:
1. The Contractor shall prepare, and submit to the Contracting Officer, a list of items to be completed or corrected, as determined by the inspection.
2. The Contracting Officer will prepare and issue a Certificate of Substantial Completion, containing:
   a. Date of Substantial Completion.
   b. The Contractor's list of items to be completed. The Contractor’s list shall be corrected, verified, and amended by the Contracting Officer.
   c. The time within which the Contractor shall complete or correct the work of listed items.
   d. Time and date AAFES will assume possession of work or designated portion thereof.
   e. Responsibilities of AAFES and Contractor for:
      1) Utilities.
      2) Operation of mechanical, electrical, and other systems.
      3) Maintenance and cleaning.
      4) Security.
   f. Signatures of:
      1) Contracting Officer.
      2) Contractor.
3. AAFES occupancy of project or designated portion of project:
   a. Contractor shall:
      1) Perform final cleaning in accordance with Specification SECTION 01710 - CLEANING.
   b. AAFES will occupy project, under provisions stated in Certificate of Substantial Completion.
4. Contractor shall complete work listed for completion or correction, within designated time.

D. Should the Contracting Officer consider that the Work is not substantially complete:
1. The Contracting Officer shall immediately notify the Contractor, in writing, stating reasons.
2. The Contractor shall complete work, and send second written notice to the Contracting Officer, certifying that the project, or designated portion of the project, is substantially complete.
3. The Contracting Officer will reinspect the work.

1.3 FINAL INSPECTION

A. Prior to final inspection, the Contractor shall submit written certification that:
1. The Contract Documents have been reviewed by the Contractor.
2. The project has been inspected for compliance with the Contract Documents.
3. The Work has been completed in accordance with the Contract Documents.
4. The equipment and systems have been tested in the presence of AAFES, and the Installation’s

Representatives, and are fully operational.

5. The project is completed and ready for final inspection.

B. Contracting Officer will make final inspection after receipt of certification.

C. Should the Contracting Officer consider that work is finally complete in accordance with requirements of Contract Documents, the Contracting Officer shall request that the Contractor complete the project closeout submittals.

D. Should the Contracting Officer consider that work is not finally complete:
   1. The Contracting Officer shall notify the Contractor, in writing, stating the reasons.
   2. The Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to the Contracting Officer certifying that work is complete.
   3. The Contracting Officer will reinspect the work after receipt of certification.

1.4 PROJECT RECORD DOCUMENTS

A. Project Record Documents: Specified requirements of Specification SECTION 01760 - PROJECT RECORD DOCUMENTS.

1.5 OPERATION AND MAINTENANCE DATA

A. Operation and Maintenance Data: Specified requirements of Specification SECTION 01770 - OPERATION AND MAINTENANCE DATA.

1.6 OPERATION AND MAINTENANCE INSTRUCTION

A. Operation and Maintenance instruction of AAFES and the Installation's designated personnel: Specified requirements of Specification SECTION 01770 - OPERATION AND MAINTENANCE DATA and Specification SECTION 01740 - STARTING OF SYSTEMS.

1.7 PREPARATION OF DD FORM 1354 "TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY"

A. At the conclusion of the project the Contractor shall compile and furnish to the Contracting Officer certain costs and quantity data of materials and systems furnished and installed.

B. A list of items for which the costs and quantity data are required will be furnished to the Contractor by the Contracting Officer.

C. A Completed DD Form 1354 shall be returned to the Contracting Officer within ten (10) days from the receipt of the list of items.

D. A completed and approved DD Form 1354 must be submitted to the Contracting Officer prior to final payment.

1.8 WARRANTY AND EXTENDED WARRANTIES:

A. Upon completion of project, prior to final payment, guarantees required by technical divisions of the Specifications shall be properly executed in six (6) copies by subcontractors and submitted to the Contracting Officer. Delivery of guarantees shall not relieve the Contractor from any obligation assumed under contract.

B. Submit guarantee covering entire project for one year.

C. Guarantees shall become valid and operative upon issuance of Certificate of Inspection and Acceptance by AAFES. Guarantees shall not apply to work where damage is a result of abuse or neglect by AAFES, or their successor(s) in interest.

PART 2 - PRODUCTS

(Not Used).

PART 3 - EXECUTION

(Not Used).

END OF SECTION

SECTION 01760 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Project Record Document Maintenance Procedures.
2. Project Record Document Submittal Procedures.

1.2 MAINTENANCE OF DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the work:
1. Contract Drawings.
2. Specifications.
3. Addenda.
4. Change Orders, Field Orders, Requests for Information, Clarifications, and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data and Samples.
6. Manufacturer's Instructions for assembly, installation, and adjusting.
7. Field Test Records.

B. Store documents in field office separate from documents used for construction.

C. Provide files and racks for storage of documents.

D. File documents in accordance with the Project Filing Format of Uniform Construction Index.

E. Maintain documents in clean, dry, legible condition.

F. Do not use record documents for construction purposes.

G. Make documents available at all times for inspection by the Contracting Officer.

1.3 MARKING DEVICES

A. Provide red colored pencils for all marking.

1.4 RECORDING

A. Label each document "PROJECT RECORD DOCUMENT" in 2 inch high printed letters.

B. Record information concurrent with construction progress.

C. Ensure entries are complete and accurate, enabling future reference by AAFES.

D. Do not permanently conceal any work until required information has been recorded.

E. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundation in relation to finish floor datum.
2. Measured Horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
4. Field changes of dimension and detail.
5. Changes made by Change Order, Field Order, Requests for Information, or Clarifications.
6. Details not on original contract drawings.

F. Specifications: Legibly mark and record at each Product Section description of actual products installed including the following:
1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda, Change Order, Field Orders, Requests for Information, Clarification, and other modifications.

1.5 PROJECT RECORD DOCUMENT SUBMITTAL PROCEDURES

A. At completion of project, deliver record documents to the Contracting Officer.

B. Accompany submittal with transmittal letter, in duplicate, containing:
   1. Date.
   2. Project title and number.
   3. Contractor's name and address.
   4. Title and number of each record document.
   5. Certification that each document as submitted is complete and accurate.
   6. Signature of Contractor, or his authorized representative.

PART 2 - PRODUCTS

(Not Used).

PART 3 - EXECUTION

(Not Used).

END OF SECTION

SECTION 01770 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
   1. Operation and Maintenance Manual Format.
   2. Contents of each volume of Operation and Maintenance Data.
   3. Maintenance Manual for Materials and Finishes.
   4. Operation and Maintenance Manual for Equipment and Systems.
   5. Instruction of AAFES and the Installation's personnel.
   6. Submittal of Operation and Maintenance Data.

B. Individual Specification Sections: Specific Requirements for Operation and Maintenance Data.

1.2 QUALITY ASSURANCE

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.3 OPERATION AND MAINTENANCE MANUAL FORMAT

A. Prepare data in the form of an instructional manual.

B. Binders: Commercial quality, 8 ½ inches x 11 inches (216 x 280 mm) three ring binders with durable plastic covers and D-shaped rings; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

C. Cover: Identify each binder with typed title OPERATION AND MAINTENANCE MANUAL; identify title of Project; identify subject matter of contents.

D. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

E. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

F. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

G. Minimum sheet size for documents shall be 8 ½ inches x 11 inches.

H. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, roles, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Valve Chart
      f. Maintenance instructions for equipment and systems.
      g. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Photocopies of warranties.
      e. Attendance Rosters for Training Sessions.
      f. Video Tapes of training sessions.

1.4 CONTENTS OF EACH VOLUME OF OPERATION AND MAINTENANCE DATA

A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect/Engineer, Subconsultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

F. Warranties: Bind in copy of each product warranty.

G. Additional Requirements: As Specified in Specification Section 01310 - SUBMITTALS.

1.5 MAINTENANCE MANUAL FOR MATERIALS AND FINISHES

A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured Products.

B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional Requirements: As specified in individual Product specification sections.

E. Additional Requirements: As specified in Specification Section 01310 - SUBMITTALS.

F. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.6 OPERATION AND MAINTENANCE MANUAL FOR EQUIPMENT AND SYSTEMS

A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

C. Include color coded wiring diagrams as installed.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Provide control diagrams by controls manufacturer as installed.

K. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

N. Include test and balancing reports as specified in Specification Section 01410 - TESTING SERVICES.

O. Additional Requirements: As specified in individual Product specification sections.

P. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.7 INSTRUCTION OF AAFES AND THE INSTALLATION'S PERSONNEL

A. Instruct AAFES and the Installation's Personnel in accordance with Specification SECTION 01740 – STARTING OF SYSTEMS.

B. After all systems are functioning properly and before final inspection, the Contractor shall provide at his expense, manufacturer's representatives to instruct AAFES and the Installation's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.

C. Each training session shall be limited to four continuous hours where practical. Schedule additional four hour sessions as required to complete all of the training requirements.

D. For equipment requiring seasonal operation, perform instructions for other seasons within six (6) months of original training sessions.

E. In addition to instructions given at the project, the Installation's maintenance personnel shall be given a classroom instruction course on operation and maintenance of the systems.

F. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

G. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

1.8 SUBMITTAL OF OPERATION AND MAINTENANCE DATA

A. For equipment, or component parts of equipment put into service during construction and operated by AAFES, submit documents within ten (10) days after acceptance.

B. Submit one (1) copy of completed volumes fifteen (15) days prior to final inspection. This copy will be reviewed and returned with Architect/Engineer comments. Revise content of all document sets as required prior to final submission of required number of sets of binders.

C. Submit six (6) sets of revised final volumes in final form within ten (10) days after final inspection and approval of the sample document by the Contracting Officer.

PART 2 - PRODUCTS

(Not Used).

PART 3 - EXECUTION

(Not Used).

END OF SECTION

SECTION 01810 - COMMISSIONING

PART 1 - GENERAL

1.1 SUMMARY

A. This section of the Specification describes the process for the commissioning of the various building systems, defines the responsibilities for the Contractor, and outlines the duties of all parties involved.

B. The commissioning process shall be applied to all equipment, components, and systems as listed herein, including specified interfaces to and from equipment and systems provided under the other Divisions of this Specification. Basic requirements of commissioning are also listed within the other Divisions.

C. Work Not Included
1. Food Service equipment
2. Car Care equipment
3. Merchandise security equipment

1.2 COMMISSIONING AGENT

A. The Commissioning Agent for this project shall be an independent firm employed by the Contractor. Representatives of AAFES and the installation must have the opportunity to observe any or all of the systems functional performance tests. The Commissioning Agent will be responsible for the scheduling of all tests and coordination between the AAFES, the installation and the various contractors.

1.3 SUBCONTRACTORS

A. The appropriate Subcontractors shall be responsible for cooperating and coordinating their work during the commissioning process. They shall be responsible for performing all work required for the installation of the components and systems, and for operation during the commissioning process. They shall furnish all necessary resources to accomplish the installation and the commissioning.

PART 2 - PRODUCTS

(Not Used).

PART 3 - EXECUTION

3.1 COMMISSIONING TEAM

A. In addition to the Commissioning Agent, the Commissioning Team shall consist of:
1. The Contractor's Representative(s)
2. The Controls contractor's Representative(s)
3. The Sheet Metal Contractor's Representative(s)
4. The Electrical Contractor's Representative(s)
5. The Fire Detection Contractor's Representative(s)
6. The Mechanical Contractor's Representative(s)
7. Air Balance Contractor's Representative(s)
8. The Fire Protection Contractor’s Representative(s)

B. Representatives for the team shall be fully qualified service personnel, capable of performing the tasks of testing, starting, and trouble shooting the various building systems under their responsibility.

C. Other personnel resources include manufacturer's representatives and service personnel as required by the Specifications.

3.2 COMMISSIONING RESPONSIBILITIES

A. The Commissioning Agent shall:
1. Plan, organize, and implement the commissioning process.
2. Chair commissioning meetings and prepare and distribute minutes to all commissioning team members.

3. Coordinate commissioning activities among all contractors, sub-trades, and suppliers.
4. Carry out all required system checks and document the results.
5. In cooperation with Controls Contractor, ensure all control point checkouts are completed and the results documented as the checks are done.
6. Observe or verify all start-ups and the initial system operations tests and checks. These shall encompass all specified functional performance tests. Ensure the results are documented as the tests are done.
7. Ensure all required instructions and demonstrations are provided to the Owner's designated operating staff.

B. Contractor
1. Within thirty (30) days of the award of Contract, the Contractor shall submit the names of all the trades people who will be part of the commissioning process. The Contractor, and all his sub-trades and suppliers, shall cooperate with the commissioning agent in carrying out the commissioning process. In this context, the Contractor shall:
   a. Provide equipment and system start-up as required.
   b. Operate equipment and systems as required for both initial systems operations and final functional performance tests.
   c. Attend commissioning meetings, and complete action items arising from them, as required to allow the commissioning process to proceed on schedule.
   d. In conjunction with the Commissioning Agent, provide instruction and demonstrations for AAFES designated operating staff, per Section 01740 - Starting of Systems.

C. AAFES and the installation will ensure the availability of operating staff for all scheduled instruction and demonstration sessions. This staff will possess sufficient skills and knowledge to operate and maintain the installation following attendance at these sessions.

3.3 COMMISSIONING PHASES

A. The on-site commissioning process shall be organized and carried out in three (3) phases, as follows:
1. Phase 1 -System Readiness and Start-Up
2. Phase 2 -Initial Operation
3. Phase 3 -Functional Performance Verification

B. Phase 1 -Systems Readiness and Start-Up: Before any equipment or systems are started, complete the readiness or pre-start checks provided by the equipment manufacturer and document the results. The following conditions and items shall be completed before moving on to Phase 2:
1. Piping systems have been pressure tested as specified, all required reports submitted, and then filled or charged as applicable.
2. Piping systems have been flushed and cleaned as specified, all required reports submitted, and then filled or charged as applicable.
3. Equipment has been lubricated to manufacturer’s specification.
4. Air system cleaning is complete and final filters are installed.
5. Vibration isolation restraints have been installed to specification and adjusted per manufacturer’s instructions.
6. Equipment drives have been aligned.
7. Electrical services have been installed and checked.
8. A control point checkouts have been completed by the ATC Contractor and turned over to the Commissioning Agent.
9. Safety controls have been installed and operation checked.
10. Major equipment start-ups has been carried out by manufacturers' representatives when specified (refer to equipment specification sections), and required start-up reports have been completed and submitted.

C. Phase 2 -Initial Operation:
1. In Phase 2 of the commissioning process, the Contractor completes the testing, balancing, and calibration of all components and systems. The Architect/Engineer shall verify the process and results. The Contractor then operates all systems through all specified modes of operation, and tests the system responses to specified abnormal or emergency conditions.
2. Work carried out during or prior to this phase of commissioning shall include the following (note not all of these activities are a direct part of the commissioning process, but they all need to be performed during or prior to this phase of commissioning):

a. Air systems balancing, including positioning of all balance dampers, adjustments to diffusers, registers, and grilles.
b. Hydronic systems balancing, including positioning of all balance valves.
c. Correction of problems revealed during balancing, including changes to fan speeds.
d. Setting up and calibrating all automatic temperature controls devices, including adjustments to control valves and damper actuators.
e. Setting up or programming controls for accurate response and precise sequencing to meet specified performance criteria. Verify that valves and dampers do not hunt.
f. The Balancing Contractor and Controls Contractor work together, setting up air flows and control calibration for variable volume terminal units and motorized air valves. The Architect/Engineer verifies the results.
g. Ensuring final adjustments to vibration isolator restraints are carried out.

3. As in Phase 1, all check and tests shall be documented on the relevant checklists as they are performed. Deficiencies or incomplete work shall be corrected, and checks and tests repeated until correct installation and function has been confirmed and the installation is ready for Architect/Engineer verification.

D. Phase 3 - Functional Performance Verification:

1. All equipment and systems shall be operated through the entire specified sequence of operations, as directed by the Architect/Engineer, for witnessing and verifying acceptable operation.
2. During this phase of commissioning, the following checks and tests will be required by the Architect/Engineer and shall be a part of base bid.
   a. Operation of all controls system devices, both sensors and actuators.
   b. Proper physical response of all controlled devices and components to setpoint changes or other relevant adjustments.
   c. Demonstration of acceptable noise and vibration levels from any equipment, under its full range of operational conditions.
   d. Operation of equipment and systems under every specified mode of operation and sequence of control.
   e. Operation of equipment and systems under normal, abnormal, and emergency conditions.
   f. Once acceptable performance of the tested systems has been verified, then operation under specified interfaces to/from equipment and systems provided under other Divisions.
3. Demonstration and Instruction: The formal demonstration and instruction for Owner's operating staff shall commence once Phase 3 commissioning is complete and substantial completion is achieved.

3.4 SYSTEM TO BE COMMISSIONED

A. The following systems shall be commissioned:

1. HVAC System
   a. Air handling systems
   b. Piping and circulating pumps
   c. VAV boxes
   d. DDC controls, valves and operators
   e. Dampers -control and fire
2. Fire Detection System
   a. Installation check
   b. Checkout and start-up by manufacturer' s representative as specified
   c. Input and output check
   d. Labeling check, trouble and alarm check, power failure check, and performance check
   e. Verify interlock and sequence with HVAC equipment
3. Life Safety
   a. Emergency power and lighting. Install check, power switch-over check, location, and run time
   b. Exit signs. Installation check, power switch-over check or illumination source check, location, and run time
   c. Generator and controls

END OF SECTION

SECTION 02050 - GEOTECHNICAL REPORT

PART 1 - GENERAL

1.1 GEOTECHNICAL REPORT

A. The Geotechnical Report bound herein was obtained from a commercial testing laboratory for use in design of pavements and foundations. The information is shown for the offer's benefit; however, offers must take cognizance of the possible variation of soil conditions within the areas to be excavated.

B. AAFES, the Contracting Officer and the Architect-Engineer do not guarantee continuity of conditions indicated at boring locations and are not responsible for information contained or not contained herein, or indicated on boring log drawings.

C. The Geotechnical Report begins on the following page.

PART 2 - MATERIALS

(Not Used).

PART 3 - EXECUTION

(Not Used).

GEOTECHNICAL REPORT FOLLOWS

REPORT OF SUBSURFACE INVESTIGATION AND
GEOTECHNICAL ENGINEERING SERVICES

CONSTRUCT SHOPPETTE – MAPES GATE 32
FORT MEADE, ANNE ARUNDEL COUNTY, MARYLAND

GET PROJECT NO: WM10-109G

JULY 1, 2010

Prepared for

EVERGREEN ARCHITECTS, INC.
168 WEST FRANKLIN STREET
CENTERVILLE, OHIO 45459
ATTN: MR. TODD MARTIN, AIA

Prepared by

GET SOLUTIONS, INC.

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www.getsolutionsinc.com

GET Solutions, Inc.
Geotechnical · Environmental · Testing

July 1, 2010

TO: **EverGreen Architects, Inc.**
168 West Franklin Street
Centerville, Ohio 45459

Attn: Mr. Todd D. Martin, AIA

RE: Report of Subsurface Investigation & Geotechnical Engineering Services
Construct Shoppette – Mapes Gate 32
Fort Meade, Anne Arundel County, Maryland
G E T Project No.: WM08-255G

Dear Mr. Martin:

In compliance with your instructions, we have completed our Subsurface Investigation and Geotechnical Engineering Services for the referenced project. The results of this study and our recommendations for geotechnical aspects of the project are presented in this report.

To help assure subsurface conditions encountered during construction are properly interpreted, **G E T Solutions, Inc.** would be pleased to continue its role as Geotechnical Engineer during the project implementation.

We trust that the information contained herein meets your immediate needs and ask that you call this office with any questions that you may have.

Respectfully Submitted,
G E T Solutions, Inc.

Sara B. Phillips

Sara Phillips
Project Geologist

D. Mark Scholefield, P.E.
Senior Geotechnical Engineer
MD Lic. # 26646

STATE OF MARYLAND
D. MARK SCHOLEFIELD
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TABLE OF CONTENTS

EXECUTIVE SUMMARY i

1.0 PROJECT INFORMATION 1
- 1.1 Project Authorization 1
- 1.2 Project Location and Site Description 1
- 1.3 Project Construction Description 1
- 1.4 Purpose and Scope of Services 2

2.0 FIELD AND LABORATORY PROCEDURES 3
- 2.1 Field Exploration 3
- 2.2 Laboratory Testing 3

3.0 SITE AND SUBSURFACE CONDITIONS 4
- 3.1 Site Geology 4
- 3.2 Subsurface Soil Conditions 5
- 3.3 Shrink-Swell Soil Characteristics 5
- 3.4 Groundwater Information 6

4.0 EVALUATION AND RECOMMENDATIONS 6
- 4.1 Clearing and Grading 7
- 4.2 Subgrade Preparation 7
- 4.3 Structural Fill and Placement 8
- 4.4 Suitability of On-site Soils 9
- 4.5 Foundation Design 9
- 4.6 Settlements 10
- 4.7 Foundation Excavations 10
- 4.8 Slab-on-Grade Design 11
- 4.9 Seismic Evaluation 11
- 4.10 Pavement Design 12
- 4.11 UST Design and Construction Considerations 13

5.0 CONSTRUCTION CONSIDERATIONS 13
- 5.1 Drainage and Groundwater Concerns 13
- 5.2 Site Utility Installation 14
- 5.3 Excavations 14

6.0 REPORT LIMITATIONS 15

APPENDIX I - BORING LOCATION PLAN
APPENDIX II - CLASSIFICATION SYSTEM FOR SOIL EXPLORATION
APPENDIX III - BORING LOGS
APPENDIX IV - GENERALIZED SOIL PROFILES
APPENDIX V - SUMMARY OF CBR TEST RESULTS

EXECUTIVE SUMMARY

The project site is located along Mapes Road within Fort Meade Military Base in Anne Arundel County, Maryland. The construction at this site is planned to consist of building a one-story gas station/convenience store facility approximately 9,000 square feet in plan area. In addition, underground storage tanks, and asphalt and concrete pavements will be constructed, along with other pertinent infrastructure components.

Our field exploration program included four (4) 20-foot deep Standard Penetration Test (SPT) borings drilled within the proposed building and canopy footprints, and three (3) 10-foot SPT borings drilled within the proposed pavement areas. A brief description of the subsurface soil conditions is tabulated below:

AVERAGE DEPTH (feet)	STRATUM	DESCRIPTION	RANGES OF SPT(1) N-VALUES
0 to 0.17-0.58	Topsoil	2 to 7 inches of Topsoil	-
0.17-0.58 to 2.0	FILL	Silty SAND (SM) with trace Gravel, Clay, and organics	7 - 17
2.0 to Boring Termination (10 and 20 feet below existing site grades)	I	Poorly graded SAND (SP-SM) with Silt, and Silty SAND (SM) with trace Clay, and Clayey SAND (SC) *An isolated layer of Sandy Lean CLAY (CL) and Silty CLAY (CL-ML) was encountered at boring location B-1 from depths ranging from 2 to 5 feet and 11 to 13 feet below the existing site elevations.*	4 - 26

Note (1) SPT = Standard Penetration Test, N-Values in Blows-per-foot

The groundwater level was recorded at the boring locations and as observed through the relative wetness of the recovered soil samples during the drilling operations. The initial groundwater table was observed to occur at depths ranging from 7 to 10 feet below current grades at the SPT boring locations. The boreholes were backfilled upon completion for safety reasons. Therefore, these results may not be indicative of the static water level.

The following evaluations and recommendations were developed based on our field exploration and laboratory-testing program:

- A field testing program is recommended during construction. This testing program should include as a minimum subgrade load testing (proofrolling), compaction testing of subgrades and Structural Fill, and foundation inspections.

- The proposed construction areas should be cleared by means of removing all topsoil, root mat, unsuitable FILL, or any otherwise unsuitable materials. It is estimated that an initial cut of up to 7 inches in depth will be required to remove the topsoil materials. This cut is expected to extend deeper in isolated areas to remove deeper deposits of unsuitable soils, organics, and/or unsuitable FILL which become evident during the clearing.

- Several 2 to 3-foot deep test pits should be excavated within the proposed construction areas to determine whether the FILL materials may remain in place beneath the slab or whether they should be removed. Regardless, all FILL materials must be removed from below the base of all footing excavations, if applicable.

- The project's budget should include an allowance for subgrade improvements (undercut of unsuitable soils and subsequent backfilling), as some additional undercut of the FILL material may become necessary.

- Any materials proposed for use as Structural Fill should be evaluated (gradation and plasticity analyses and Proctor testing) at the time of construction.

- Shallow foundations can be designed using a net allowable bearing capacity of 2,000 psf, subject to the minimum dimensioning criteria discussed herein. Foundations may experience estimated total and differential foundation settlements up to 1-inch and ½-inch, respectively.

- The first floor slab may be constructed as a slab-on-grade (provided the previously indicated subgrade improvement techniques are properly implemented).

- Based on the subsurface soil characteristics at this site and our experience with the seismic site classifications of the properties within the immediate area, the site is expected to be a Site Class 'D' in accordance with Table 1613.5.2 of the 2009 International Building Code.

- Pavement sections to be designed using a CBR value of 12.9, typical pavement sections are provided in the body of the report.

This summary briefly discusses some of the major topics mentioned in the attached report. Accordingly, this report should be read in its entirety to thoroughly evaluate the contents.

1.0 PROJECT INFORMATION

1.1 Project Authorization

G E T Solutions, Inc. has completed our Subsurface Investigation and Geotechnical Engineering Services for the Construct Shoppette – Mapes Gate 32 project located on the Fort Meade Military Base within Anne Arundel County, Virginia. The geotechnical engineering services were conducted in general accordance with **G E T** Proposal No. PWM09-258G. Authorization to proceed with our services was received verbally from the client.

1.2 Project Location and Site Description

The project is located along Mapes Road on Fort Meade Military Base in Anne Arundel County, Maryland. Specifically, the site is located in the northwest quadrant of the intersection of Mapes Road and 6th Armored Calvary Road. This area is an open, partially grass covered area with few trees and was previously a baseball field. Dugouts with concrete pads and benches are present on the southern and southeastern portions of the site. In addition, utilities were observed near Mapes Road. The site slopes down to the south with elevations ranging from 143 to 153 feet MSL across the entire project site.

It should be noted that FILL materials were encountered at this site to a depth of 2 feet below the existing site elevations. These FILL materials are more than likely associated with previous construction activities (clearing, grading, etc.) across the project site. Although not encountered in the SPT borings, existing foundations, abandoned utilities, and old roadways may still exist on the property and may be encountered during construction. Evidence of existing utilities was observed across the project site and associated FILL materials are anticipated in these areas.

1.3 Project Construction Description

The construction at this site is planned to include a one-story gas station/shoppette facility approximately 9,000 square feet in plan area. The building will be of steel frame and masonry bearing wall construction with a slab-on-grade floor. A canopy will be constructed over the fueling area, and fuel storage tanks (UST's) will be buried on-site. The maximum column and wall loads associated with these structures are not expected to exceed 50 kips and 2 klf, respectively. The project will include construction of asphalt and concrete pavements. Cuts and fills of less than about 3 feet will be required to establish the design grades.

If any of the noted information is incorrect or has changed, please inform **G E T Solutions, Inc.** so that we may amend the recommendations presented in this report, if appropriate.

1.4 Purpose and Scope of Services

The purpose of this study was to obtain information on the general subsurface conditions at the project site. The subsurface conditions encountered were evaluated with respect to the available project characteristics. In this regard, engineering assessments for the following items were formulated:

1. General assessment of the soils revealed by the borings performed at the project site.

2. General location and description of potentially deleterious material encountered in the borings that may interfere with construction progress or structure performance, including existing fills or surficial/subsurface organics.

3. Evaluation of earthwork requirements, to include subgrade stripping and preparation, Structural Fill suitability, and fill placement procedures. Evaluation of the suitability of on-site soils for re-use as Structural Fill.

4. Shrink/Swell characteristics of the foundation bearing soils.

5. Feasibility of utilizing a shallow foundation system for support of the proposed building and canopy. Design parameters required for the foundation systems, including foundation sizes, allowable bearing pressures, foundation levels, and expected total and differential settlements.

6. Evaluation of the subsurface profile to determine the site class definition for earthquake design considerations based on the 2009 International Building Code (IBC).

7. Pavement design based on the field exploration, CBR test results, and our experience with similar soil conditions.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic material in the soil, bedrock, surface water, groundwater or air, on or below or around this site. Prior to development of this site, an environmental assessment is advisable.

2.0 FIELD AND LABORATORY PROCEDURES

2.1 Field Exploration

In order to explore the general subsurface soil types and to aid in developing associated foundation design parameters, four (4) 20-foot deep Standard Penetration Test (SPT) borings (designated as B-1 through B-4) were drilled within the proposed building and canopy footprints.

In order to explore the general subsurface soil types and to aid in developing associated pavement design parameters, three (3) 10-foot deep SPT borings (CBR-1 through CBR-3) were drilled within the proposed pavement areas.

The SPT borings were performed with the use of rotary wash "mud" drilling procedures in general accordance with ASTM D 1586. The tests were performed continuously from the existing ground surface to depths of 10 and 12 feet, and at 5-foot intervals thereafter. The soil samples were obtained with a standard 1.4" I.D., 2" O.D., 30" long split-spoon sampler. The sampler was driven with blows of a 140 lb. hammer falling 30 inches, using an automatic hammer. The number of blows required to drive the sampler each 6-inch increment of penetration was recorded and is shown on the boring logs. The sum of the second and third penetration increments is termed the SPT N-value, (uncorrected for automatic hammer). A representative portion of each disturbed split-spoon sample was collected with each SPT, placed in a glass jar, sealed, labeled, and returned to our laboratory for review.

Two (2) bulk soil samples (designated as CBR-1 and CBR-2) were collected from the proposed pavement areas at their respective boring locations. The bulk subgrade soil samples were collected from depths ranging from 0.5 to 1.5 feet below existing grades. The bulk soil samples were returned to our laboratory and subjected to CBR, Proctor, and classification testing in accordance with ASTM standards.

The boring locations were staked in the field by a representative of **G E T Solutions, Inc.** The approximate boring locations are shown on the attached Boring Location Plans of Appendix I, which was reproduced, based on a site plan (dated December 26, 2009) provided by the client.

2.2 Laboratory Testing

Representative portions of all soil samples collected during drilling were sealed in glass jars, labeled, and transferred to our laboratory for classification and analysis. The soil classification was performed by an Engineering Geologist in accordance with ASTM D2488. The classification system for soil exploration is included in Appendix II.

Four (4) representative split spoon soil samples were selected and subjected to natural moisture, -#200 sieve wash, and Atterberg limits testing and analysis in order to corroborate the visual classification. These test results are tabulated below and are also presented on the "Boring Logs" sheets of Appendix III.

Table I – Laboratory Test Results

Boring No.	Depth (Feet)	Natural Moisture (%)	Percent Passing #200	Atterberg Limits (LL/PL/PI)	USCS Classification
B-1	2-4	10.4	59	23/14/9	CL
B-2	4-6	14.9	39	Non-Plastic	SM
B-3	18-20	22.3	8	Non-Plastic	SP-SM
B-4	13-15	15.2	39	Non-Plastic	SM

The two (2) bulk soil samples that were obtained from the proposed pavement areas were returned to the laboratory and subjected to natural moisture content, -#200 sieve wash, Atterberg Limits, Standard Proctor, and CBR testing in accordance with ASTM standards. These test results are presented on the Summary of CBR Test Results in Appendix V.

3.0 SUBSURFACE CONDITIONS

3.1 Site Geology

The project site lies within a major physiographic province called the Atlantic Coastal Plain. Numerous transgressions and regressions of the Atlantic Ocean have deposited marine, lagoonal, and fluvial (stream lain) sediments generally in bands paralleling the coast. The regional geology is very complex, and generally consists of interbedded layers of varying mixtures of sands, silts and clays. Near surface materials are Clay and Sand fluvial and alluvial sediments which were generally deposited within the last 20,000 years. Ancient stream channels now buried and containing soft marine sediments are present throughout the area, but were not encountered on this site.

3.2 Subsurface Soil Conditions

The results of our field exploration program indicated the following:

AVERAGE DEPTH (feet)	STRATUM	DESCRIPTION	RANGES OF SPT[1] N-VALUES
0 to 0.17-0.58	Topsoil	2 to 7 inches of Topsoil	-
0.17-0.58 to 2.0	FILL	Silty SAND (SM) with trace Gravel, Clay, and organics	7 - 17
2.0 to Boring Termination (10 and 20 feet below existing site grades)	I	Poorly graded SAND (SP-SM) with Silt, and Silty SAND (SM) with trace Clay, and Clayey SAND (SC) *An isolated layer of Sandy Lean CLAY (CL) and Silty CLAY (CL-ML) was encountered at boring location B-1 from depths ranging from 2 to 5 feet and 11 to 13 feet below the existing site elevations.*	4 - 26

Note (1) SPT = Standard Penetration Test, N-Values in Blows-per-foot

It is noted that the topsoil designation references the presence of surfical organic laden soil, and does not represent any particular quality specification. This material is to be tested for approval prior to use.

The subsurface description is of a generalized nature provided to highlight the major soil strata encountered. The records of the subsurface exploration are included in Appendix III (Boring Logs) and in Appendix IV (Generalized Soil Profiles), which should be reviewed for specific information as to the individual borings. The stratifications shown on the records of the subsurface exploration represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the transition may be gradual or occur between sample intervals.

3.3 Shrink/Swell Characteristics

The soils recovered during our field exploration were tested and evaluated for their potential to expand or contract with moisture changes (typically termed shrink-swell). Shallow foundations constructed on expansive soils at certain depths may be subjected to detrimental uplift or horizontal forces caused by the swelling of these soils as a result of an increase in the moisture content. Conversely, as these Clays loose moisture they may shrink, adversely affecting the foundations. The depth to which soils are normally affected by moisture changes extends to about 3 to 6 feet below existing grades in this area, depending on site topography and drainage characteristics.

The cohesive soils (Clays) encountered on this site to a depth of 5 feet below the surface are considered to have a low to moderate shrink/swell potential as indicated by the classification testing of the recovered soils.

3.4 Groundwater Information

The groundwater level was recorded at the boring locations during the drilling operations and as observed through the wetness of the recovered soil samples. The groundwater table was measured to occur at depths ranging from 7 to 10 feet below current grades at the boring locations. The boreholes were backfilled upon completion for safety reasons. Therefore, the reported groundwater levels may not be indicative of the stabilized static groundwater level.

As subsurface soils begin to dry, moisture moves upwards through the soil profile by means of capillary action. Based on the subsurface soil composition (soils containing more than 30% of fines by weight), these initial groundwater readings could be in part attributed to the capillary action of the soils. Therefore, if the static groundwater elevation is critical to the design of the proposed structures and site infrastructure, it is recommended to install temporary groundwater monitoring wells to substantiate these initial observations.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as existing swales, drainage ponds, underdrains, and areas of covered soil (paved parking lots, side walks, etc.). In the project area, seasonal groundwater fluctuations of ± 2 feet are common; however, greater fluctuations have been documented. We recommend that the contractor determine the actual groundwater levels at the time of the construction to determine groundwater impact on the construction procedures, if necessary.

4.0 EVALUATION AND RECOMMENDATIONS

Our recommendations are based on the previously discussed project information, our interpretation of the soil test borings and laboratory data, and our observations during our site reconnaissance. If the proposed construction should vary from what has been described herein, or should differing conditions be encountered during construction, we request the opportunity to review our recommendations and make any necessary changes.

4.1 Clearing and Grading

The proposed construction areas should be cleared by means of removing all topsoil, root mat, unsuitable FILL, or any otherwise unsuitable materials. It is estimated that an initial cut of up to 7 inches in depth will be required to remove the topsoil materials. This cut is expected to extend deeper in isolated areas to remove deeper deposits of unsuitable soils, organics, and/or unsuitable FILL which become evident during the clearing. FILL materials and organics were observed as deep as 2 feet below existing site grades. It is recommended that the clearing operations extend laterally at least 5 feet beyond the perimeter of the proposed construction areas.

The results of our field exploration program indicated that the soils below the topsoil and FILL material consisted predominantly of Silty SAND (SM) with trace Clay. Combinations of excess surface moisture from precipitation ponding on the site and the construction traffic, including heavy compaction equipment, may create pumping and general deterioration of the bearing capabilities of the surface soils. Soils with moisture contents above their optimum moisture contents tend to soften during the stripping and grading activities. In this regard, and in order to reduce the potential for undercutting, care should be exercised during the grading and construction operations at the site. Furthermore, inherently wet subgrade soils combined with potential poor site drainage make this site particularly susceptible to subgrade deterioration. Thus, grading should be performed during a dry season if at all possible. This should minimize these potential problems, although they may not be eliminated. As such, it is recommended to include a contingency in the budget to account for potential subgrade improvements.

It is recommended that the budget include an allowance for undercutting of unsuitable soils and replacing them with Imported Structural Fill or Subbase Fill and/or additional Aggregate Base Material.

Control of surface water is very important to the successful completion of the proposed construction. The contractor should plan his grading activities to control surface water and minimize erosion of exposed cut or fill material. This may include constructing temporary berms, ditches, and swales to intercept runoff and discharge it in a controlled fashion.

4.2 Subgrade Preparation

Following the clearing operation, the exposed subgrade soils should be densified with a large static drum or sheepsfoot roller. Subgrades to a depth of at least 6 inches should be compacted to a dry density of at least 95% of the Standard Proctor maximum dry density, in accordance with ASTM D 698 (if possible). The moisture content of the subgrade should be within +/- 2% of the optimum moisture content at the time of compaction. These compaction and moisture recommendations may be achievable in the relatively wet environment. As such, some subgrade improvements should be expected.

After the subgrade soils have been compacted, they should be evaluated by **G E T Solutions, Inc.** for stability. Accordingly, the subgrade soils should be proofrolled to check for pockets of loose material hidden beneath a crust of better soil. Several passes should be made by a large rubber-tired roller or loaded dump truck over the construction areas, with the successive passes aligned perpendicularly (if possible). The number of passes will be determined in the field by the Geotechnical Engineer depending on the soil conditions. Any pumping and unstable areas observed during proofrolling (beyond the initial cut) should be undercut and/or stabilized at the direction of the Geotechnical Engineer. These improvement recommendations (where required) should also consider the thickness of the subbase and its ability to bridge marginal areas.

In addition to the proofroll, several 2-foot deep test pits should be excavated within the proposed construction areas. The test pits are considered necessary to determine the thickness and composition of the FILL materials. The test pits should be performed under the observation of a representative **G E T Solutions, Inc.**, who will evaluate the composition of the recovered soils. In addition to the test pits, several compaction tests should be performed on the Fill material within the proposed building, asphalt, and concrete areas to further substantiate the suitability of the existing FILL material. It is possible that some subgrade improvements will be required to provide suitable soils for building, slab, and asphalt support. The FILL material may remain in place under asphalt pavements and slabs if approved by the Geotechnical Engineer (to be determined following the completion of the test pit and compaction testing). Regardless, all FILL materials will be required to be removed from the base of all footing excavations. Recommendations concerning the subgrade improvements (as necessary) will be provided in the field following the testing procedures. Again, the project's budget should include an allowance for subgrade improvements (undercut/backfill with Structural Fill).

4.3 Structural Fill and Placement

Any material to be used for Structural Fill should be evaluated and tested by **G E T Solutions, Inc.** prior to placement to determine if they are suitable for the intended use. Suitable structural fill material should consist of sand or gravel containing less than 25% by weight of fines (SP, SM, SW, GP, GW - with dimensions not to exceed 2 inches in diameter), having a liquid limit less than 20 and plastic limit less than 6, and should be free of rubble, organics, clay, debris and other unsuitable material.

All Structural Fill should be compacted to a dry density of at least 95% of the Standard Proctor maximum dry density, in accordance with ASTM D 698. The moisture content of the structural fill should be within +/- 2% of the optimum moisture content at the time of placement. In general, the compaction should be accomplished by placing the fill in maximum 8-inch loose lifts and mechanically compacting each lift to at least the specified minimum dry density.

We recommend that fill placement be monitored on a full-time basis by a qualified Geotechnical Engineering firm to verify that the specified materials are used and the required degree of compaction is achieved.

Surface water control measures should be instituted to protect the new fill from erosion. A protective cover of grass or other vegetation should be established on permanent slopes as soon as possible during construction.

It does not appear that dewatering will be required for mass grading, except where localized surface moisture might be present. Utility and UST excavations could encounter the groundwater table, depending on the depth and location on site. Dewatering at depths below the groundwater level may require well pointing. Seepage from shallow perched water may require pumping from sumps, depending on seasonal conditions. Prior to bidding and/or construction, the grading contractor should determine actual groundwater conditions at the location of deep excavations so its impact on the project can be determined.

4.4 Suitability of On-site Soils

Based on our laboratory and visual classification, the majority of the subsurface soils do not appear suitable for reuse as Structural Fill. Some of the Silty SAND (SM) subgrade soils recovered beneath the FILL materials may be suitable for reuse as Structural Fill; however, these soils are commonly located near or below the groundwater level and will require extensive moisture manipulation (stockpiling and placement in thin lifts) prior to their use. In order to verify the acceptance or rejection of the existing soils for re-use as Structural Fill, additional classification tests (natural moisture and -#200 sieve wash) will have to be performed during construction.

Further classification testing (natural moisture content, plasticity, gradation analysis, and Proctor testing) should be performed during construction to evaluate the suitability of excavated soils for reuse as Structural Fill within building and pavement areas.

4.5 Foundation Design

Provided that the construction procedures are properly performed, the proposed buildings can be supported by shallow foundations bearing upon firm natural soil or well compacted Structural Fill placed over firm, natural subgrades. In-place FILL materials are not considered suitable for foundation support and must be removed from below footings. In-place FILL materials were observed to extend to a depth of up to 2 feet below existing grades at all of the boring locations. The footings can be designed using a net allowable soil pressure of 2,000 pounds per square foot (psf). In using net pressures, the weight of the footings and balanced backfill over the footings, including the weight of the floor slab, need not be considered. Hence, only loads applied at or above the finished floor need to be used for dimensioning the footings.

In order to develop the recommended bearing capacity of 2,000 psf, the base of the footings should have an embedment of at least 30 inches beneath finished grades. Square column footings (canopy or pier footings) should have a minimum width of 36 inches. Continuous footings should have a minimum width of 24 inches. The structural engineer should design the canopy foundations to resist overturning moments, uplift, compressive, torsion, and shear forces. The recommended 30-inch footing embedment is considered sufficient to provide adequate cover against frost penetration to the bearing soils and to accommodate the shrink/swell concerns.

4.6 Settlements

It is estimated that, with proper site preparation, the maximum resulting total settlement of the foundations should be up to 1 inch. The maximum differential settlement magnitude is expected to be less than ½-inch between adjacent footings (wall footings and column footings). The settlements were estimated on the basis of the results of the field penetration tests. Careful field control will contribute substantially towards minimizing the settlements.

4.7 Foundation Excavations

In preparation for shallow foundation support, the footing excavations should extend into firm natural soil or well compacted Structural Fill. In-place FILL materials are not considered suitable for foundation support and must be removed from below footings. The foundation bearing capacities should be verified in the field during construction by means of performing an inspection of all footings. At that time, the Geotechnical Engineer will explore the extent of excessively loose, soft, or otherwise unsuitable material within the exposed excavations. Also, at the time of the footing observations, the Geotechnical Engineer should perform hand auger borings or use a hand penetration device in the bases of the foundation excavations. The necessary depth of penetration will be established during the subgrade observations.

Where foundation undercut is performed, the design footing elevation should be re-established by backfilling with MDOT Size No. 57 Stone or flowable fill.

Immediately prior to foundation concrete placement, it is suggested that the bearing surfaces of all foundations be compacted using hand operated mechanical tampers. In this manner, any localized areas, which have been loosened by excavation operations, should be adequately recompacted. The compaction testing in the base of the foundation may be waived by the Geotechnical Engineer where firm bearing soils are observed during the foundation inspections.

Soils exposed in the bases of all satisfactory foundation excavations should be protected against any detrimental change in condition such as from physical disturbance, rain or frost. Surface run-off water should be drained away from the excavations and not be allowed to pond. If possible, all footing concrete should be placed the same day the excavation is made. If this is not possible, the footing excavations should be adequately protected.

4.8 Slab-on-Grade Design

The floor slabs may be constructed as a slab-on-grade provided the previously recommended earthwork activities and evaluations are properly accomplished. It is recommended that all ground floor slabs be "floating". That is, generally ground supported and not rigidly connected to walls or foundations. This is to minimize the possibility of cracking and displacement of the floor slabs because of differential movements between the slab and the foundation.

It is recommended that all ground floor slabs be directly supported by a Porous Fill layer. The Porous Fill can consist of at least 4 inches of relatively clean, compacted, poorly graded SAND (SP) or GRAVEL (GP) with less than 5% passing the No. 200 Sieve (0.074 mm). ASTM C33 Concrete Sand and MDOT Size No. 57 Stone are considered suitable for this purpose. The purposes of the Porous Fill layer are to serve as a capillary barrier, equalizing moisture conditions beneath the slab, and to provide for more uniform slab support.

It is recommended that a vapor barrier be employed over the Porous Fill in heated areas to minimize the potential for floor dampness, which can affect the performance of glued tile, carpet, and finishes.

Floor slabs-on-grade constructed as discussed herein can be designed assuming a subgrade modulus of 100 pci.

4.9 Seismic Site Class

Based on the subsurface profile as indicated by the borings at this site and seismic site testing performed by us in the project vicinity, the site is expected to be a Site Class ‘D’ in accordance with Table 1613.5.2 of the 2009 International Building Code.

4.10 Pavement Design

We understand that parking for approximately 40 vehicles will be provided at the project site. Our design assumes that either curbs and gutters or ditches and swales will be provided along the edges of all pavements to prevent water penetration of the subgrade soils. Based on the results of our soil borings, it appears that the soils that will be exposed as pavement subgrades will consist mainly of Silty SAND (SM) with trace Gravel. Based on the CBR test results, we have selected a design CBR value of 12.9, or about two-thirds of the average CBR tests. The following typical asphalt (flexible) and concrete (rigid) pavement sections are recommended below.

Table II – Typical Flexible Pavement Sections

Section	Hot Mix Asphalt		Aggregate Base[1]	Subgrade[2]
	Surface	Base		
Light Duty Parking Stalls 10 Vehicles Per Day	2”	-	8”	Stable and Compacted and lined with geotextile fabric (Mirafi HP270 or equivalent)
Heavy Duty Drive Isle/Entrances 400 Vehicles Per Day	1.5”	3”	8”	Stable and Compacted and lined with geotextile fabric (Mirafi HP270 or equivalent)

1 - MDOT Type 21-A, compacted to a dry density of at least 100% of the Standard Proctor maximum dry density (ASTM D 698).
2 - Compacted to a dry density of at least 95% of the Standard Proctor maximum dry density (ASTM D 698).

Table III – Typical Rigid Pavement Sections

Section	Reinforced Portland Cement Concrete (min. 4,000 psi)	Aggregate Base[1]	Subgrade[2]
Heavy Duty Loading Dock, Fueling, and Dumpster Pad Areas 10 Trucks Per Day	6”	6”	Stable and Compacted and lined with geotextile fabric (Mirafi HP270 or equivalent)

1 - MDOT Type 21-A, compacted to a dry density of at least 100% of the Standard Proctor maximum dry density (ASTM D 698).
2 - Compacted to a dry density of at least 95% of the Standard Proctor maximum dry density (ASTM D 698).

During the subgrade testing (proofrolling and compaction testing) isolated areas of unstable subgrade soils will probably become evident. Subgrade scarification, aeration, and drying or subgrade stabilization in the form of undercutting may be required to achieve a stable subgrade.

Actual pavement section thickness should be provided by the design Civil Engineer based on traffic loads, volume, and the owners design life requirements. The above section corresponds to thickness representative of typical local construction practices and periodic maintenance should be anticipated. All pavement material and construction procedures should conform to Maryland Department of Transportation (MDOT) requirements.

Following pavement rough grading operations, the exposed subgrade should be observed under proofrolling. This proofrolling should be accomplished with a fully loaded dump truck or 7 to 10 ton drum roller to check for pockets of soft material hidden beneath a thin crust of better soil. Any unsuitable materials thus exposed should be removed and replaced with a well-compacted material. The inspection of these phases should be performed by the Geotechnical Engineer or his representative. The subgrade soils are likely to be unstable at the time of construction and some ground improvement requirements are anticipated. Considering this, the project's budget should include a contingency to accommodate the potential subgrade improvements.

Where excessively unstable subgrade soils are observed during proofrolling and/or fill placement, it is expected that these weak areas can be stabilized by means of thickening the aggregate base course layer by 6 to 12 inches. These recommendations are to be addressed by the Geotechnical Engineer during construction, if necessary, who will recommend the most economical approach at the time.

4.11 Underground Storage Tank Design and Construction Considerations

The groundwater table was encountered in the relatively porous, granular soils at depths of about 7 to 10 feet below existing grades, depending on surface elevations. Excavations below the groundwater table will be subject to cave-in and unstable conditions. Where excavation just below the water table is required to place UST base materials (No. 57 Stone), the base materials should be placed in the excavation as soon as possible. Excavation significantly below the groundwater table will require well pointing. The design of tie-downs should consider the seasonally high groundwater table conditions.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Drainage and Groundwater Concerns

It is expected that dewatering may be required for excavations that extend near or below the groundwater table. Dewatering above the groundwater level could probably be accomplished by pumping from sumps. Dewatering at depths below the groundwater level will require well pointing.

It would be advantageous to construct all fills early in the construction. If this is not accomplished, disturbance of the existing site drainage could result in collection of surface water in some areas, thus rendering these areas wet and very loose. Temporary drainage ditches should be employed by the contractor to accentuate drainage during construction. We recommend that the contractor determine the actual groundwater levels at the time of construction to determine groundwater impact on this project.

5.2 Site Utility Installation

The base of the utility trenches should be observed by a qualified inspector prior to the pipe and structure placement to verify the suitability of the bearing soils. Utilities and structures bearing in cohesive and/or loose granular soils may require some stabilization to provide suitable bedding. This stabilization is typically accomplished by providing additional bedding materials (MDOT No. 57 stone). In addition depending on the depth of the utility trench excavation, some means of dewatering may be required to facilitate the utility installation and associated backfilling.

The resulting excavations should be backfilled with structural fill, as described in Section 4.3 of this report.

5.3 Excavations

In Federal Register, Volume 54, No. 209 (October, 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that all excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new (OSHA) guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. **G E T Solutions, Inc.** is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

6.0 REPORT LIMITATIONS

The recommendations submitted are based on the available soil information obtained by **G E T Solutions, Inc.** and the information supplied by the client and its consultants for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, **G E T Solutions, Inc.** should be notified immediately to determine if changes in the foundation recommendations are required. If **G E T Solutions, Inc.** is not retained to perform these functions, **G E T Solutions, Inc.** can not be responsible for the impact of those conditions on the geotechnical recommendations for the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete the Geotechnical Engineer should be provided the opportunity to review the final design plans and specifications to assure our engineering recommendations have been properly incorporated into the design documents so that the earthwork and foundation recommendations can be properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of **EverGreen Architects, Inc.** and their consultants for the specific application to the Construct Shoppette – Mapes Gate 32 project located at Fort Meade Military Base in Anne Arundel County, Maryland.

APPENDICES

I. BORING LOCATION PLAN

II. CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

III. BORING LOGS

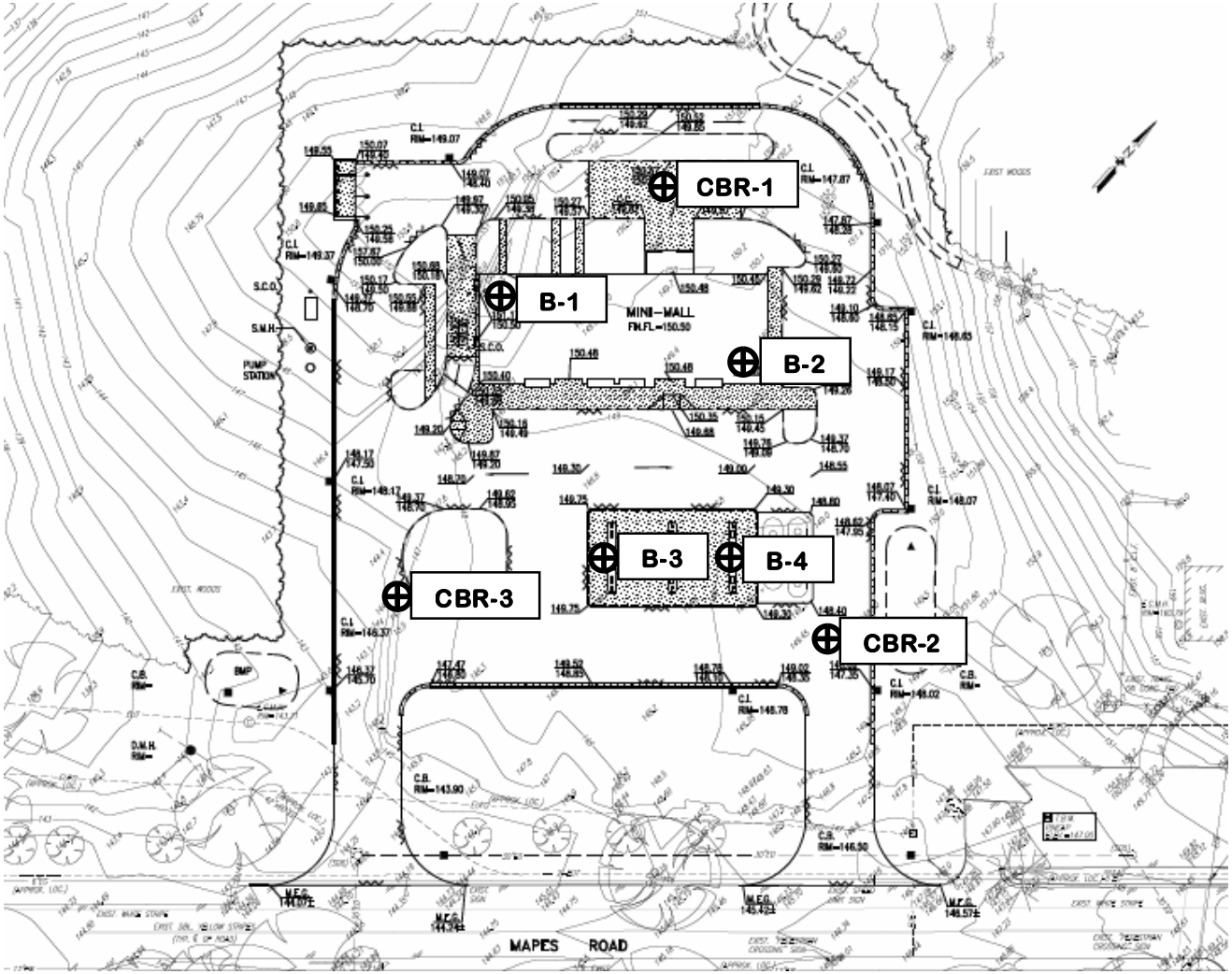
IV. GENERALIZED SOIL PROFILES

V. SUMMARY OF CBR TEST RESULTS

APPENDIX I

BORING LOCATION PLAN

Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001



Locations are approximate

BORING LOCATION PLAN

PROJECT: Construct Shoppette – Mapes Gate 32
Fort Meade, Anne Arundel County, Maryland
PROJECT NO: WM10-109G
CLIENT: EverGreen Architects, Inc.

SCALE: NTS
DATE: 6/18/10
PLOT BY: SP

APPENDIX II

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

GET Solutions, Inc.
Geotechnical • Environmental • Testing

Virginia Beach
204 Grayson Road
Virginia Beach, VA 23462
(757) 518-1703

Williamsburg
1592 Penniman Rd. Suite E
Williamsburg, Virginia 23185
(757) 564-6452

Elizabeth City
504 East Elizabeth St. Suite 2
Elizabeth City, NC 27909
(252) 335-9765

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

Standard Penetration Test (SPT), N-value

Standard Penetration Tests (SPT) were performed in the field in general accordance with ASTM D 1586. The soil samples were obtained with a standard 1.4" I.D., 2" O.D., 30" long split-spoon sampler. The sampler was driven with blows of a 140 lb. hammer falling 30 inches. The number of blows required to drive the sampler each 6-inch increment (4 increments for each soil sample) of penetration was recorded and is shown on the boring logs. The sum of the second and third penetration increments is termed the SPT N-value.

NON COHESIVE SOILS

(SILT, SAND, GRAVEL and Combinations)

Relative Density

Very Loose	4 blows/ft. or less
Loose	5 to 10 blows/ft.
Medium Dense	11 to 30 blows/ft.
Dense	31 to 50 blows/ft.
Very Dense	51 blows/ft. or more

COHESIVE SOILS

(CLAY, SILT and Combinations)

Consistency

Very Soft	2 blows/ft. or less
Soft	3 to 4 blows/ft.
Medium Stiff	5 to 8 blows/ft.
Stiff	9 to 15 blows/ft.
Very Stiff	16 to 30 blows/ft.
Hard	31 blows/ft. or more

Particle Size Identification

Boulders	8 inch diameter or more	
Cobbles	3 to 8 inch diameter	
Gravel	Coarse	1 to 3 inch diameter
	Medium	$^1/_2$ to 1 inch diameter
	Fine	$^1/_4$ to $^1/_2$ inch diameter
Sand	Coarse	2.00 mm to $^1/_4$ inch (diameter of pencil lead)
	Medium	0.42 to 2.00 mm (diameter of broom straw)
	Fine	0.074 to 0.42 mm (diameter of human hair)
Silt		0.002 to 0.074 mm (cannot see particles)

Relative Proportions

Descriptive Term	Percent
Trace	0-5
Few	5-10
Little	15-25
Some	30-45
Mostly	50-100

Strata Changes

In the column "Description" on the boring log, the horizontal lines represent approximate strata changes.

Groundwater Readings

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as tidal influences and man-made influences, such as existing swales, drainage ponds, underdrains and areas of covered soil (paved parking lots, side walks, etc.).

CLASSIFICATION SYMBOLS (ASTM D 2487 and D 2488)

Coarse Grained Soils

More than 50% retained on No. 200 sieve

GW - Well-graded Gravel
GP - Poorly graded Gravel
GW-GM - Well-graded Gravel w/Silt
GW-GC - Well-graded Gravel w/Clay
GP-GM - Poorly graded Gravel w/Silt
GP-GC - Poorly graded Gravel w/Clay
GM - Silty Gravel
GC - Clayey Gravel
GC-GM - Silty, Clayey Gravel
SW - Well-graded Sand
SP - Poorly graded Sand
SW-SM - Well-graded Sand w/Silt
SW-SC - Well-graded Sand w/Clay
SP-SM - Poorly graded Sand w/Silt
SP-SC - Poorly graded Sand w/Clay
SM - Silty Sand
SC - Clayey Sand
SC-SM - Silty, Clayey Sand

Fine-Grained Soils

50% or more passes the No. 200 sieve

CL - Lean Clay
CL-ML - Silty Clay
ML - Silt
OL - Organic Clay/Silt
Liquid Limit 50% or greater
CH - Fat Clay
MH - Elastic Silt
OH - Organic Clay/Silt

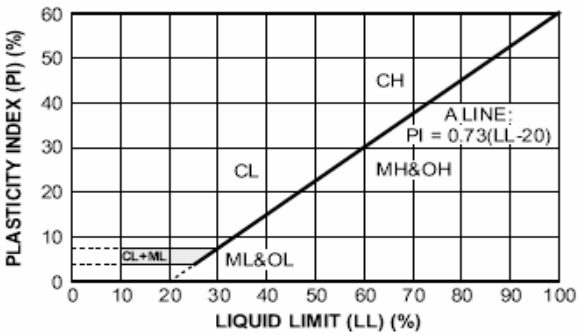
Highly Organic Soils

PT - Peat

Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent	GW, GP, SW,SP
More than 12 percent	GM, GC, SM, SC
5 to 12 percent	Borderline cases requiring dual symbols

Plasticity Chart



APPENDIX III

BORING LOGS

GET Solutions, Inc.
Geotechnical • Environmental • Testing

BORING LOG B-1

PROJECT: Construct Shoppette - Mapes Gate 32
CLIENT: EverGreen Architects, Inc.
PROJECT LOCATION: Fort Meade, Anne Arundel County, Maryland **PROJECT NO.:** WM10-109G
BORING LOCATION: See Attached Boring Location Plan **SURFACE ELEVATION:** 152'
DRILLER: GET Solutions, Inc. **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling **DATE:** 5/10/2010
DEPTH TO WATER - INITIAL*: 8.0' **AFTER 24 HOURS:** NT **CAVING>** C

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0								
			7 inches of Topsoil (0.58)		1	24	SS	2 3 5 7	8	
150			Brown, moist, Silty, fine to medium SAND (SM) with trace Gravel, Clay, and organics, Loose, FILL (2)		2	24	SS	5 7 7 9	14	59
	2		Brown, moist, Sandy, Lean CLAY (CL) with trace organics, Stiff							
		5	(5)		3	24	SS	4 5 5 6	10	
			Tan and brown, moist, Silty, fine to medium SAND (SM), Loose (6)							
145			Tan, moist, poorly graded SAND (SP-SM) with Silt, Loose (8)		4	24	SS	5 5 5 6	10	
			Tan, wet, Silty, fine to medium SAND (SM) with trace Clay, Medium Dense		5	24	SS	5 7 7 9	14	
		10			6	24	SS	5 6 5 7	11	
140	4		Mottled, light gray-orangish brown, wet, Silty CLAY (CL-ML) with trace Sand, Stiff (11.5)							
			Light gray, wet, Silty, fine to medium SAND (SM) with trace Clay, Medium Dense (13)		7	24	SS	2 5 9 13	14	
		15								
135										
			Light gray and orangish brown, wet, Silty, fine to medium SAND (SM) with trace Gravel and Clay, Loose (18)		8	24	SS	2 2 3 4	5	
	6	20								
			Boring terminated at 20 ft.							
130										
		25								
	8									
125										
		30								
120	10									
		35								
115										
	12	40								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:
Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG B-2

PROJECT: Construct Shoppette - Mapes Gate 32
CLIENT: EverGreen Architects, Inc.
PROJECT LOCATION: Fort Meade, Anne Arundel County, Maryland **PROJECT NO.:** WM10-109G
BORING LOCATION: See Attached Boring Location Plan **SURFACE ELEVATION:** 149.5'
DRILLER: GET Solutions, Inc. **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling **DATE:** 5/10/2010
DEPTH TO WATER - INITIAL*: ▽ 7.0' **AFTER 24 HOURS:** ▼ NT **CAVING>** C

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0								
			4 inches of Topsoil (0.33)		1	24	SS	3 5 6 8	11	
			Brown, moist, Silty, fine to medium SAND (SM) with trace Gravel, Clay, and organics, Medium Dense, FILL (2)		2	24	SS	3 4 3 5	7	
145	2	5	Orangish brown, moist, Silty, fine to medium SAND (SM) with trace Clay, Loose		3	24	SS	3 2 3 5	5	39
			Orangish brown to brown, moist to wet, Silty, fine to medium SAND (SM) with trace Gravel from 10 to 13 feet, Medium Dense (6)		4	24	SS	3 4 7 9	11	
140		10	Wet below 7.5 feet		5	24	SS	9 11 12 14	23	
	4				6	24	SS	7 8 11 11	19	
135		15	Brown, wet, Clayey, fine to medium SAND (SC), Medium Dense (13)		7	24	SS	5 7 6 8	13	
130	6	20	Tan, wet, Silty, fine to medium SAND (SM), Loose (18)		8	24	SS	3 4 5 5	9	
			Boring terminated at 20 ft.							
125		25								
	8									
120		30								
	10									
115		35								
110	12	40								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:
Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG B-3

PROJECT: Construct Shoppette - Mapes Gate 32
CLIENT: EverGreen Architects, Inc.
PROJECT LOCATION: Fort Meade, Anne Arundel County, Maryland **PROJECT NO.:** WM10-109G
BORING LOCATION: See Attached Boring Location Plan **SURFACE ELEVATION:** 148.5'
DRILLER: GET Solutions, Inc. **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling **DATE:** 5/10/2010
DEPTH TO WATER - INITIAL*: ▽ 7.0' **AFTER 24 HOURS:** ▼ NT **CAVING>** C

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0								
			5 inches of Topsoil (0.42)		1	24	SS	3 6 10 9	16	
			Brown and orangish brown, moist, Silty, fine to medium SAND (SM) with trace Gravel, Clay, and organics, Medium Dense, FILL (2)		2	23	SS	3 3 3 3	6	
145			Brown, moist to wet, Silty, fine to medium SAND (SM) with trace Clay, Loose		3	20	SS	2 3 3 4	6	
	2	5			4	18	SS	2 2 4 8	6	
			Wet below 7 feet (8)		5	18	SS	15 13 11 12	24	
140		10	Tan, wet, poorly graded SAND (SP-SM) with Silt and trace Gravel, Medium Dense (10)		6	24	SS	10 13 13 15	26	
	4		Orangish brown, wet, Silty, fine SAND (SM) with trace Clay, Medium Dense (13)		7	20	SS	6 8 7 10	15	
135		15	Tan, wet, Clayey, fine to coarse SAND (SC) with little Gravel, Medium Dense (18)		8	18	SS	5 8 8 11	16	8
130	6	20	Tan, wet, poorly graded SAND (SP-SM) with Silt, Medium Dense							
			Boring terminated at 20 ft.							
125		25								
	8									
120		30								
	10									
115		35								
110	12	40								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:
Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG B-4

PROJECT: Construct Shoppette - Mapes Gate 32
CLIENT: EverGreen Architects, Inc.
PROJECT LOCATION: Fort Meade, Anne Arundel County, Maryland **PROJECT NO.:** WM10-109G
BORING LOCATION: See Attached Boring Location Plan **SURFACE ELEVATION:** 148.5'
DRILLER: GET Solutions, Inc. **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling **DATE:** 5/10/2010
DEPTH TO WATER - INITIAL*: 7.0' **AFTER 24 HOURS:** NT **CAVING>** C

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	6 inches of Topsoil (0.5)		1	24	SS	3 5 8 8	13	
			Brown, moist, Silty, fine to medium SAND (SM) with trace Gravel, Clay, and organics, Medium Dense, FILL (2)		2	24	SS	2 3 2 4	5	
145			Orangish brown and brown, moist, Silty, fine to medium SAND (SM) with trace Clay, Loose		3	24	SS	3 4 4 4	8	
	2	5	Orangish brown, moist to wet, Silty, fine to medium SAND (SM), Loose (6) Wet below 7 feet		4	24	SS	2 4 5 8	9	
140			Orangish brown, wet, poorly graded SAND (SP-SM) with Silt and trace Gravel, Medium Dense (8)		5	24	SS	9 11 14 15	25	
		10	Orangish brown, wet, Silty, fine to medium SAND (SM) with trace Clay, Medium Dense (10)		6	24	SS	7 11 8 12	19	
135	4				7	24	SS	5 7 7 9	14	39
		15								
130	6	20	Tan, wet, poorly graded SAND (SP-SM) with Silt, Medium Dense (18)		8	24	SS	4 7 8 10	15	
			Boring terminated at 20 ft.							
125		25								
120	8									
		30								
115	10									
		35								
110	12	40								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:
Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG
CBR-1

PROJECT: Construct Shoppette - Mapes Gate 32
CLIENT: EverGreen Architects, Inc.
PROJECT LOCATION: Fort Meade, Anne Arundel County, Maryland **PROJECT NO.:** WM10-109G
BORING LOCATION: See Attached Boring Location Plan **SURFACE ELEVATION:** 151'
DRILLER: GET Solutions, Inc. **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling **DATE:** 5/10/2010
DEPTH TO WATER - INITIAL*: ▽ 10.0' **AFTER 24 HOURS:** ▽ NT **CAVING>** C

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	7 inches of Topsoil							
150			Orangish brown, moist, Silty, fine to medium SAND (SM) with trace Gravel, Clay, and organics, Loose, FILL (0.58)		1	24	SS	3 4 3 6	7	
	0.8	2	Orangish brown, moist, Silty, fine to medium SAND (SM) with trace Clay, Loose (2)		2	24	SS	3 5 5 8	10	
148		4	Tan, moist, Silty, fine SAND (SM) with trace Gravel and Clay, Medium Dense (4)		3	24	SS	4 7 6 8	13	
146	1.6	6			4	24	SS	4 6 6 7	12	
144	2.4	8	Tan, moist to wet, poorly graded SAND (SP-SM) with Silt and trace Gravel, Loose (8)		5	24	SS	3 4 6 9	10	
142		10 ▽	Boring terminated at 10 ft. Wet below 10 feet							
140	3.2	12								
138	4	14								
136	4.8	16								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:
Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG
CBR-2

PROJECT: Construct Shoppette - Mapes Gate 32
CLIENT: EverGreen Architects, Inc.
PROJECT LOCATION: Fort Meade, Anne Arundel County, Maryland **PROJECT NO.:** WM10-109G
BORING LOCATION: See Attached Boring Location Plan **SURFACE ELEVATION:** 149.5'
DRILLER: GET Solutions, Inc. **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling **DATE:** 5/10/2010
DEPTH TO WATER - INITIAL*: 8.0' **AFTER 24 HOURS:** NT **CAVING>** C

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	2 inches of Topsoil (0.17)							
148		2	Orangish brown, moist, Silty, fine to medium SAND (SM) with trace Clay and organics, Medium Dense, Possible FILL (2)		1	24	SS	6 7 10 10	17	
146	0.8	4	Brown to orangish brown, moist, Silty, fine to medium SAND (SM) with trace Clay, Loose to Very Loose		2	24	SS	3 5 4 4	9	
144	1.6	6			3	24	SS	2 2 2 3	4	
142	2.4	8	Tan, moist to wet, Silty, fine to medium SAND (SM), Loose (6) Wet below 8 feet		4	24	SS	4 5 4 5	9	
140		10			5	24	SS	1 4 5 8	9	
138	3.2		Boring terminated at 10 ft.							
136	4	12								
134	4.8	14								
		16								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:
Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

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BORING LOG
CBR-3

PROJECT: Construct Shoppette - Mapes Gate 32
CLIENT: EverGreen Architects, Inc.
PROJECT LOCATION: Fort Meade, Anne Arundel County, Maryland **PROJECT NO.:** WM10-109G
BORING LOCATION: See Attached Boring Location Plan **SURFACE ELEVATION:** 147'
DRILLER: GET Solutions, Inc. **LOGGED BY:** SP
DRILLING METHOD: Rotary Wash "Mud" Drilling **DATE:** 5/10/2010
DEPTH TO WATER - INITIAL*: ▽ 7.0' **AFTER 24 HOURS:** ▼ NT **CAVING>** C

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	7 inches of Topsoil							
146			0.58 Orangish brown, moist, Silty, fine to medium SAND (SM) with trace Gravel, Clay, and organics, Loose, FILL		1	24	SS	3 3 6 6	9	
		2	2 Orangish brown, moist, Silty, fine to medium SAND (SM) with trace Clay, Loose to Medium Dense							
144	0.8				2	24	SS	3 4 5 7	9	
		4								
142	1.6				3	24	SS	4 6 6 7	12	
		6	5.5 Tan, moist to wet, Silty, fine to medium SAND (SM) with trace Gravel, Medium Dense							
140			Wet below 7 feet		4	24	SS	4 5 7 7	12	
	2.4	8								
138					5	24	SS	4 6 6 6	12	
		10	Boring terminated at 10 ft.							
	3.2									
136										
		12								
134	4									
		14								
132										
	4.8	16								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

Notes:
Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

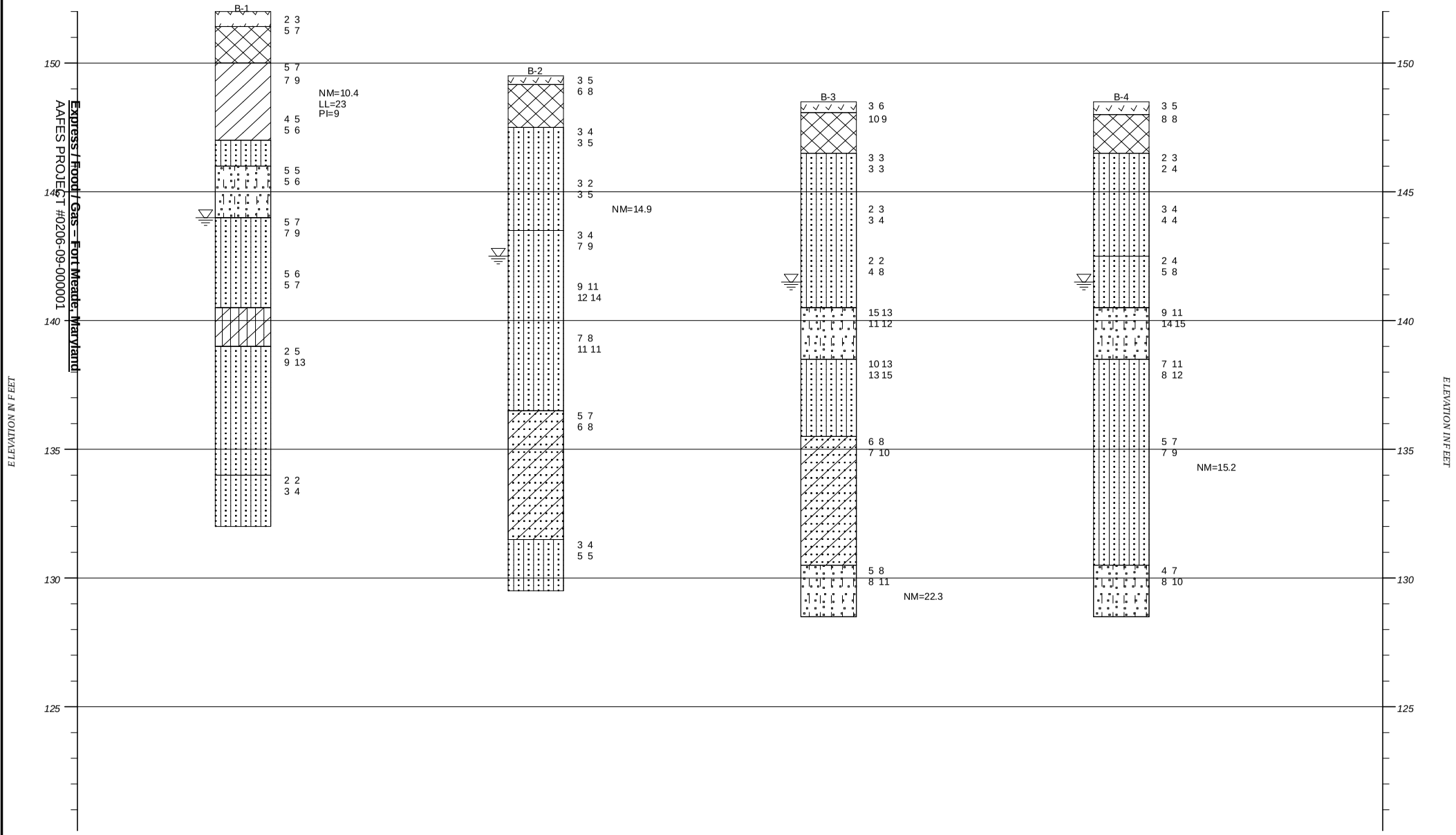
*The initial groundwater reading may not be indicative of the static groundwater level.

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

APPENDIX IV

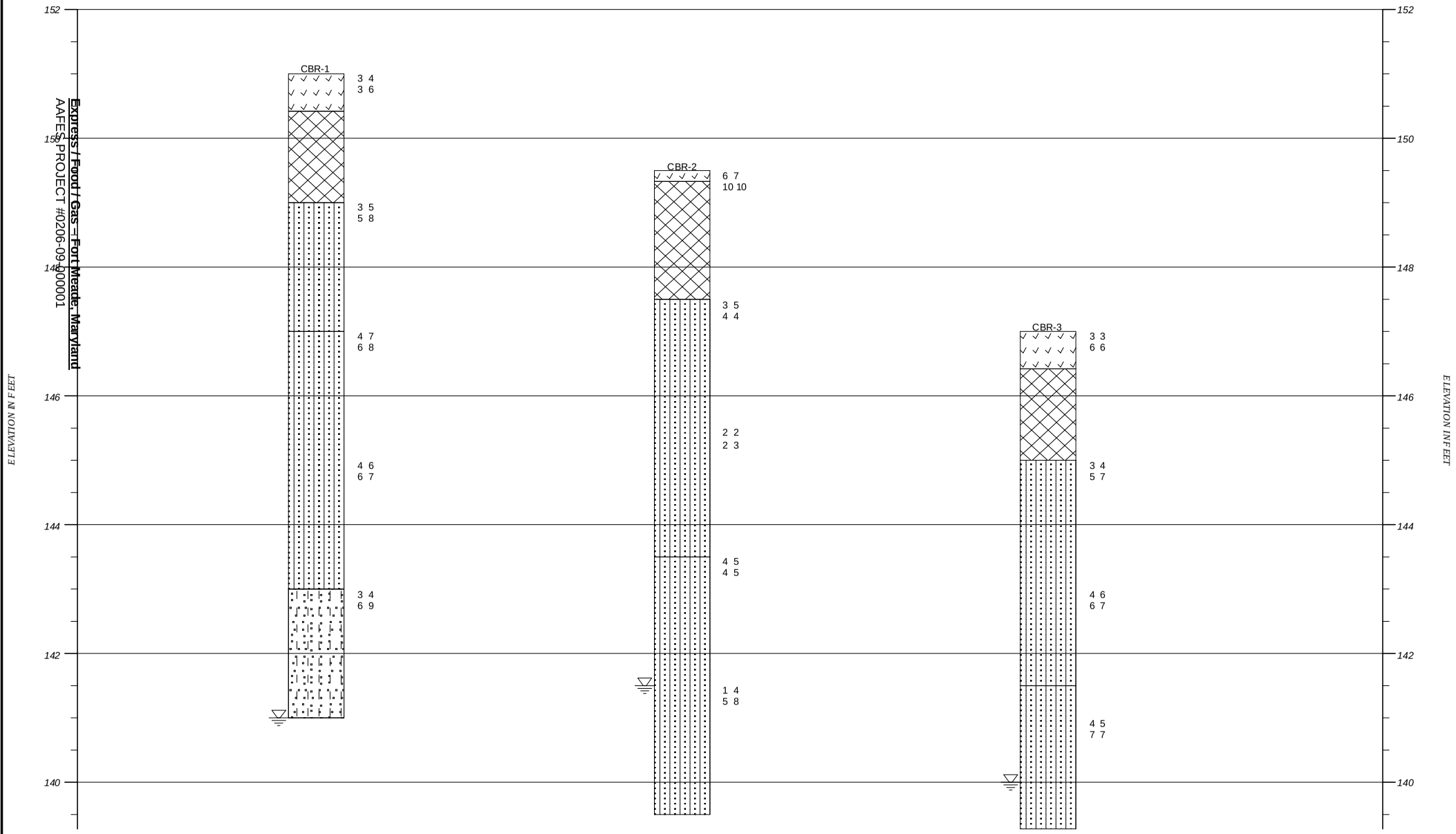
GENERALIZED SOIL PROFILES



Strata symbols

- Topsoil
- Fill
- Lean Clay
- Silty Sand
- Poorly graded Sand with Silt
- Silty Clay
- Clayey Sand

GET Solutions, Inc. GENERALIZED SOIL PROFILE		
HORIZONTAL SCALE: VERTICAL SCALE: 1"=5'	DRAWN BY/APPROVED BY SP	DATE DRAWN 6/18/2010
Construct Shoppette - Mapes Gate 32 Fort Meade, Maryland		
PROJECT NO. WM10-109G		FIGURE NUMBER 1



Strata symbols

- Topsoil
- Fill
- Silty Sand
- Poorly graded Sand with Silt

GET Solutions, Inc. GENERALIZED SOIL PROFILE		
HORIZONTAL SCALE: VERTICAL SCALE: 1"=2'	DRAWN BY/APPROVED BY SP	DATE DRAWN 6/18/2010
Construct Shoppette - Mapes Gate 32 Fort Meade, Maryland		
PROJECT NO. WM10-109G		FIGURE NUMBER 2

APPENDIX V

SUMMARY OF CBR TEST RESULTS

SUMMARY OF CBR TEST RESULTS

Project: Construct Shoppette - Mapes Gate 32

Project Location: Anne Arundel County, Maryland

Client: EverGreen Architects, Inc.

Project Number: WM10-109G

Sample Number	Sample Location	Sample Depth (ft)	USCS Symbol	Natural Moisture Content (%)	Atterberg Limits (LL/PL/PI)	Passing #200 Sieve (%)	Maximum Dry Density (pcf)	Optimum Moisture (%)	Soaked CBR Value	Swell (%)
CBR-1	CBR-1	0.5-1.5	SM	5.3	Non-Plastic	19.7	119.2	10.1	19.9	0.0
CBR-2	CBR-2	0.5-1.5	SM	9.6	Non-Plastic	37.6	125.1	10.1	18.9	0.0

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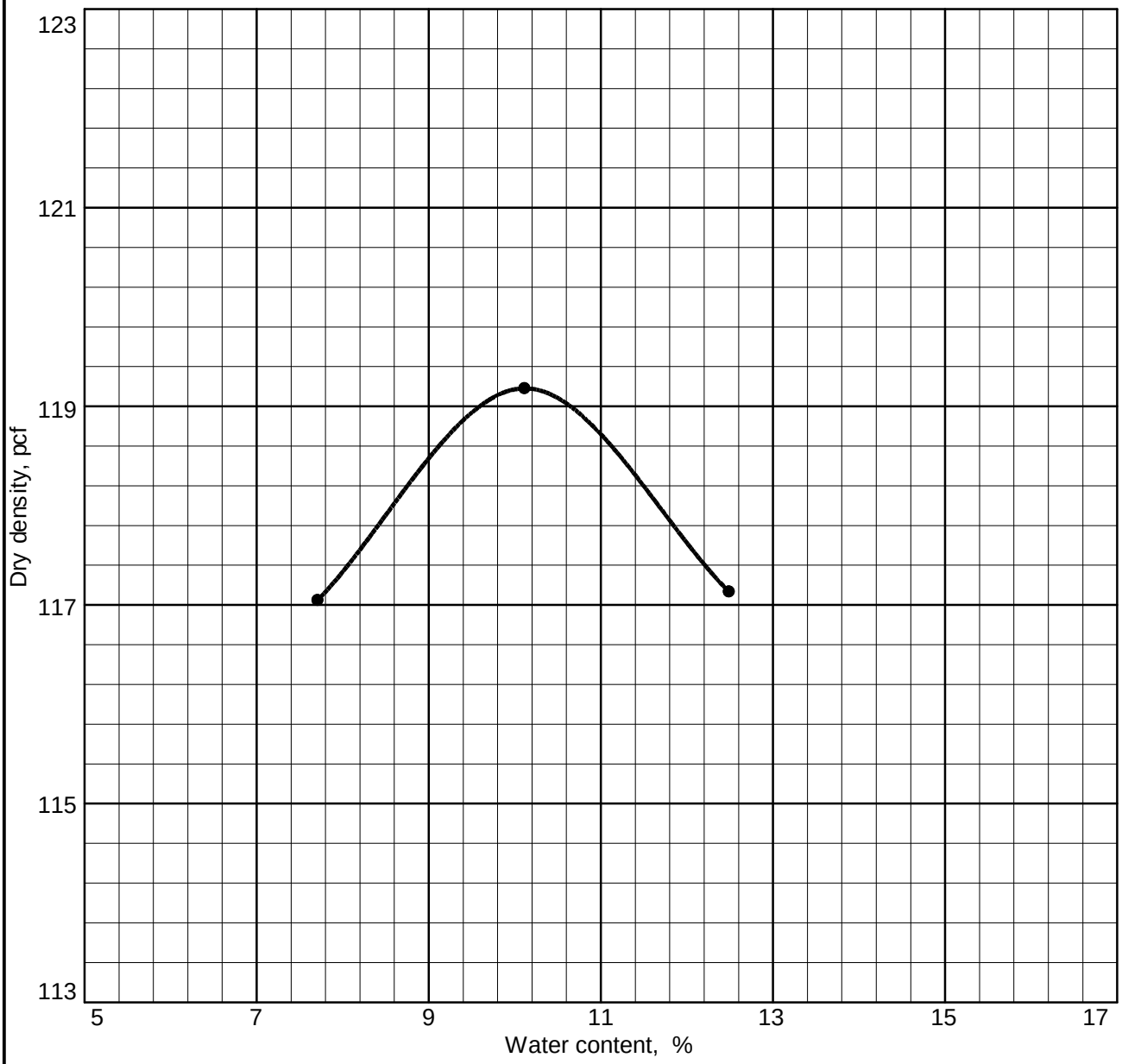
1592 Pennimna Road, Suite E
Williamsburg, Virginia 23185
Tel: 757-564-6452 Fax: 757-564-6453

MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.5'-1.5' Below G.	SM	A-2-4(0)	5.3	Estimated	NP	NP	3.0	19.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 119.2 pcf Optimum moisture = 10.1 %	Brown, Silty, fine to medium SAND (SM) with trace Gravel

Project No. WM10-109G **Client:** EverGreen Architects, Inc.

Project: Construct Shoppette - Mapes Gate 32

● **Location:** CBR #1 - See Attached Boring Location Plan

Remarks:

CBR #1
Sample Obtained: 5/10/10
Sample Tested: 6/10/10

MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)

Express / Food / Gas – Fort Meade, Maryland

AAFES PROJECT #020-09-0[illegible]

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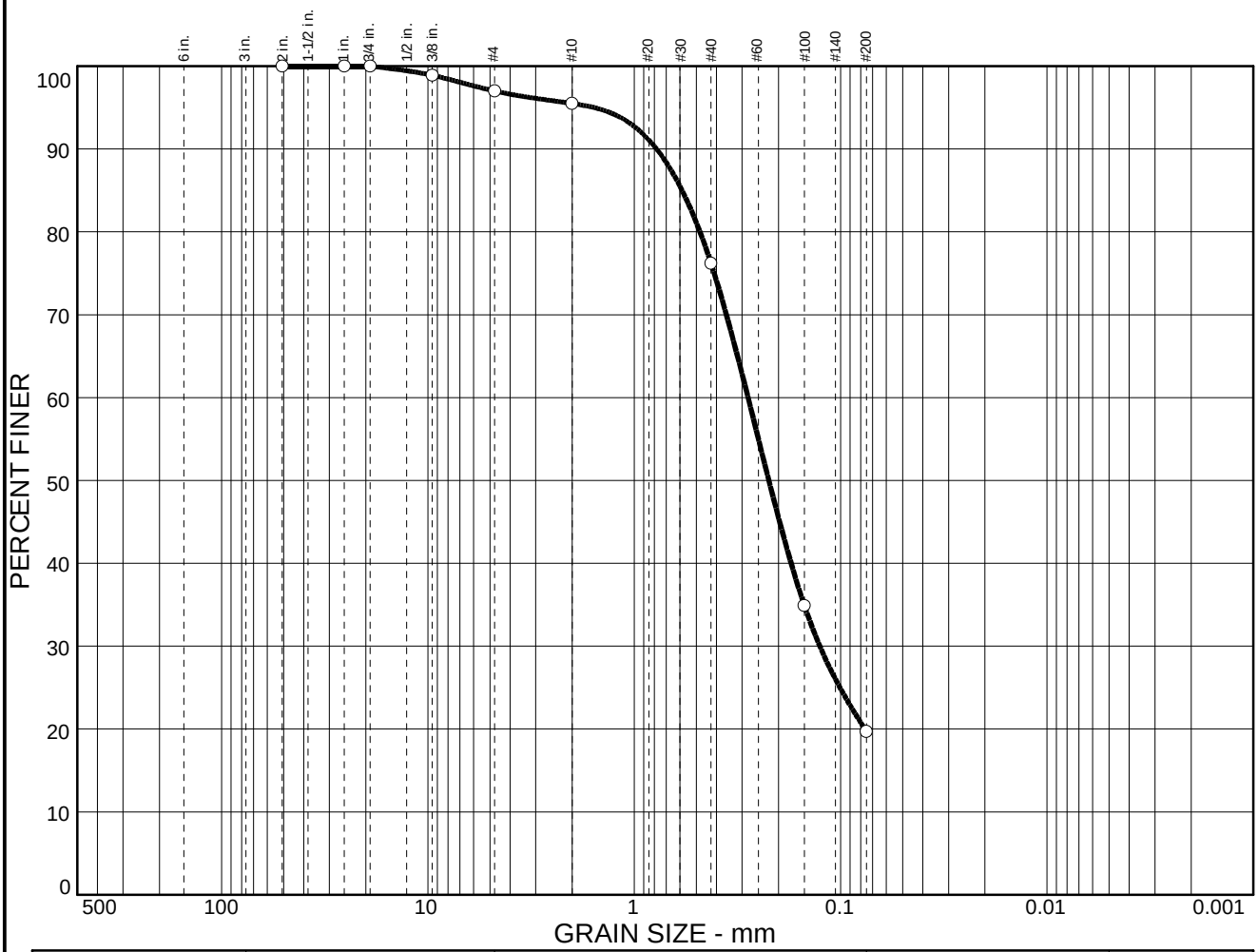
Figure 1

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	3.0	77.3	19.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2 in.	100.0		
1 in.	100.0		
3/4 in.	100.0		
3/8 in.	98.9		
#4	97.0		
#10	95.5		
#40	76.2		
#100	34.9		
#200	19.7		

* (no specification provided)

Soil Description

Brown, Silty, fine to medium SAND (SM) with trace Gravel

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.587 D_{60}= 0.281 D_{50}= 0.223
D_{30}= 0.126 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

CBR #1
Sample Obtained: 5/10/10
Sample Tested: 5/20/10

Sample No.: CBR #1 **Source of Sample:** **Date:** 5/20/10
Location: CBR #1 - See Attached Boring Location Plan **Elev./Depth:** 0.5'-1.5'

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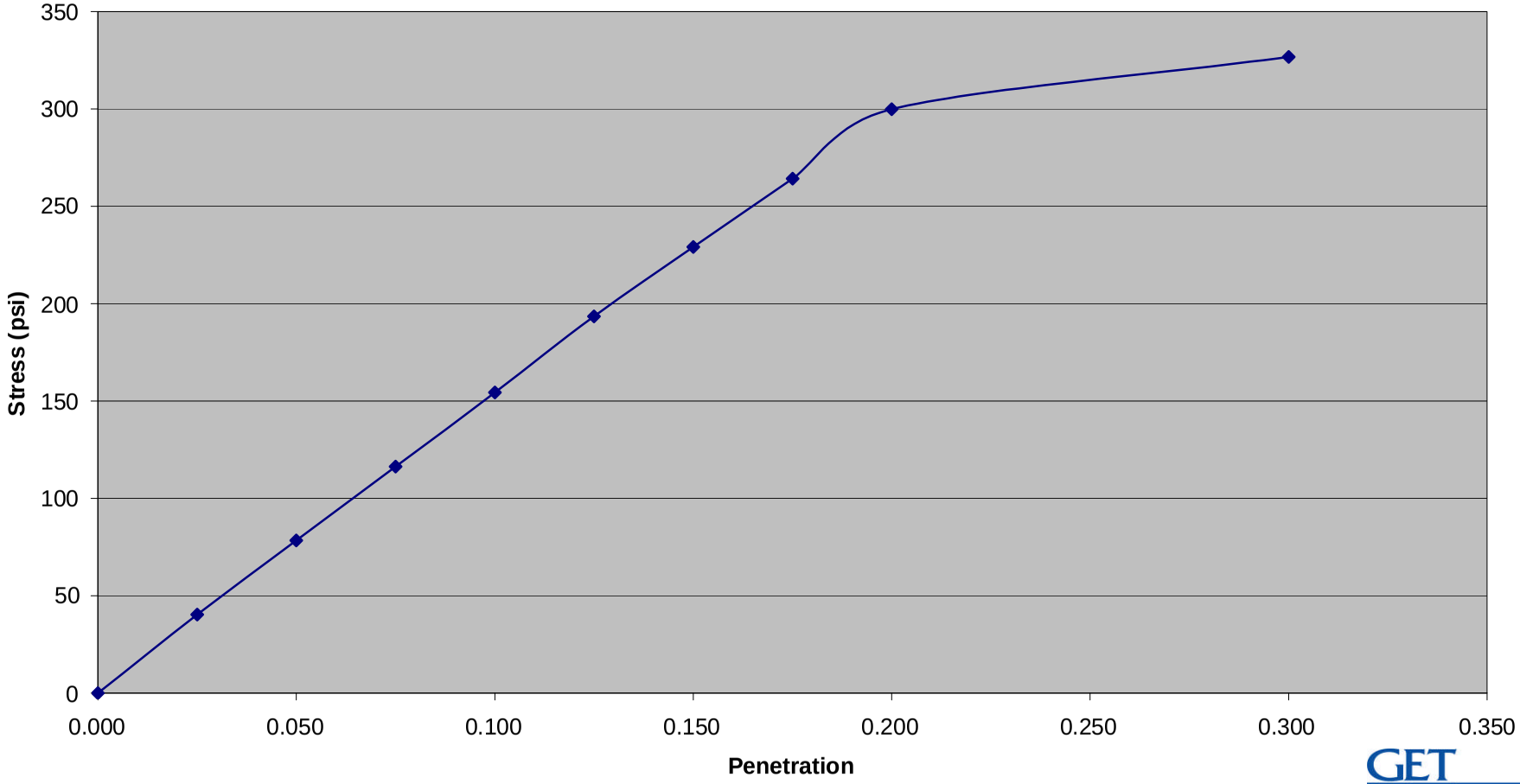
Express / Food / Gas – Fort Meade, Maryland
AAPES PROJECT 10-00-01-0000

Client: EverGreen Architects, Inc.
Project: Construct Shoppette - Mapes Gate 32

Project No: WM10-109G **Figure** 1a

Construct Shoppette - Mapes Gate 32
Fort Meade, Anne Arundel County, Maryland
G E T Project No.: WM10-109G

CBR #1



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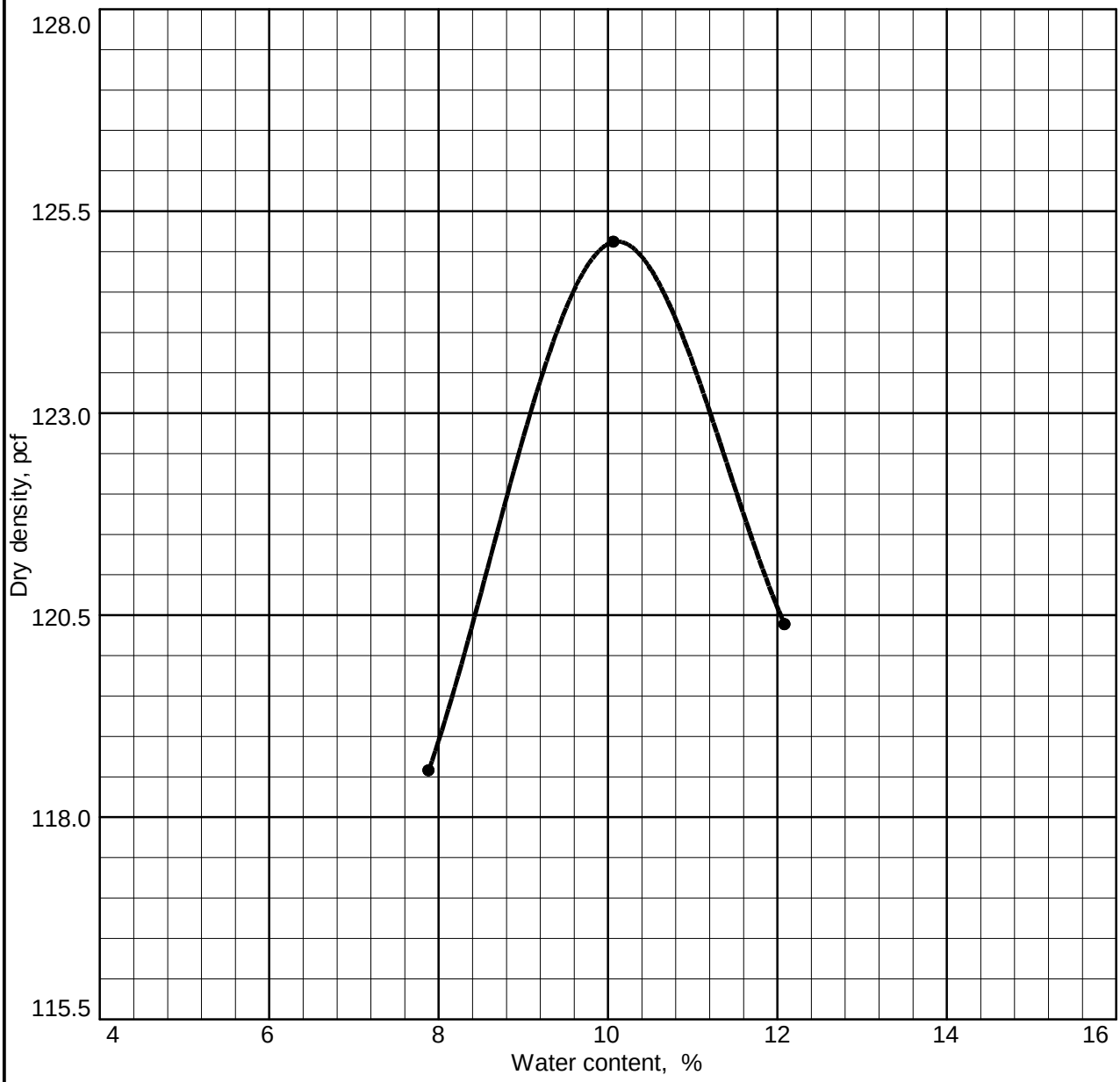
MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.5'-1.5' Below G.	SM	A-4(0)	9.6	Estimated	NP	NP	0.0	37.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 125.1 pcf Optimum moisture = 10.1 %	Brown, Silty, fine to medium SAND (SM)

Project No. WM10-109G **Client:** EverGreen Architects, Inc.

Project: Construct Shoppette - Mapes Gate 32

● **Location:** CBR #2 - See Attached Boring Location Plan

Remarks:

CBR #2
Sample Obtained: 5/10/10
Sample Tested: 6/10/10

MOISTURE DENSITY RELATIONSHIP (PROCTOR CURVE)

Express / Food / Gas – Fort Meade, Maryland

AAFES PROJECT #020-09-0[illegible]

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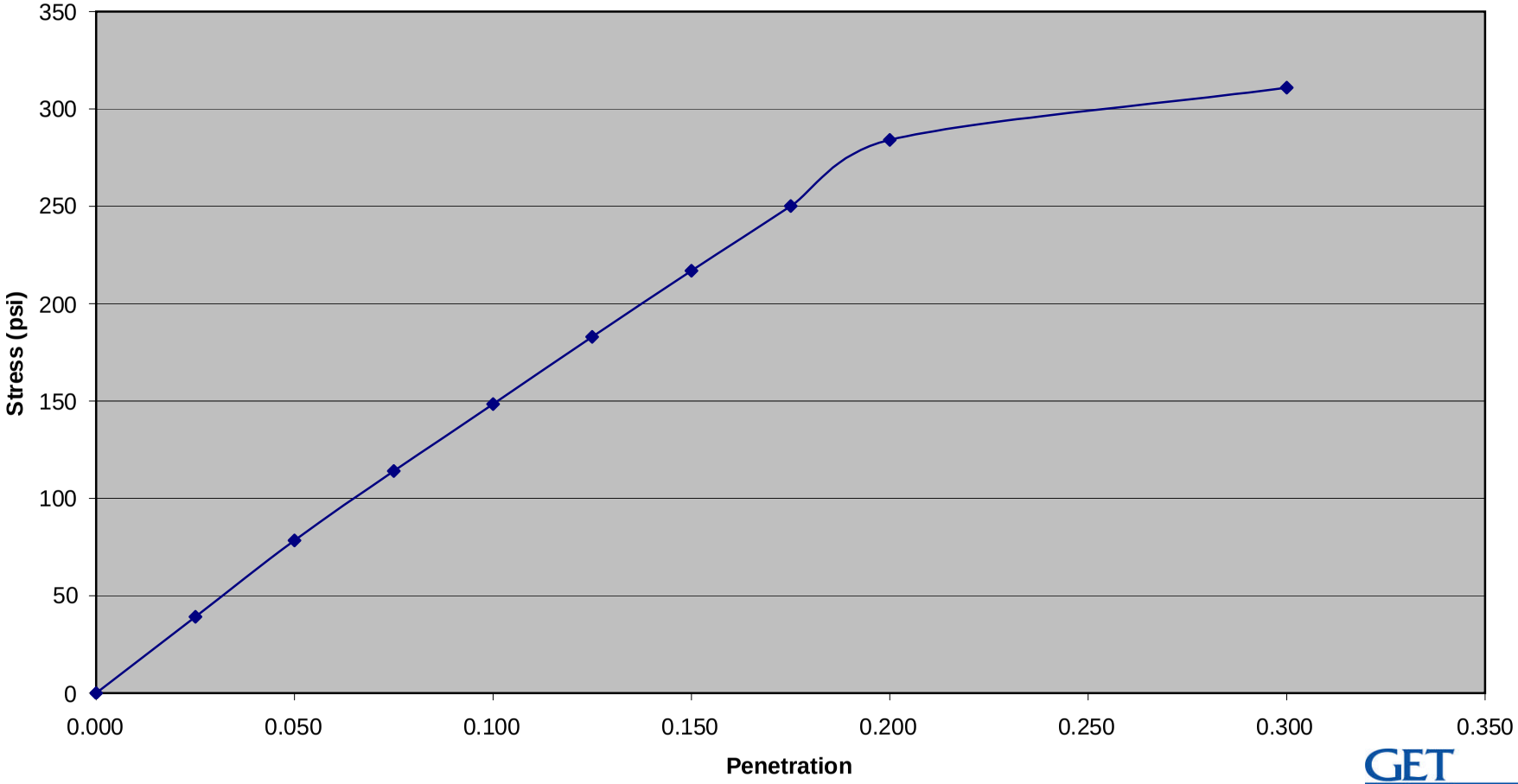
Figure 2

Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

Construct Shoppette - Mapes Gate 32
Fort Meade, Anne Arundel County, Maryland
G E T Project No.: WM10-109G

CBR #2



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SECTION 02055 - GROUND PENETRATING RADAR (GPR) REPORT

PART 1 - GENERAL

1.1 GROUND PENETRATING RADAR REPORT

A. The Ground Penetrating Radar Report bound herein was obtained from a commercial testing laboratory to determine the general subsurface conditions at the proposed project site with respects to the location of possible buried structures and / or bed rock. The information is shown for the offerer's benefit.

B. The Ground Penetrating Radar Report begins on the following page.

PART 2 - MATERIALS

(Not Used).

PART 3 - EXECUTION

(Not Used).

GROUND PENETRATING RADAR REPORT FOLLOWS

Shoppette / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

Shoppette / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

April 5, 2011

TO: **EverGreen Architects, Inc.**
168 West Franklin Street
Centerville, Ohio 45459

Attn: Mr. Todd D. Martin, AIA

RE: Report of Geophysical and Engineering Services
Fort Meade Gas Station Facility
Ft. Meade, Maryland
G E T Project No: VB11-138G

Dear Mr. Martin:

In compliance with your instructions, we have completed our geophysical and engineering services for the above referenced project. The services were conducted in general accordance with the scope of service defined in **G E T Solutions, Inc.**'s proposal PVB10-148G dated March 6, 2010. The results of the geophysical and engineering services are presented in this letter.

The project site is located at Fort Meade in Maryland. More specifically, the project site is located along the north side of Mapes Road approximately 200 feet northeast from the intersection of Mapes Road and 6th Armored Calvary Road. The project site is reported to be an approximate 6 acre parcel. The majority of the project site is currently developed with a baseball/softball field. The northwest corner of the project site is wooded. The future construction at this site is planned to consist of building a Gas Station Facility with associated infrastructure.

Purpose and Scope

The purpose of our services was to determine the general subsurface conditions at the proposed project site with respects to the location of possible buried structures and/or bed rock in the upper 10 feet of the subgrade soils using Ground Penetrating Radar (GPR). In order to provide this information, a Sensors and Software 250 MHz Smart Cart GPR unit was used to scan the accessible areas of the project site. It is noted that the north and northwest portions of the project site are currently wooded thus the area scanned using the GPR was limited.

Field Work Procedure

In order to explore the existing subgrade soils as it pertains to the location of possible buried structures and/or bed rock, GPR scans were performed by a **G E T Solutions, Inc.** field crew. The scans were performed utilizing a Sensor and Software 250 MHz Smart Cart GPR system. GPR in general employs radio waves to map structures and features buried in subgrade soils. The structures and/or bed rock are mapped by detecting reflected or scattered signals. The reflections are created by changes in the electromagnetic energy associated with the encountered materials and their dielectric constants variations.

In order to explore the general subsurface using the GPR, twenty (20) grids were established in the study area. The designation of the grids and sizes of the grids are provided on the following page in Table – I. The grids were scanned using the GPR with a line spacing of 10 feet in both the X and Y directions. An average velocity of 0.328 ft/ns, which is a typical velocity of dry soils, was established to allow for up to an approximate 10-foot signal penetration. The collected GPR data was downloaded and data reduction was performed.

Table I - GPR Grid Schedule

Grid Designation	Grid Dimensions (feet)
Grid 0-1	150 x 40
Grid 1-1	150 x 40
Grid 2-1	60 x 100
Grid 3-1	50 x 30
Grid 4-1	40 x 20
Grid 5-1	30 x 20
Grid 6-1	150 x 200
Grid 7-1	20 x 20
Grid 8-1	120 x 30
Grid 9-1	100 x 20
Grid 0-2	40 x 20
Grid 1-2	20 x 10
Grid 2-2	40 x 20
Grid 3-2	50 x 120
Grid 4-2	30 x 100
Grid 5-2	10 x 60
Grid 6-2	20 x 180
Grid 7-2	10 x 40
Grid 8-2	100 x 30
Grid 9-2	30 x 50

The grid locations were established and located in the field by **G E T Solutions, Inc.** by measuring distances from existing identifiable site features. The approximate locations are illustrated on the "GPR Grid Location Plan", Attachment I.

Findings

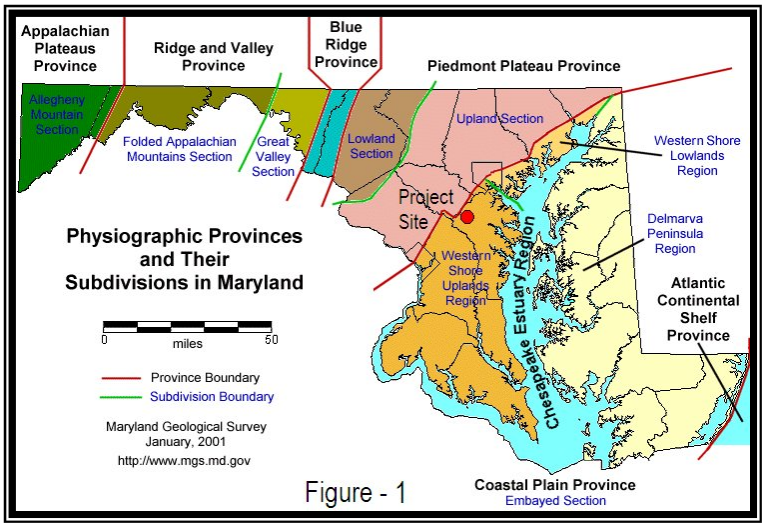


Figure - 1

Based upon our field exploration, review of the collected GPR data and review of readily available geological information; it is not likely that the project site contains bedrock in the upper ten feet. Maryland has three (3) distinct physiographic regions, the Coastal Plain Province, the Piedmont Province and the Mountain Province (Blue Ridge, Ridge and Valley and Appalachian Plateaus). The project site lies within the Coastal Plain Providence in the Western Shore Uplands Region which is located west of the Chesapeake Bay and east of the fall line (See figure 1), which commonly does not have bedrock in the upper 10 feet.

The results of our field exploration program and review of the collected GPR data indicated some anomalies existed in Grid 3-1, Grid 5-1, Grid 7-1, Grid 8-1, Grid 9-1, Grid 0-2, Grid 5-2, Grid 6-2, Grid 7-2 and Grid 8-2 (north and northwest portions of the project site) which are likely associated with gravel to boulder size deposits of material. These deposits can be expected to be encountered at depths ranging 4 to 9 feet below current site grades. The size of these materials can not be determined but it is expected that if boulders are encountered the size may be large enough to prove difficult to manage (i.e. remove) during construction. The anomalies observed in Grid 1-1 and Grid 9-2 are likely associated with previous construction activities in the form of buried structures (i.e. utilities). Reference the attached Composite Plan View Map of GPR Data for approximate areas of detected anomalies (Attachment II).

G E T Solutions, Inc. can not preclude the presence or absence of bed rock and/or buried structures at other un-scanned locations.

Limitations

The Geotechnical Engineer warrants that the findings, recommendations, specifications or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

This report has been prepared for the exclusive use of EverGreen Architects, Inc. and their consultants for the specific application to the Ft. Meade Gas Station Facility project located in Ft. Meade, Maryland.

We appreciate the opportunity to work with you on this project. We trust that the information contained herein meets your immediate need, and should you have any questions or if we could be of further assistance, please do not hesitate to contact us.

Respectfully Submitted,
G E T Solutions, Inc.

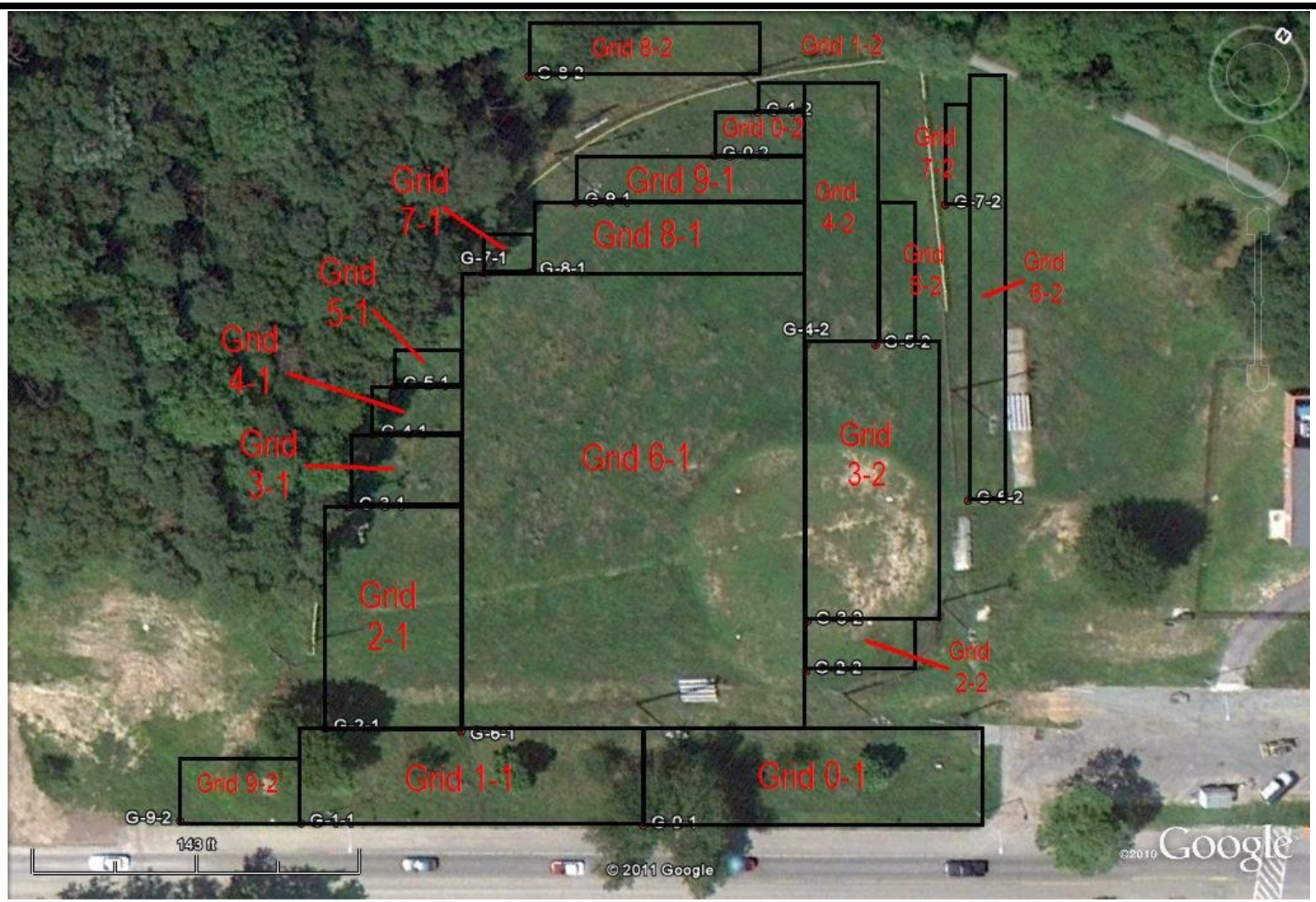
Bradley T. Mitchell
Project Geologist

D. Mark Scholefield, P.E.
Senior Geotechnical Engineer
VA Lic. # 033932

COMMONWEALTH OF VIRGINIA
D. MARK SCHOLEFIELD
Lic. No. 033932
PROFESSIONAL ENGINEER

Copies: (3) Client

Attachment I
GPR Grid Location Plan



Locations are approximate based on site visit sketch.

GPR Grid Location Plan

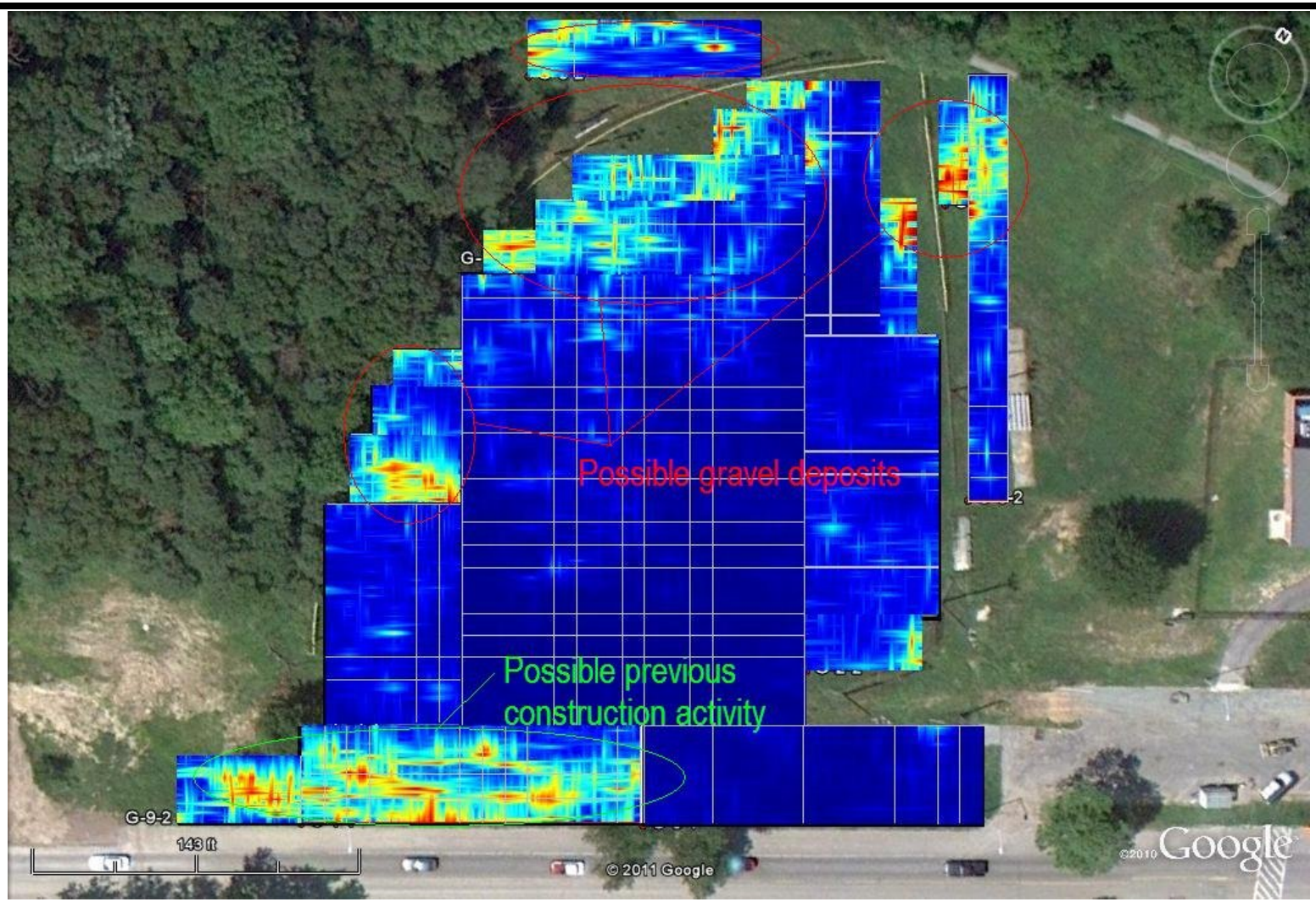
Project: Fort Meade Gas Station Facility
Fort Meade, Maryland

Project No: VB11-138G
Client: EverGreen Architects, Inc.

Scale: As Drawn
Date: 4/5/2011
Plot By: BTM

Attachment II

Composite Plan View Map of GPR Data



Locations are approximate based on site visit sketch.

Composite Plan View Map of GPR Data

Project: Fort Meade Gas Station Facility
Fort Meade, Maryland

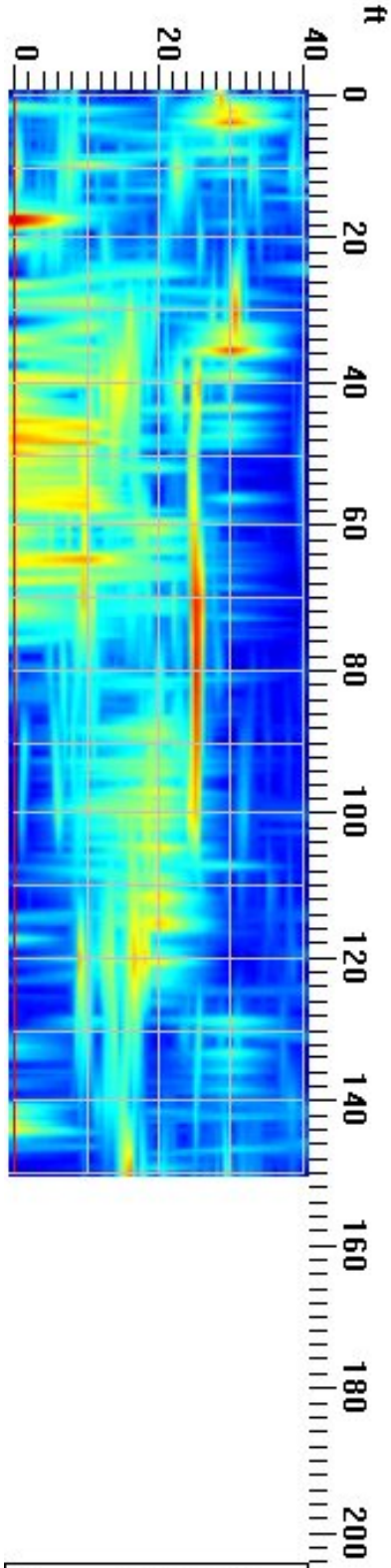
Project No: VB11-138G
Client: EverGreen Architects, Inc.

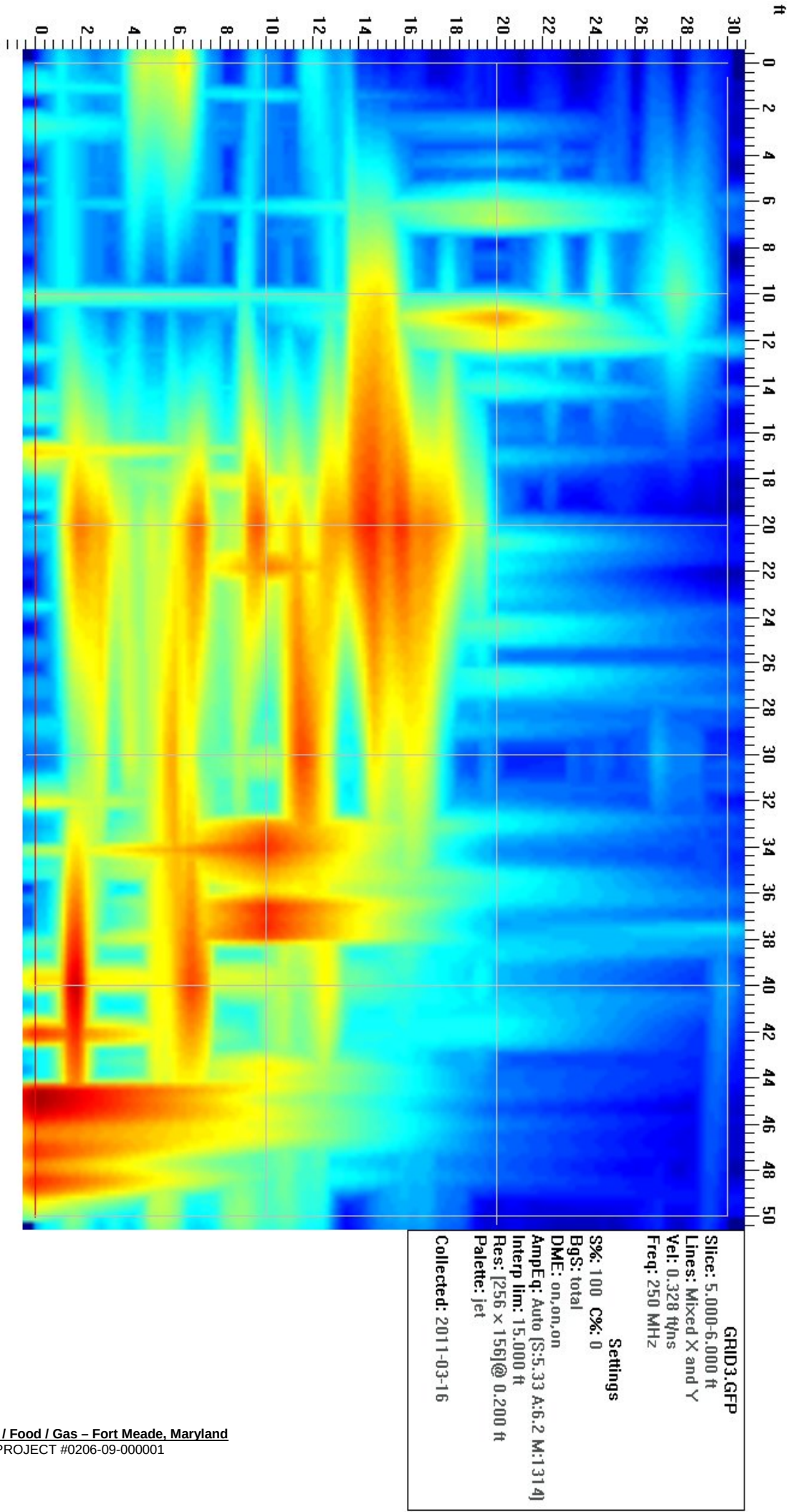
Scale: As Drawn
Date: 4/5/2011
Plot By: BTM

Attachment III

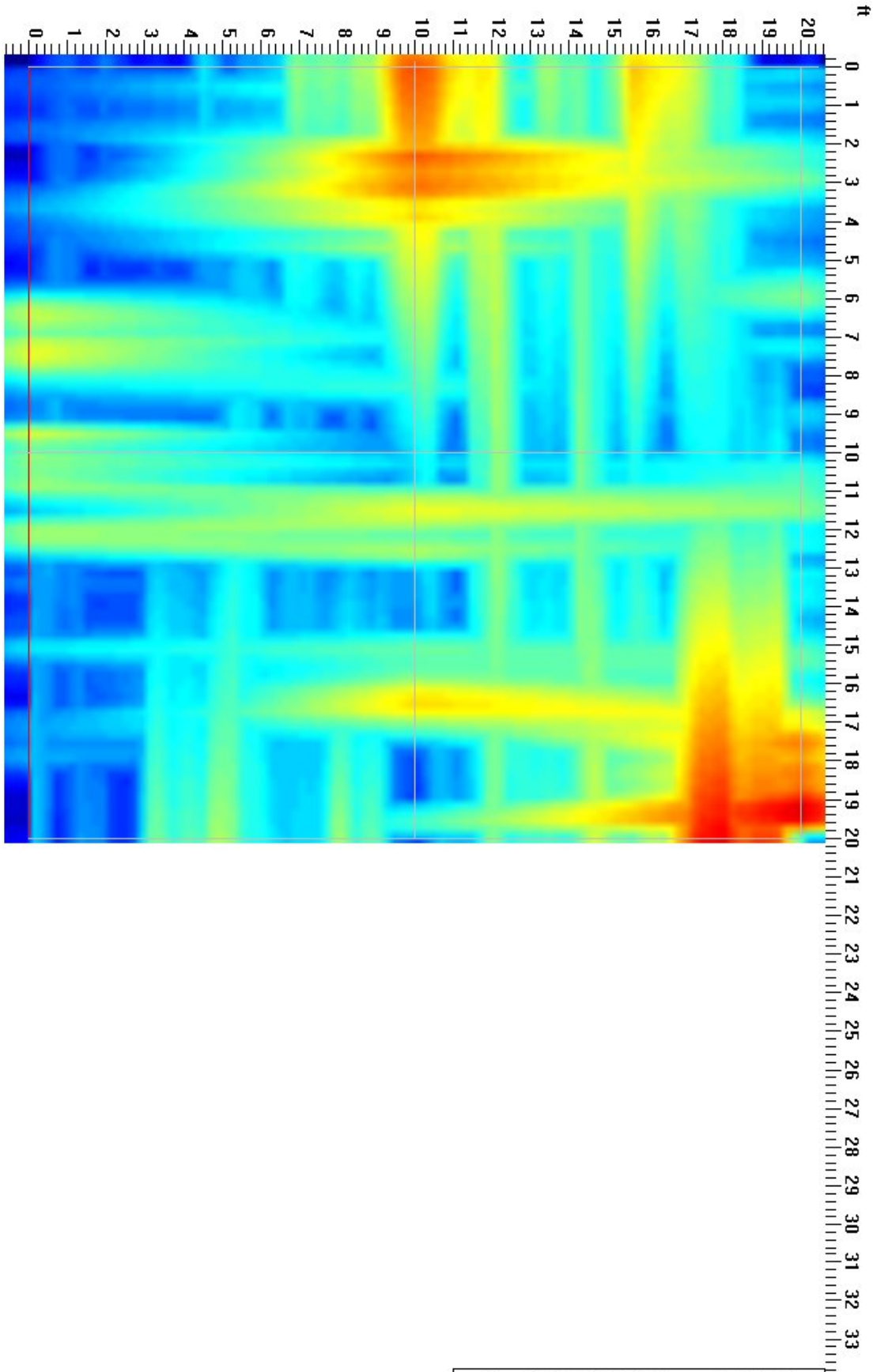
Selected Plan View Maps of GPR Data

Grids 0-1 through 9-1


ft
40
20
0
0
20
40
60
80
100
120
140
160
180
200
GRID1.GFP
Slice: 3.000-4.000 ft
Lines: Mixed X and Y
Vel: 0.328 ft/ns
Freq: 250 MHz
Settings
S%: 100 C%: 0

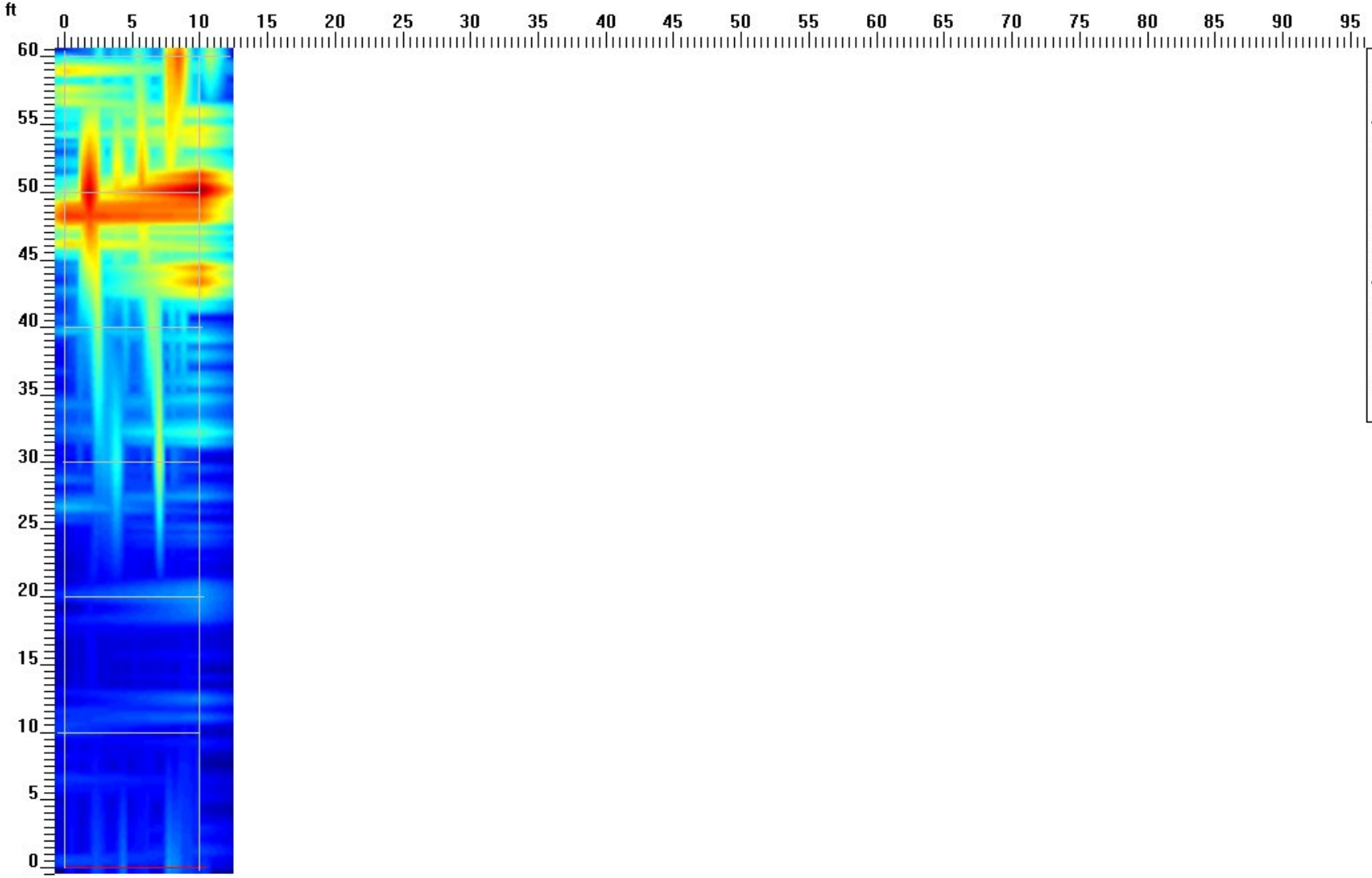


Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001



Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

Grids 0-2 through 9-2

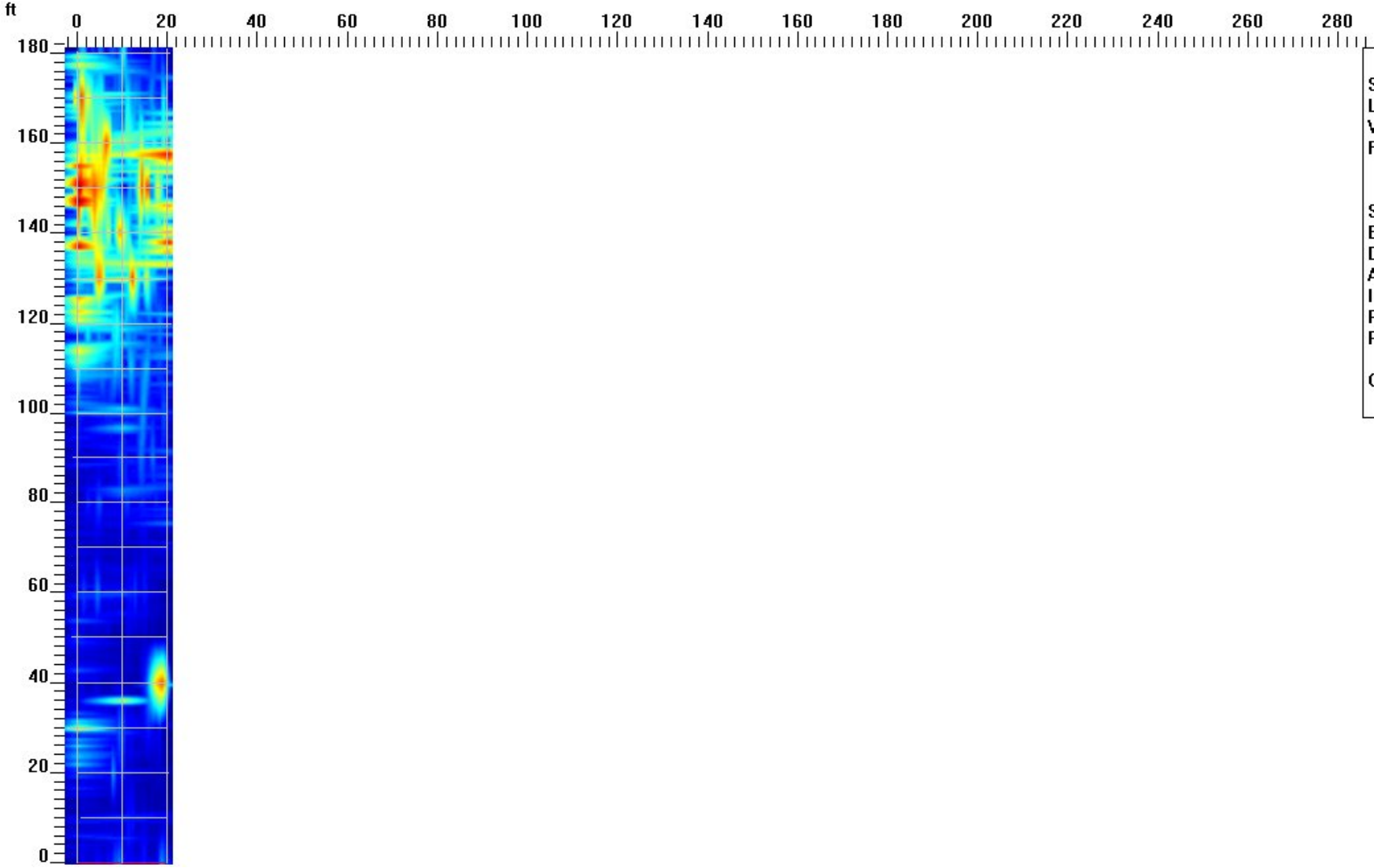


GRID5.GFP
Slice: 3.000-4.000 ft
Lines: Mixed X and Y
Vel: 0.328 ft/ns
Freq: 250 MHz

Settings
S%: 100 **C%:** 0
BgS: total
DME: on,on,on
AmpEq: Auto (S:10.00 A:4.0 M:948)
Interp lim: 15.000 ft
Res: [66 x 306]@ 0.200 ft
Palette: jet

Collected: 2011-03-17

Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

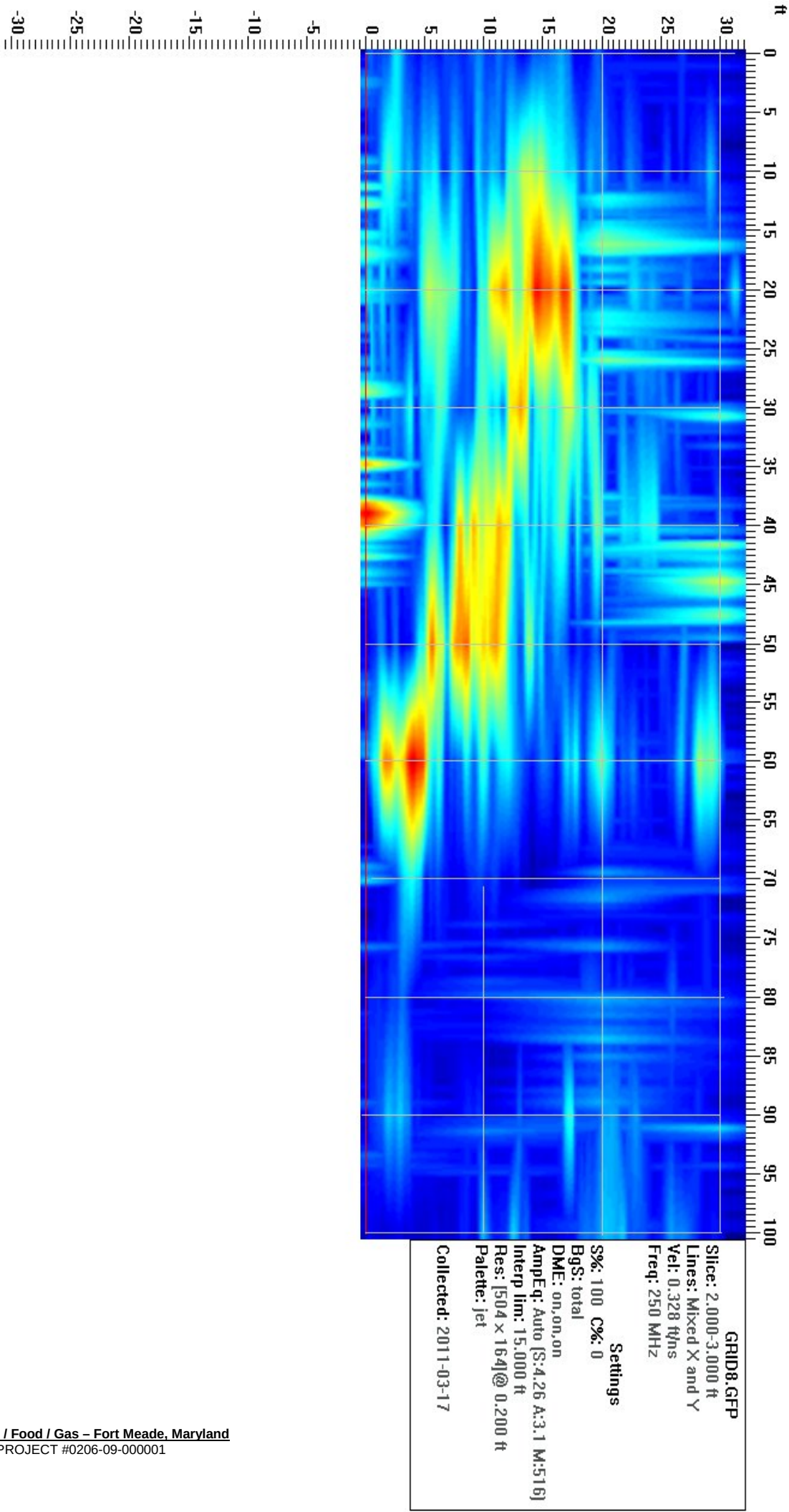


GRID6.GFP
Slice: 4.000-5.000 ft
Lines: Mixed X and Y
Vel: 0.328 ft/ns
Freq: 250 MHz

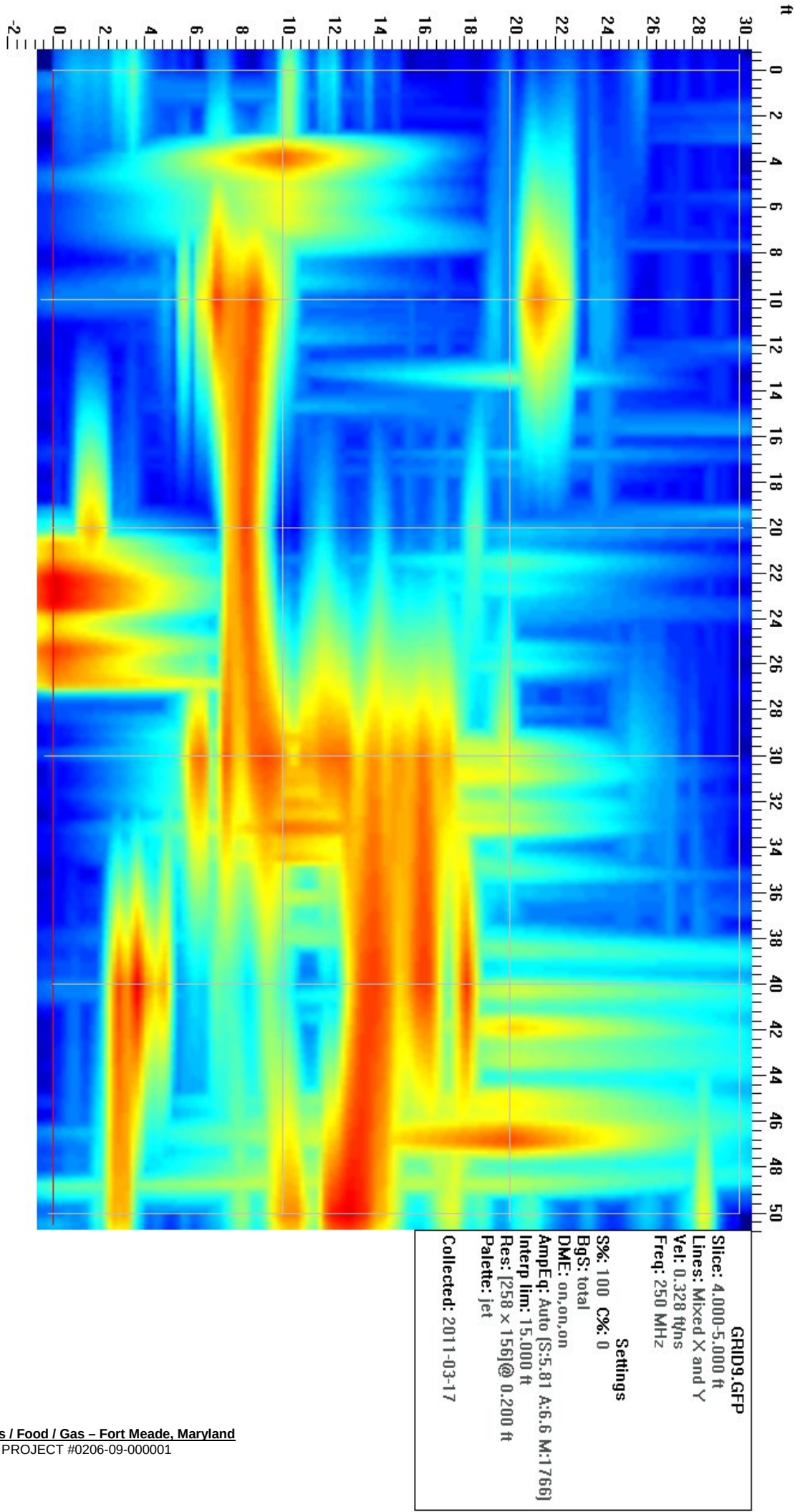
Settings
S%: 100 **C%:** 0
BgS: total
DME: on,on,on
AmpEq: Auto (S:7.22 A:3.0 M:711)
Interp lim: 15.000 ft
Res: [48 x 364]@ 0.500 ft
Palette: jet

Collected: 2011-03-17

Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001



Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001



Express / Food / Gas – Fort Meade, Maryland
AAFES PROJECT #0206-09-000001

SECTION 02100 – SITE PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section Includes:
1. Clearing and grubbing
2. Removal of surface debris.
3. Removal of asphalt paving, concrete paving, curbs, and curb and gutter.
4. Removal of existing utilities, as indicated on the drawings.
5. Removal of existing fence.
6. Provisions for protection, removal, replacement and disposal.

1.2 REGULATORY REQUIREMENTS/REFERENCES

A. Contractor shall comply with the requirements of specification Section 01150 – Requirements of the Installation.

B. Streets, roads, trees, adjacent property, and other works to remain shall be protected throughout the work by the General Contractor.

C. Maintain all bench marks, monuments, and other reference points. If disturbed or destroyed, replace as directed by the Architect. Contractor shall contact the Architect if additional bench mark information is required.

1.3 GEOTECHNICAL REPORT

The Geotechnical Report for the project can be found in Specification Section 02050 “Geotechnical Report”. The Geotechnical Report offers detailed information and recommendations concerning the soils at the time of the field investigation. The contractor shall review the geotechnical report and construct accordingly.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that existing plant life designated to remain is tagged or identified.

B. Prior to commencement of work, the contractor shall identify the proper area for placing removed materials.

C. Underground Utilities:
1. Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location, identification and elevation of the existing utilities indicated prior to starting construction. The Contractor shall scan the construction site with electromagnetic and sonic equipment and mark the surface of the ground where existing underground utilities are discovered.

3.2 PROTECTION

A. Where pedestrian and driver safety is endangered, use traffic barricades with flashing lights.

B. Trees and vegetation to be left standing shall be protected from damage during construction operations. Contractor shall submit details of protection system. Tree protection shall extend to one foot beyond the tree’s drip line.

C. Protect benchmarks, survey control points, pavements to remain, existing structures, and all existing facilities which remain from damage or displacement.

D. Provide contractor design shoring, bracing and protection systems as required to prevent damage or displacement to new work and existing facilities.

E. Protection and Removal of Utility Lines

1. Existing utility lines that are shown on the plans or the locations of which are made known to the Contractor prior to excavation and that are to be retained, as well as utility lines constructed during excavation operations, shall be protected from damage during all site work operations, and if damaged shall be repaired by the Contractor at no expense to AAFES. In the event that the Contractor damages existing utility lines that are not shown on the plans, or the locations of which have not been known to the Contractor, report of such damage shall be made immediately to the Architect. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Architect in ample time for the necessary measures to be taken to prevent interruption of the service.
2. The contractor shall be required to hand excavate adjacent to active utilities. Any damages to existing utilities shall be repaired by the Contractor at no cost to as identified in specification Section 01150 – Requirements of The Installation

3.3 REMOVAL / DEMOLITION

A. Remove asphalt paving, concrete paving, curbs, and curb and gutter in their entirety as indicated on the drawings. Neatly saw cut edges at right angle to surface.

B. Remove existing utilities, utility piping, utility poles and all structures in their entirety as indicated on the drawings.

C. Remove existing fence, including pickets, line posts, and concrete foundations in there entirety as indicated on the drawings.

3.4 CLEARING

A. Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing. Any application of any herbicide or pesticide must be pre-approved by the Department of Public Works prior to the application.

3.5 GRUBBING

A. Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas, which are all areas to be improved. Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

3.6 DRAINAGE / DEWATERING

A. See specification Section 01500 - Temporary Facilities and Controls for requirements.

3.7 HAZARDOUS MATERIALS

A. If in the performance of the work the Contractor encounters any abnormal materials such as, but not limited to drums, tanks, stained earth, unexploded munitions, or unusual odors during site clearing

operations, the work shall be temporarily discontinued, equipment left in place, the area cordoned off and notify the Contracting Officer, AE, Project Manager and other Installation Authorities as required. The area is considered to contain hazardous or toxic material. Work may be resumed only after a determination has been made by the proper authorities and unsafe materials removed and the area declared safe.

3.8 REPLACEMENT OF DAMAGED AREAS

A. Contractor shall repair or replace at no additional cost to the AAFES any damage resulting from, or incidental to, construction.
   1. Replacement or repair of seeded areas, sod, bituminous pavement and concrete pavement, structures, shrubbery, trees, drives, walks, and/or fences damaged by construction work, or work incidental thereto, shall be preformed by the Contractor as soon as is practical.
   2. Replacement shall include existing trees and shrubs not scheduled for removal, that do not show definite signs of life and/or satisfactory growth during the growing period following construction.

B. Where removals leave holes and damage surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces.

3.9 DISPOSAL

A. Removing From Construction Site:
   1. All concrete, asphalt pavement, excavated materials, below grade utilities and structures, and demolition debris not required for construction shall be removed in accordance with the provisions of specifications Section 01150 – Requirements of the Installation, paragraph Disposal.
   2. The General Contractor shall be responsible for contacting the Ft. Meade Point of Contact, Director of Public Works prior to the start of excavation and disposal of materials.
   3. Burning shall not be permitted.

3.10 QUALITY CONTROL

A. The Contractor shall establish and maintain quality control for operations under this section to ensure compliance with contract requirements and maintain records of his quality control for all materials, equipment, and construction operations, including but not limited to the following:
   1. Clear areas flush or below original ground surface.
   2. Disposal of cleared and grubbed materials.

B. A copy of these records and Contractor tests, as well as the records of corrective action taken, shall be furnished to Department of Public Works as directed by the Architect.

END OF SECTION

SECTION 02111 – SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Removal of surface debris.

B. Removal of asphalt paving, concrete paving, curbs, and curb and gutter.

C. Removal of existing utilities, as indicated on the drawings.

D. Removal of existing fence.

E. Provisions for protection, removal, replacement and disposal.

1.1 REGULATORY REQUIREMENTS/REFERENCES

A. Streets, roads, trees, adjacent property, and other works to remain shall be protected throughout the work by the General Contractor.

B. Maintain all bench marks, monuments, and other reference points. If disturbed or destroyed, replace as directed by the Contracting Officer. Contractor shall contact contracting officer if additional bench mark information is required.

1.2 GENERAL

A. Underground Utilities:

1. Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location, identification and elevation of the existing utilities indicated prior to starting construction. The Contractor shall scan the construction site with electromagnetic and sonic equipment and mark the surface of the ground where existing underground utilities are discovered.

B. Protection and Removal of Utility Lines

1. Existing utility lines that are shown on the plans or the locations of which are made known to the Contractor prior to excavation and that are to be retained, as well as utility lines constructed during excavation operations, shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired by the Contractor at no expense to AAFES. In the event that the Contractor damages existing utility lines that are not shown on the plans, or the locations of which have not been known to the Contractor, report of such damage shall be made immediately to the Contracting Officer. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Contracting Officer in ample time for the necessary measures to be taken to prevent interruption of the service.
2. The contractor shall be required to hand excavate adjacent to active utilities. Any damages to existing utilities shall be repaired by the Contractor at no cost to AAFES.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Equipment shall be at the Contractor's option.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that existing plant life designated to remain is tagged or identified.

B. Prior to commencement of work, the contractor shall identify the proper area for placing removed materials.

3.2 PROTECTION

A. Where pedestrian and driver safety is endangered, use traffic barricades with flashing lights.

B. Protect trees, plant growth, and features designated to remain, as final landscaping.

C. Protect benchmarks, survey control points, pavements to remain, existing structures, and all existing facilities which remain from damage or displacement.

D. Provide contractor design shoring, bracing and protection systems as required to prevent damage or displacement to new work and existing facilities.

3.3 REMOVAL / DEMOLITION

A. Remove asphalt paving, concrete paving, curbs, and curb and gutter in their entirety as indicated on the drawings. Neatly saw cut edges at right angle to surface.

B. Remove existing utilities, utility piping, utility poles and all structures in their entirety as indicated on the drawings.

C. Remove existing fence, including pickets, line posts, and concrete foundations in there entirety as indicated on the drawings.

3.4 REPLACEMENT OF DAMAGED AREAS

A. Contractor shall repair or replace at no additional cost to the AAFES any damage resulting from, or incidental to, construction.
   1. Replacement or repair of seeded areas, sod, bituminous pavement and concrete pavement, structures, shrubbery, trees, drives, walks, and/or fences damaged by construction work, or work incidental thereto, shall be preformed by the Contractor as soon as is practical.
   2. Replacement shall include existing trees and shrubs not scheduled for removal, that do not show definite signs of life and/or satisfactory growth during the growing period following construction.

B. Where removals leave holes and damage surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces.

3.5 DISPOSAL

A. Removing From Construction Site:
   1. All concrete, asphalt pavement, excavated materials, below grade utilities and structures, and demolition debris not required for construction shall be removed from Government property and disposed of at a State approved location.
   2. The General Contractor shall be responsible for contacting the Ft. Meade Point of Contact, prior to the start of excavation and disposal of materials.
   3. Burning shall not be permitted.

3.6 DRAINAGE / DEWATERING

A. See specification Section 01500 - Temporary Facilities and Controls for requirements.

3.7 QUALITY CONTROL

A. The Contractor shall establish and maintain quality control for operations under this section to ensure compliance with contract requirements and maintain records of his quality control for all materials, equipment, and construction operations, including but not limited to the following:
   1. Clear areas flush or below original ground surface.
   2. Disposal of cleared and grubbed materials.

B. A copy of these records and Contractor tests, as well as the records of corrective action taken, shall be furnished to Base Engineering as directed by the Contracting Officer.

END OF SECTION

SECTION 02211 - ROUGH GRADING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work performed under this section consists of general site work, including soil removal, subgrade preparation, general excavation and backfill, drainage/dewatering and finish grading.

1.2 REGULATORY REQUIREMENTS/REFERENCES

A. American Society for Testing and Materials (ASTM)
ASTM D 698 – Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu.ft)

1.3 GENERAL

A. Locate, identify, and protect utilities that remain, from damage as required in specification Section 02111 - Selective Site Demolition.

1.4 TESTING SERVICES

A. The testing services shall be supervised by a Professional Engineer, registered in the State of Maryland.

B. Soil Compaction Testing:
1. The Contractor shall employ and pay for the services of a qualified geotechnical engineering consultant for advice on all earthwork techniques involved in the work. Contractor shall inform the Contracting Officer of conditions requiring a variation to the Contract Documents and consult with the Contracting Officer regarding disposition of earthwork variations.
2. The Contractor will employ an independent testing agency to perform tests on structural fill for compaction. Tests shall be provided by a laboratory approved and paid for by the Contractor. The Contractor shall provide a 50-pound (22.68 kg) sample of each material, from each source, to the testing agency five days prior to start of earthwork. Do not place any fill material until laboratory tests confirm material suitable as structural fill.
3. Laboratory Test on soil materials for compaction: ASTM D 698.
4. Laboratory test on structural fill for compaction: ASTM D 698.
5. Contractor shall notify the testing agency and geotechnical engineering consultant sufficiently in advance of operations to allow for their assignment of personnel and scheduling of tests.
6. Testing Agency and geotechnical engineer shall prepare written reports of services performed. Testing Agency shall provide three (3) copies of testing reports to the Contracting Officer no later than 10 calendar days from the date testing occurs or test results are obtained.
7. Tests (To be performed by the Contractor employed testing agency):
   a. Perform tests in areas where compacted fill densities are specified.
   b. Perform tests on sub-grade areas prior to backfilling, and at each layer of compacted fill for every 1000 square feet (92.9 square meters) , or less, of filled area, for areas other than back fill at foundation walls.
   c. Perform tests at undisturbed bearing area and at each layer of compacted fill in bearing area not to exceed 50 feet (15.24 M) o.c. at each individual footing.
   d. Perform tests at each layer of compacted backfill at foundation walls; perform tests at locations not to exceed 50 feet (15.24 M) o.c.
   e. Perform tests remote from each other and in areas representative of the entire subgrade.
   f. Perform tests at each layer of compacted fill in utility trenches not to exceed 100 feet (30.48) o.c.
8. The testing laboratory shall promptly notify Contracting Officer and Contractor of irregularities or deficiencies of work which are observed during performance of services. If in the opinion of the Contracting Officer additional tests are required beyond those specified and their results indicate compaction less than the percentage density specified, the contractor shall bear the expense of such additional tests ordered.

C. Allowable Tolerances:
1. Perform all earthwork to a finished tolerance within plus or minus one tenth of a foot.

D. Samples: Provide test results and samples of materials that have been tested for fill.

1.5 SUBMITTALS FOR REVIEW

1. Notification: Start of Proof Rolling. Notify the Contracting Officer a minimum of 3 days prior to proof rolling.

1.6 GEOTECHNICAL REPORT

The Geotechnical Report for the project can be found in Specification Section 02050 “Geotechnical Report”. The Geotechnical Report offers detailed information and recommendations concerning the soils at the time of the field investigation. The contractor shall review the geotechnical report and construct accordingly.

PART 2 - PRODUCTS

2.1 FILL MATERIAL / SOIL MATERIAL

A. Provide fill materials and soil materials in accordance with specification Section 02300 - Earthwork.

PART 3 - EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

C. Protect bench marks, survey control points, existing structures, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.2 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Newly graded areas shall be protected from traffic, erosion, and any settlement or washing away that may occur from any cause, prior to acceptance. Damaged areas shall be repaired and grades re-established to the required elevations and slopes at no additional cost to AAFES until such time that newly planted vegetation has stabilized the slopes.

C. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

D. For additional protection requirements refer to specification Section 02111 - Selective Site Demolition.

3.3 EXCAVATION

A. Excavation of every description, regardless of material encountered, within the grading limits of the project shall be performed to the lines and grades indicated.

B. During the construction, proper drainage / dewatering shall be provided at all times and as specified herein.

C. Topsoil excavation requirements are specified in specification Section 02100 - Site Preparation.

3.4 SUB-GRADE PREPARATION

A. Unsuitable Material.
   1. Remove vegetation, debris, decayed vegetable matter, sod, mulch, and rubbish underneath paved areas or concrete slabs. Refer to specification Section 02300 – Earthwork, for other unsuitable materials requiring removal.

B. Proof Rolling
   1. Proof rolling shall be done on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. After stripping, excavation and scarifying, proof roll the existing subgrade of the pavement with six (6) passes of a fifteen ton (13.6 metric ton), pneumatic-tired roller. Operate the roller in a systematic manner to ensure the number of passes overall areas, and at speeds between 2 1/2 (4.0) to 3 1/2 (5.6) miles per hour (kilometers per hour).
   2. Proof rolling shall be performed under the observation of a geotechnical engineer and the

Contracting Officer. Notify the Contracting Officer a minimum of three (3) days prior to proof rolling. Upon approval of the sub-grade by the geotechnical engineer, the Contractor may commence backfilling procedures.

3. If the geotechnical engineer does not approve the sub-grade, the contractor shall immediately notify the Contracting Officer of the unsatisfactory condition for further direction.

C. Compaction

1. Compact the prepared subgrade to the density requirements as specified herein as defined in specification Section 02300 - Earthwork.

3.5 REPLACEMENT OF DAMAGED AREAS

A. Provide in accordance with specification Section 02111 - Selective Site Demolition.

3.6 BACKFILL AND COMPACTION OF SOIL MATERIALS

A. Once it is established by the Testing Agency that the sub-grade is suitable for backfill, the Contractor shall proceed with backfilling in accordance with specification Section 02300 - Earthwork.

3.7 DRAINAGE / DEWATERING

A. Construction facilities and controls required shall comply with Section 01500 – Temporary Facilities and Controls.

B. Dispose of surface water which may accumulate in open excavations, unfinished fills, or other low areas. Surface dewatering shall include rerouting of any storm water runoff or natural drainage if necessary.

C. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction.

D. Rework by the contractor due to insufficient drainage / dewatering techniques during construction shall be performed at no additional expense to the AAFES.

3.8 FINISHED EXCAVATION AND FILLS

A. All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth graded. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The degree of finish shall be that ordinary obtainable from blade-grader operations, except as otherwise specified. Surface shall be finished not more than 0.10 foot (0.03 M) above or below the established grade.

3.9 FIELD QUALITY CONTROL

A. Specification Section 01400 - Quality Control: Field inspection and testing.

B. Provide for visual inspection of bearing surfaces.

3.10 SPOILS

A. Any earth left over from the various sections shall be removed in accordance with specification Section 02111 Selective Site Demolition paragraph entitled “Disposal”.

END OF SECTION

SECTION 02300 - EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Soil Materials
2. Excavating for building foundations, slabs-on-grade, paving, curbs and gutters, landscaping and site utilities.
3. Removal of overburden
4. Fill under slabs-on-grade and paving.
5. Consolidation and compaction.
6. Fill for over-excavation.
7. Backfilling and compaction of building and site structures.
8. Utility Pipe Bedding
9. Excavating, backfilling and compacting trenches for utilities from 5 feet outside building to tie to existing utilities.

1.2 DEFINITIONS

A. Backfill – Soil or crushed stone used to fill the space between the excavation and the exterior of a structure or around the foundation walls to provide a means for water to drain away from the foundation.

B. Fill – Soil, crushed stone or overburden material used to raise an existing grade or as a man-made deposit.

C. Utility – Any buried pipe, duct, conduit or cable.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO)
1. AASHTO T 180 - Moisture-Density Relations of Soils Using a 10-lb Rammer and an 18-in. Drop.

B. ASTM International
1. ASTM D 1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
2. ASTM D 698 - Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400 ft-lbf/cu. ft.
3. ASTM D 2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
4. ASTM D2487 - Classification of Soils for Engineering Purposes.
5. ASTM D 2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D 3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

C. Maryland Department of Transportation, State Highway Administration
1. Standard Specifications for Construction and Materials.
a. The provisions for method of measurement and payment do not apply.
b. Reference to “Engineer” and “State” shall be interpreted to mean “Contracting Officer” and “Federal Government” respectively.

1.4 SUBMITTALS

A. All submittals shall be in accordance with Section 01310.

B. Samples:
1. Submit 10 pound samples of existing soil and each type of fill to testing laboratory.
2. All sample containers shall be identified with the name of the material source.

1.5 SOURCE QUALITY CONTROL

A. Specification Section 01400 - Quality Control and specification Section 01410 - Testing Services: Testing and analysis of soil material.

B. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D 698 and ASTM D2487.

C. Testing and Analysis of Topsoil Material: Composition testing as specified herein.

D. If tests indicate materials do not meet specified requirements, change material and retest.

E. Provide materials of each type from same source throughout the Work.

1.6 GEOTECHNICAL REPORT

The Geotechnical Report for the project can be found in Specification Section 02050 “Geotechnical Report”. The Geotechnical Report offers detailed information and recommendations concerning the soils at the time of the field investigation. The contractor shall review the geotechnical report and construct accordingly.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Source: Materials classified below as Backfill and Fill Material, and Select Material shall be obtained from source outside of Fort Meade. For additional requirements, refer to specification Section 01150 – Requirements the Installation.

B. Soil Materials: Free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and deleterious or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

C. Common Fill: Approved, unclassified soil material with the characteristics required to compact to the soil density specified for the intended location.

D. Backfill and Fill Material: ASTM D 2487, classification GW, GP, GM, GC, SW, SP, SM and SC with a maximum ASTM D 4318 liquid limit of 35, maximum ASTM D 4318 plasticity index of 12, and a maximum of 25 percent by weight passing ASTM D 1140, No. 200 sieve.

E. River Rock: 3” – 5” River Rock, grey to brown in color.

F. Select Material: ASTM D 2487, classification GW, GP, SW, SP.

G. Existing Soil Material: See specification Section 02050 - Geotechnical Report for additional information.

2.2 TOPSOIL MATERIALS

A. Existing Soil: Modify existing soil to conform to the requirements specified in paragraph entitled "Composition."

B. On-Site Topsoil: Reuse surface soil stripped and stockpiled on site if requirements specified for topsoil in paragraph entitled "Composition" are met.

C. Off-Site Topsoil: Conform to requirements specified in paragraph entitled "Composition." Additional topsoil shall be furnished by the contractor.

D. Composition: Containing from 5 to 20 percent organic matter. Maximum particle size, 3/4 inch, with maximum 3 percent retained on 1/4 inch screen. Other components shall be within the following percentages:

Silt	25-50
Clay	10-30
Sand	20-35
pH	5 to 7.6
Soluble Salts	600 ppm maximum

2.3 UNSUITABLE MATERIALS

A. In-Situ soil or other material which can be identified as having insufficient strength characteristics or stability to carry intended loads in the trench without excessive consolidation or loss of stability. Also backfill material which contains refuse, frozen material, large rocks, debris, soluble particles, and other material which could damage the pipe or cause the backfill not to compact.

B. Vegetation, debris, decayed vegetable matter, sod, mulch, and rubbish underneath paved areas or

concrete slabs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

C. Protect bench marks, survey control points, existing structures, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.2 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Newly graded areas shall be protected from traffic, erosion, and any settlement or washing away that may occur from any cause, prior to acceptance. Damaged areas shall be repaired and grades re-established to the required elevations and slopes at no additional cost to AAFES until such time that newly planted vegetation has stabilized the slopes.

C. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

3.3 SUB-GRADE PREPARATION

A. Proof Rolling

1. Proof rolling shall be done on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. After stripping, excavation and scarifying, proof roll the existing subgrade of the pavement with six (6) passes of a fifteen ton, pneumatic-tired roller. Operate the roller in a systematic manner to ensure the number of passes overall areas, and at speeds between 2 1/2 to 3 1/2 miles per hour).
2. Proof rolling shall be performed under the observation of a geotechnical engineer and the Architect. Notify the Architect a minimum of three (3) days prior to proof rolling. Upon approval of the sub-grade by the geotechnical engineer, the Contractor may commence backfilling procedures.
3. If the geotechnical engineer does not approve the sub-grade, the contractor shall immediately notify the Architect of the unsatisfactory condition for further direction.

B. Compaction

1. Compact the prepared subgrade to the density requirements as specified herein.

3.4 EXCAVATING

A. Underpin adjacent structures which may be damaged by excavating work.

B. Excavate existing soils to accommodate building foundations, slabs-on-grade, paving and site structures, and construction operations, and detention basins.

C. Excavate sufficiently outside the finished lines of walls to allow for placement and removal of forms where required.

D. Slope banks with machine to angle of repose or less until shored.

E. Shore and brace where sloping is not possible because of space restrictions or stability of existing soil.

F. Do not interfere with 45 degree bearing splay of foundations.

G. Grade top perimeter of excavating to prevent surface water from draining into excavation.

H. Level off bottom of all excavations for foundations to exact depth. All foundations must be placed on undisturbed earth or compacted fill, unless otherwise directed by the Architect. Areas of over-excavation shall be brought to correct level using lean concrete (1000 psi) or approved fill material compacted to 95% in accordance with ASTM D 698.

I. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

J. Any existing drainage or utility lines which may be uncovered and/or broken or destroyed shall be repaired and protected at the contractor's expense to the satisfaction of the Architect.

3.5 STOCKPILING

A. Stockpile excavated material in area designated on site.
   1. Stockpile in sufficient quantities to meet Project schedule and requirements.
   2. Separate differing materials with dividers or stockpile apart to prevent mixing.
   3. Prevent intermixing of soil types or contamination.

B. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

C. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

3.6 DRAINAGE/DEWATERING

A. Dispose of surface water which may accumulate in open excavations, unfinished fills, or other low areas. Surface dewatering shall include rerouting of any storm water runoff or natural drainage if necessary.

B. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing or excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction.

C. Rework by the contractor due to insufficient drainage / dewatering techniques during construction shall be performed at no additional expense to the AAFES.

3.7 UTILITY TRENCHING

A. Excavation:
   1. Trenches shall be of the necessary width for proper laying of pipe, cables, or ducts.
   2. The banks of trenches shall be as nearly vertical as practicable. Shore and brace where sloping is not possible because of space restrictions or stability of existing soil.
   3. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or suitable for backfill shall be piled as necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods.
   4. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each section of the pipe on undisturbed soil at every point along its entire length, except for the portions of pipe sections where it is necessary to excavate for bedding bell holes and for the proper sealing of pipe joints, and as hereinafter specified.
   5. Bell holes and depressions for joints shall be dug after the trench bottom has been graded, and in order that the pipe rest on the prepared bottom for as nearly its full length as practicable. Bell holes and depressions shall be only of such length, depth, and width as required for properly making the particular type of joint.
   6. Stone and rubble shall be removed as necessary to avoid point bearing.
   7. Except as hereinafter specified for wet or otherwise unstable material, overdepths shall be backfilled with materials specified for backfilling the lower portion of trenches.
   8. Whenever wet or otherwise unstable material that is incapable of properly supporting the pipe is encountered in the bottom of the trench, such material shall be overexcavated to a depth to allow for construction of a stable pipe bedding. The trench shall be backfilled to the proper grade with suitable approved materials.

B. Utility Pipe Bedding:
   1. Provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Backfill to top of pipe shall be compacted to 95 percent of ASTM D 698 maximum density. Plastic piping shall have bedding to spring line of pipe. Provide ASTM D 2321 materials as follows:
   2. Class I: Angular, 0.25 to 1.5 inches, graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.
   3. Class II: Coarse sands and gravels with maximum particle size of 1.5 inches, including various graded sands and gravels containing small percentage of fines, generally granular and non-cohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as

specified in ASTM D 2487.

3.8 BACKFILLING

A. Backfill excavations as promptly as work permits, but not until completion of the following:
   1. Acceptance of construction below finish grade including, where applicable, waterproofing and perimeter insulation.
   2. Inspection, testing, approval and recording locations of underground utilities.
   3. Removal of concrete formwork.
   4. Removal of all shoring and bracing, and backfilling of voids with satisfactory materials.
   5. Removal of trash and debris
   6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

B. Backfill areas to contours, and elevations and dimensions indicated. Compact each lift before placing overlaying lift.

C. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

D. Common Fill: Place and compact materials in equal continuous layers as specified herein. Compact areas not accessible to rollers or compactors with mechanical hand tampers. Aerate material excessively moistened by rain to satisfactory moisture content. Finish to a smooth surface by blading, rolling with a smooth roller or both.

E. Backfill and Fill Material and Select Material: Place and compact materials in place backfill material adjacent to structured as the structural elements are completed and accepted. Backfill against concrete only when approved. Place and compact material to avoid loading upon or against structures.

F. Aggregate Base: Place and compact materials as specified in specification Section 02740 – Bituminous Paving.

G. Place topsoil in equal continuous layers as specified herein and where indicated. Take care to prevent wedging action of backfill against structures or displacement of utilities.

H. Employ a placement method that does not disturb or damage other work.

I. Maintain optimum moisture content of materials to attain required compaction density.

J. Backfill against supported foundation walls and structures. Do not backfill against unsupported foundation walls and structures

K. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

L. Provide a positive grade away from building a minimum 2 inches in 10 ft, unless noted otherwise.

M. Make gradual grade changes. Blend slope into level areas.

N. Remove surplus imported backfill materials completely off of government property.

O. Leave fill material stockpile areas free of excess fill materials.

3.9 COMPACTION

A. Compact subgrade to the density requirements specified herein. Compaction shall be accomplished with soil having a moisture content within 2% of optimum moisture content.

B. Immediately Adjacent to Building Foundations
   1. Fill Type: Select material to subgrade elevation, each 6 inch lift, compacted to 95 percent of the maximum dry density as determined by the ASTM D-698 method of compaction.

C. Fill Under Grass Areas and under Sidewalks:
   1. Fill Type: Common Fill, to bottom of walk and to bottom of topsoil, each 8 inch lift, compacted to 90 percent of the maximum dry density as determined by the ASTM D-698 method of compaction.
   2. Fill Type: Topsoil, compacted to 90 percent of the maximum dry density as determined by the ASTM D-698 method of compaction.

D. Fill Under Landscaped Areas:
   1. Fill Type: Common Fill, to bottom of topsoil, 8 inch (200 mm) lifts, compacted to 90 percent of

the maximum dry density as determined by the ASTM D-698 method of compaction.

2. Fill Type: Topsoil, compacted to 90 percent of the maximum dry density as determined by the ASTM D-698 method of compaction.

E. Subgrade and Fill Under Asphalt, Concrete Slabs on Grade and Concrete Paving:

1. Compact subgrade to 95% of its dry density as determined by ASTM D 698 method of compaction.
2. Backfill and Fill Type: 6 inch lifts, compacted to 95% as determined by ASTM D 698 method of compaction.
3. Select Material: 6 inch lifts, as determined by ASTM D 698 method of compaction

F. Fill Over Initial Backfill:

1. Fill Type: Backfill and Fill Material, to base course under pavements and site slabs on grade. Compact to 95 percent as determined by the ASTM D-698 method of compaction.

3.10 FINISHED EXCAVATION AND FILLS

A. All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth graded. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The degree of finish shall be that ordinary obtainable from blade-grader operations, except as otherwise specified. Surface shall be finished not more than 0.10 foot above or below the established grade.

3.11 DISPOSAL

A. All excess excavated material shall be removed in accordance with Specification Section 02111 – Selective Site Demolition, paragraph entitled “Disposal”

B. Trucks hauling excavated material shall not be loaded beyond their rated load capacity.

3.12 FIELD QUALITY CONTROL

A. The testing services shall be supervised by a Professional Engineer, registered in the State of Maryland.

B. Soil Compaction Testing:

1. The Contractor shall employ and pay for the services of a qualified geotechnical engineering consultant for advice on all earthwork techniques involved in the work. Contractor shall inform the Architect of conditions requiring a variation to the Contract Documents and consult with the Architect regarding disposition of earthwork variations.
2. The Contractor will employ an independent testing agency to perform tests on structural fill for compaction. Tests shall be provided by a laboratory approved and paid for by the Contractor. The Contractor shall provide a 50-pound sample of each material, from each source, to the testing agency five days prior to start of earthwork. Do not place any fill material until laboratory tests confirm material suitable as structural fill.
3. Laboratory Test on soil materials for compaction: ASTM D 698.
4. Laboratory test on structural fill for compaction: ASTM D 698.
5. Contractor shall notify the testing agency and geotechnical engineering consultant sufficiently in advance of operations to allow for their assignment of personnel and scheduling of tests.
6. Testing Agency and geotechnical engineer shall prepare written reports of services performed. Testing Agency shall provide three (3) copies of testing reports to the Architect no later than 10 calendar days from the date testing occurs or test results are obtained.
7. Tests:
   a. Perform tests in areas where compacted fill densities are specified.
   b. Perform tests on sub-grade areas prior to backfilling, and at each layer of compacted fill for every 1000 square feet, or less, of filled area, for areas other than back fill at foundation walls.
   c. Perform tests at undisturbed bearing area and at each layer of compacted fill in bearing area not to exceed 50 feet o.c. at each individual footing.
   d. Perform tests at each layer of compacted backfill at foundation walls; perform tests at locations not to exceed 50 feet o.c.
   e. Perform tests remote from each other and in areas representative of the entire subgrade.
   f. Perform tests at each layer of compacted fill in utility trenches not to exceed 100 feet

o.c.

8. The testing laboratory shall promptly notify Architect and Contractor of irregularities or deficiencies of work which are observed during performance of services. If in the opinion of the Architect additional tests are required beyond those specified and their results indicate compaction less than the percentage density specified, the contractor shall bear the expense of such additional tests ordered.

C. Provide for visual inspection of bearing surfaces.

3.13 TOLERANCES

A. Perform all earthwork to a finished tolerance within plus or minus one tenth of a foot.

END OF SECTION

SECTION 02360 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
   1. Soil treatment for termite control below grade, at interior and exterior foundation perimeter and under concrete slabs-on grade.

1.2 SUBMITTALS

A. General:
   1. Submittals shall be in accordance with SECTION 01310.

B. Product Data:
   1. Termiticides
      a. Manufacturer's label and Material Safety Data Sheet (MSDS) for termiticides proposed for use.

C. Termiticide Application Plan:
   1. Termiticide application plan with proposed sequence of treatment work with dates and times. The termiticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area/volume treated, amount applied; and the name and state license number of the state certified applicator shall be included.
   2. Application Equipment: A listing of equipment to be used.

D. Samples:
   1. Submit, on request, samples of the pesticides used in this work to the AAFES Project Manager, the Installation Pest Management Coordinator (IPMC), or Pest Management Quality Assurance Evaluator (PMQAE) who may draw, at any time and without prior notice, from stocks at the job site. Should analysis, performed by the Installation or AAFES, indicate such samples to contain less than the amount of active ingredient specified on the label, work performed with such products shall be repeated, with pesticides conforming to this specification, at no additional cost to AAFES.

E. Test Reports:
   1. Equipment Calibration and Tank Measurement: Certification of calibration tests conducted on the equipment used in the termiticide application.
   2. Soil Moisture: Soil moisture test result.
   3. Quality Assurance: Pest Management Report and copies of daily records signed by an officer of the Contractor, the IMPC, and the PMQAE. Contact EMD prior to work to obtain copies of necessary reporting forms and instructions regarding how to fill them out.

F. Certificates:
   1. Qualifications and state certification number of the termicide applicator that will be performing the application. Applicator must be certified by Georgia Department of Agriculture in category 30 wood destroying organisms.

G. Verification of Measurement:
   1. Written verification that the volume of termiticide used meets the application rate.

H. Warranty
   1. Copy of Contractor's warranty.

1.3 QUALIFICATIONS

A. The Contractor's principal business shall be pest control. The Contractor shall be licensed and the termiticide applicators certified in the state where the work is to be performed. Termiticide applicators shall also be certified in the U.S. Environmental Protection Agency (EPA) pesticide applicator category which includes structural pest control. The Contractor must possess a Georgia Department of Agriculture business license for termite control. All records, including but not limited to business license, certification of application and liablity insurance, must be submitted prior to application of any pesticide.

B. The Contractor shall:

1. Have personnel with a state of Georgia certification as required. Provide a submittal with the following information to AAFES Project Manager and the IPMC:
   a. Quantity of pesticide used.
   b. Rate of dispersion.
   c. Percent of use.
   d. Total amount used.

C. Check in with the EMD, IPMC or PMQAE prior to application of pesticides.

1.4 SAFETY REQUIREMENTS

A. Formulate, treat, and dispose of termiticides and their containers in accordance with label directions. Draw water for formulating only from sites designated by the Contracting Officer, and fit the filling hose with a backflow preventer meeting local plumbing codes or standards. The filling operation shall be under the direct and continuous observation of a contractor's representative to prevent overflow. Secure pesticides and related materials under lock and key when unattended. Ensure that proper protective clothing and equipment are worn and used during all phases of termiticide application. Dispose of used pesticide containers off Government property.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Termiticide material shall be delivered to the site in the original unopened containers bearing legible labels indicating the EPA registration number and manufacturer's registered uses. All other materials to be used on site for the purpose of termite control shall be delivered in new or otherwise good condition as supplied by the manufacturer or formulator.

B. Materials shall be stored off Post and in accordance with manufacturer's labels. Termiticides and related materials shall be kept under lock and key when unattended.

C. Termiticides shall be handled in accordance with manufacturer's labels. Manufacturer's warnings and precautions shall be observed. Materials shall be handled preventing contamination by dirt, water, and organic material. Protect termiticides from sunlight as recommended by the manufacturer.

1.6 INSPECTION

A. Termiticides shall be inspected upon arrival at the job site for conformity to type and quality in accordance with paragraph Termiticides. Each label shall bear evidence of registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended or under appropriate regulations of the host county. Other materials shall be inspected for conformance with specified requirements. Unacceptable materials shall be removed from the job site.

1.7 WARRANTY

A. The Contractor shall provide a 5-year written warranty against infestations or reinfestations by subterranean termites of the buildings or building additions constructed under this contract. Warranty shall include annual inspections of the buildings or building additions. If live subterranean termite infestation or subterranean termite damage is discovered during the warranty period, and the soil and building conditions have not been altered in the interim, the Contractor shall:

1. Retreat the soil and perform other treatment as may be necessary for elimination of subterranean termite infestation;
2. Repair damage caused by termite infestation; and
3. Re-inspect the building approximately 180 days after the retreatment.

1.8 QUALITY ASSURANCE

A. The Contractor shall comply with 7 USC Section 136 for requirements on contractor's licensing, certification, and record keeping. The Contractor shall maintain daily records using Pest Management Maintenance Record, DD Form 1532-1 and submit copies of records when requested by the Installation and AAFES Project Manager. These forms may be obtained from the main web site: http://web1.whs.osd.mil/icdhome/formsrpt/WWWDDAllbyNumber_1Page10.htm.
Or directly from the following websites:
http://web1.whs.osd.mil/forms/DD1532-1.pdf and
http://web1.whs.osd.mil/forms/DD1532.pdf.

B. Upon completion of this work, submit Pest Management Report. DD Form 1532 identifying target pest, type of operation, brand name and manufacturer of pesticide, formulation, concentration or rate of application used.

PART 2 - PRODUCTS

2.1 TERMITICIDES

A. Termiticides shall be non-repellant. Termiticides shall be currently registered by the EPA or approved for such use by the appropriate agency of the host county. Termiticide shall be selected for maximum effectiveness and duration after application. The selected termiticide shall be suitable for the soil and climatic conditions at the project site. The selected termitcide shall be approved by the IMPC.

PART 3 - EXECUTION

3.1 TECHNICAL REPRESENTATIVE

A. The certified Pest Management Quality Assurance Evaluator (PMQAE), shall be present at all meetings concerning treatment measures for subterranean termites, and must be present during treatment application. The command Pest Control Coordinator IMPC shall be contacted prior to starting work.

3.2 SITE PREPARATION

A. Site preparation shall be in accordance with SECTIONS 02100 SITE PREPARATION, 02300 EARTHWORK, and 02920 LAWNS AND GRASSES. Work related to final grades, landscape plantings, foundations, or any other alterations to finished construction which might alter the condition of treated soils, shall be coordinated with this specification.

B. Food sources shall be eliminated by removing debris from clearing and grubbing and post construction wood scraps such as ground stakes, form boards, and scrap lumber from the site, before termiticide application begins.

C. Before work starts, the Contractor shall verify that final grades are as indicated and smooth grading has been completed in accordance with Section 02300 Earthwork. Soil particles shall be finely graded with particles no larger than 1 inch and compacted to eliminate soil movement to the greatest degree.

D. The Contractor shall provide written verification that final grading and landscape planting operations will not disturb treatment of the soil on the exterior sides of foundation walls, grade beams, and similar structures.

E. The Contractor shall provide written verification that the location and identity of HVAC ducts and vents, water and sewer lines, and plumbing have been accomplished prior to the termiticide application.

F. The Contractor shall provide written verification that the location and identity of crawl and plenum air spaces have been accomplished prior to the termiticide application.

3.3 SITE CONDITIONS

A. The following conditions shall determine the time of application.

1. Soil Moisture: Soils to be treated shall be tested immediately before application. Soil moisture content shall be tested to a minimum depth of 3 inches. The soil moisture shall be as recommended by the termiticide manufacturer. The termiticide will not be applied when soil moisture exceeds manufacturer's recommendations because termiticides do not adhere to the soil particles in saturated soils.
2. Runoff and Wind Drift: Termiticide shall not be applied during or immediately following heavy rains. Applications shall not be performed when conditions may cause runoff or create an environmental hazard. Applications shall not be performed when average wind speed exceeds 10 miles per hour. The termiticide shall not be allowed to enter water systems, aquifers, or endanger humans or animals.
3. Vapor Barriers and Waterproof Membranes: Termiticide shall be applied prior to placement of a vapor barrier or waterproof membrane.
4. Utilities and Vents: Prior to application, HVAC ducts and vents located in treatment area shall be turned off and blocked to protect people and animals from termiticide.
5. Placement of Concrete: Concrete covering treated soils shall be placed as soon as the

termiticide has reached maximum penetration into the soil. Time for maximum penetration shall be as recommended by the manufacturer.

3.4 TERMITICIDE TREATMENT

A. The Contractor shall submit a Termiticide Application Plan to the Facility's Environmental Management Division, Pesticide Department for review and approval before starting the specified treatment.

B. Equipment Calibration and Tank Measurement: Immediately prior to commencement of termiticide application, calibration tests shall be conducted on the application equipment to be used and the application tank shall be measured to determine the volume and contents. These tests shall confirm that the application equipment is operating within the manufacturer's specifications and will meet the specified requirements. The Contractor shall provide written certification of the equipment calibration test results within 1 week of testing.

C. Mixing and Application: Formulating, mixing, and application shall be performed in the presence of the Contracting Officer or the technical representative and the PMQAE. A closed system is recommended as it prevents the termiticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying termiticides shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

D. Treatment Method: For areas to be treated, the Contractor shall establish complete and unbroken vertical and/or horizontal soil poison barriers between the soil and all portions of the intended structure which may allow termite access to wood and wood related products. Application shall not be made to areas which serve as crawl spaces or for use as a plenum air space. The treatment method shall comply with the provisions of Georgia Rules of Structural Pest Control.

E. Surface Application: Surface application shall be used for establishing horizontal barriers. Surface applicants shall be applied as a coarse spray and provide uniform distribution over the soil surface. Termiticide shall penetrate a minimum of 1 inch into the soil, or as recommended by the manufacturer.

F. Rodding and Trenching: Rodding and trenching shall be used for establishing vertical soil barriers. Trenching shall be to the depth of the foundation footing. Width of trench shall be as recommended by the manufacturer, or as indicated. Rodding or other approved method may be implemented for saturating the base of the trench with termiticide. Immediately after termiticide has reached maximum penetration as recommended by the manufacturer, backfilling of the trench shall commence. Backfilling shall be in 6 inch rises or layers. Each rise shall be treated with termiticide.

G. Sampling: The Contracting Officer or the PMQAE may draw from stocks at the job site, at any time and without prior notice, samples of the termiticides used to determine if the amount of active ingredient specified on the label is being applied.

3.5 VERIFICATION OF MEASUREMENT

A. Once termiticide application has been completed, tank contents shall be measured to determine the remaining volume. The total volume measurement of used contents for the application shall equal the established application rate for the project site conditions. The Contractor shall provide written verification of the measurements.

3.6 CLEAN UP, DISPOSAL, AND PROTECTION

A. Once application has been completed, the Contractor shall proceed with clean up and protection of the site without delay.

B. Clean Up: The site shall be cleaned of all material associated with the treatment measures, according to label instructions, and as indicated. Excess and waste material shall be removed and disposed off of Government property.

C. Disposal of Termiticide: The Contractor shall dispose of residual termiticides and containers off Government property, and in accordance with label instructions and EPA criteria.

D. Protection of Treated Area: Immediately after the application, the area shall be protected from other use by erecting barricades and providing signage as required or directed. Signage shall be placed

inside the entrances to crawl spaces and shall identify the space as treated with termiticide and not safe for children and animals.

3.7 CONDITIONS FOR SATISFACTORY TREATMENT

A. Equipment Calibrations and Measurements: Where results from the equipment calibration and tank measurements tests are unsatisfactory, re-treatment will be required.

B. Testing: Should an analysis, performed by a third party, indicate that the samples of the applied termiticide contain less than the amount of active ingredient specified on the label, and/or if soils are treated to a depth less than specified or approved, re-treatment will be required.

C. Disturbance of Treated Soils: Soil and fill material disturbed after treatment shall be re-treated before placement of slabs or other covering structures.

D. Termites Found Within the Warranty Period: If live subterranean termite infestation or termite damage is discovered during the warranty period, the Contractor shall re-treat the site.

3.8 RE-TREATMENT

A. Where re-treatment is required, the Contractor shall comply with the requirements specified in paragraph Warranty.

END OF SECTION

SECTION 02505 – MANHOLES AND COVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
   1. Monolithic precast concrete manholes and /or masonry manholes with transition to lid frame, covers, anchorage, and accessories.

1.2 REFERENCES

A. American Association of State Highway and transportation Officials (AASHTO)
   1. AASHTO M198 - (1990;R 1993) Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets.

B. American Concrete Pipe Association
   1. ACPA 01-102 - (1988) Concrete Pipe Handbook
   2. ACPA 01-103 - (1990) Concrete Pipe Installation Manual

C. ASTM International
   1. ASTM A 497 - Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
   2. ASTM A 615/A 615/M - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
   3. ASTM C 32 - Sewer and Manhole Brick (Made from Clay or Shale)
   4. ASTM C 62 - Building Brick (Solid Masonry Units Made From Clay or Shale)
   5. ASTM C 76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
   6. ASTM C 139 - Concrete Masonry Units for Construction of Catch Basins and Manholes
   7. ASTM C 270 - Mortar for Unit Masonry
   8. ASTM C 443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
   9. ASTM C 476 - Grout for Masonry
   10. ASTM C 478 - Precast Reinforced Concrete Manhole Sections
   11. ASTM D 3212 - Joints for Drain and Sewer Plastic Pipes Using Flexible Elastometric Seals.
   12. ASTM D 4101 - Propylene Plastic Injection and Extrusion Materials
   13. ASTM F 477 - Elastometric Seals (Gaskets) for Joining Plastic Pipe
   14. ASTM F 794 - Polyvinyl Chloride (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

D. Federal Register
   1. 29 CFR 1910.27 - Fixed Ladders

E. Federal Specification
   1. CID A-A-60005 - Frames, Covers, Gratings, Steps, Sump and Catch Basin, Manhole

1.3 SUBMITTALS

A. All submittals shall be in accordance with Section 01310

B. Product Data: Provide manhole covers, component construction, features, and configuration.

C. Shop Drawings: Indicate manhole locations, elevations, sizes and elevations of penetrations.

D. Shop Drawings for all Structure Types.

E. As-Built Survey indicating Manhole and Pipe locations and Inverts.

F.Certify that materials comply with specification requirements.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material with manufacture's tags and labels intact.

B. Handle and store so as to avoid damage.

PART 2 - PRODUCTS

2.1 MANHOLE SECTIONS

A. Drainage Structures: Shall be Precast Concrete Structures: ASTM C 478, except as specified herein. Provide an air content of 6 percent, plus or minus 3 percent and a minimal wall thickness of 5 inches. ASTM A 615/A 615M reinforcing bars. ASTM A 497 welded wire fabric. ASTM C 443 or AASHTO M 198, Type B gaskets for joint connections. Provide a 4-inch layer of clean gravel bedding with a maximum size of 2 inches.

B. Grout: ASTM C 476.

2.2 METAL ITEMS

A. Frames, Covers and Gratings: Traffic rated. Dimension as indicated.

B. Drainage Structure Steps: Zinc-coated steel conforming to ANSI A14.3. Plastic or rubber coating pressure-molded to the steel. Plastic coating shall conform to ASTM D 4101, copolymer polypropylene. Rubber shall conform to ASTM C 443, except shore A durometer hardness shall be 70, plus or minus 5. Steps are not required in manholes, curb inlets or catch basins less than 4 feet in depth.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location, and ready for roughing into Work.

C. Verify excavation for manholes is correct.

3.2 PREPARATION

A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

3.3 PLACING MANHOLE SECTIONS

A. Place manhole cylinder plumb and level, to correct dimensions and elevations.

B. Cut and fit for pipe.

C. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.

D. Set cover frames and covers level without tipping, to correct elevations.

E. Coordinate with other sections of work to provide correct size, shape, and location.

3.4 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

A. Location: The work covered by this section shall terminate at a point approximately 5 feet from the building.

B. Manhole, Construction: Use precast concrete base sections. Make inverts of precast concrete bases with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent drainage sections. For precast concrete construction, make joints between sections with the gaskets specified for this purpose; install in the manner specified for installing joints in concrete piping. Give a smooth finish to inside joints of precast concrete manholes, curb inlets and catch basins. Parging will not be required for precast concrete manholes. Make joints between concrete manholes and pipes entering manholes mortared to produce a watertight joint; install in accordance with the recommendations of the connector manufacturer. Where a new manhole is constructed on an existing line, remove existing pipe as required to construct the manhole. Cut existing pipe so that pipe ends are approximately flush with the interior face of manhole wall, but not protruding beyond into the manhole.

C. Metal Work: Perform metal work so that workmanship and finish will be equal to the best practices in modern structural shops and foundries. Form iron to shape and size with sharp lines and angles. Do shearing and punching so that clean true lines and surfaces are produced. Make casting sound and free from warp, cold shuts and blow holes that may impair their strength or appearance. Give exposed surfaces a smooth finish with sharp well-defined lines and arises. Provide rabbets, lugs and brackets wherever necessary for fitting and support.

D. Field Painting of Metal Work: After installation, clean cast-iron frames, covers, gratings and steps not buried in masonry or concrete to bare metal of mortar, rust, grease, dirt and other deleterious materials and apply a coat of bituminous paint.

END OF SECTION

SECTION 02510 - WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work of this Section includes the following:

1. Water Distribution Specifications of American Water

SECTION 33 01 10.13

PRESSURE AND LEAKAGE TESTS

PART 1 GENERAL

1.01 SCOPE OF WORK

Test all piping, valves, and appurtenances installed under these Contract Documents. Testing shall be performed concurrent with installation. Do not install more than 1,200 feet of pipe without being tested, unless approved by AW.

1.02 SUBMITTALS

Prepare and submit schedules and procedures to AW for testing of all parts of the water main installed in accordance with these Contract Documents. Submit the schedule at least seven days prior to any testing.

PART 2 PRODUCTS

1.01 EQUIPMENT

Furnish the pump, pipe connections, and all necessary apparatus for the pressure and leakage tests including gauges and metering devices. AW reserves the option to furnish the gauges and metering devices for the tests. Excavate, backfill, and furnish all necessary assistance for conducting the tests.

PART 3 EXECUTION

1.01 GENERAL

A. Perform hydrostatic pressure and leak tests in accordance with AWWA C600, Section 4 - Hydrostatic Testing after the pipe or section of pipe has been laid, thrust blocking cured (min. 5 days), and the trench is completely or partially backfilled. Where practical, testing shall be performed fully isolated from the active distribution system.

B. The Contractor may, at his option, completely backfill the trench or partially backfill the trench over the center portion of each pipe section to be tested. However, AW may direct the Contractor to completely backfill the trench if local traffic or safety conditions require.

SECTION 33 01 10.15

DISINFECTING PIPELINES

PART 1 GENERAL

1.01 SCOPE OF WORK

Flush and disinfect all pipelines installed under this Contract if indicated in the summary of work. This would include furnishing the necessary labor, tools, transportation, and other equipment for the operation of valves, hydrants, and blowoffs during the chlorination. Install, and if directed remove, all chlorination taps required for disinfection. The cost of this work shall be included in the bid item for pipe installation. The disinfection will be performed under the supervision of AW.

1.02 WORK BY OWNER

AW reserves the option to provide/furnish the chlorine and chlorination equipment. AW will furnish water for testing, flushing and disinfecting pipelines. AW will also reserve the right to perform bacteriological testing and may collect the sample.

1.03 PROTECTION

Chlorine disinfection and dechlorination shall be under the direct supervision of someone familiar with the physiological, chemical, and physical properties of the form of chlorine used. They shall be trained and equipped to handle any emergency that may arise. All personnel involved shall observe appropriate safety practices to protect working personnel and the public.

The forwards of AWWA Standards B300 and B301 contain information and additional reference material regarding the safe handling of hypochlorites and liquid chlorine. The Contractor shall familiarize himself with this information prior to performing any disinfection work.

1.04 RELATED WORK

Observe the precautions described in Specification Section 33 11 00 to avoid contamination during installation of the pipeline.

1.05 REFERENCES

Refer to current AWWA Standard for Disinfecting Water Mains C651.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Furnish liquid chlorine and injection equipment and/or calcium hypochlorite (HTH) as needed to disinfect all pipelines and appurtenances.

B. Liquid chlorine contains 100% available chlorine and is packaged in steel containers, usually of 100 lb, 150 lb, or 1 ton net chlorine weight. Liquid chlorine is to be furnished in accordance with AWWA B301.

C. Calcium hypochlorite is available in granular form or in approximately 5-g tablets, and contains approximately 65% available chlorine by weight. The material should be stored in a cool, dry, and dark environment to minimize its deterioration. Do not use calcium hypochlorite intend for swimming pool disinfection, as this material (containing trichloroisocyanuric acid) has been sequestered and is extremely difficult to eliminate from the pipe after the desired contact time had been achieved.

D. Calcium hypochlorite must conform to AWWA B300.

PART 3 EXECUTION

3.01 PREPARATION

All pipelines shall be pressure and leak tested, flushed, and cleaned of debris and dirt prior to application of the disinfectant. Flushing shall continue until the volume in the newly installed main has turned over at least one time unless AW determines that conditions do not permit the required volume to be safely discharged to waste.

3.02 APPLICATION OF DISINFECTANT

Methods to be used for disinfection are those detailed in ANSI/AWWA C651 Disinfecting Water Mains.

3.03 WATER MAINS

Three (3) methods of chlorination are described below. The third method, using tablets of hypochlorite, is only permitted by expressed approval of AW and under no circumstance allowed for projects of 2000 feet or more. Otherwise, information in the forward of AWWA Standard C651 will be helpful in determining the best method to be used.

A. Continuous Feed Method

1. Set up

The continuous feed method consists of completely filling the main to remove all air pockets, flushing the completed main to remove particulates, and then refilling the main with chlorinated potable water. The potable water shall be chlorinated, so that after a 24-hour holding period in the main, there will be a free chlorine residual of not less than 10 mg/L in collected samples.

Chlorine can be applied in advance of preliminary flushing by swabbing joints with bleach or placing hypochlorite granules in the pipe in areas where contamination is suspected. In any such case, the contractor shall make sure and take appropriate action to make sure that the flushed water is dechlorinated.

Preliminary flushing. Prior to being chlorinated, fill the main to eliminate air pockets and flush to remove particulates. The flushing velocity in the main shall be not less than 2.5 fps unless the Engineer determines that conditions do not permit the required flow to be discharged to waste. Table 1 shows the rates of flow required to produce a velocity of 2.5 fps in pipes of various sizes.

NOTE: Flushing is no substitute for preventive measures during construction. Certain contaminants such as caked deposits resist flushing at any feasible velocity.

TABLE 1
Required Flow and Openings to Flush Pipelines
(40 psi Residual Pressure in Water Main)*

Pipe Diameter (inches)	Flow required to produce 2.5 fps velocity in main (gpm)	Size of Tap. (inches) 1	1-1/2	2	Number of Hydrant Outlets To Use
		Number of taps on Pipe†			
4	100	1	-	-	1
6	200	-	1	-	1
8	400	-	2	1	1
10	600	-	3	2	1
12	900	-	-	2	2
16	1600	-	-	4	2

*With a 40 psi pressure in the main with the hydrant flowing to atmosphere, a 2½-inch hydrant outlet will discharge approximately 1,000 gpm and a 4½-inch hydrant outlet will discharge approximately 2,500 gpm.

† Number of taps on pipe based on discharging through 5 feet of galvanized iron pipe with one 90 degree elbow.

In mains of 24-inches or larger diameter, an acceptable alternative to flushing is to broom-sweep the main, carefully removing all sweepings prior to chlorinating the main.

2. Chlorinating the Main.

a. Flow water from the existing distribution system or other approved source of supply at a constant, measured rate into the newly laid water main. In the absence of a meter, approximate the rate by placing a pitot gauge in the discharge or measuring the time to fill a container of known volume.

b. At a point not more than 10 feet downstream from the beginning of the new main, dose the water entering the new main with chlorine fed at a constant rate such that

the water will have not less than 25 mg/L free chlorine. Measure the chlorine concentration at regular intervals to ensure that this concentration is provided. Measure chlorine in accordance with the procedures described in the current edition of the AWWA Manual M12 or of *Standard Methods for the Examination of Water and Wastewater*.

c. Table 2 gives the amount of chlorine required for each 100 feet of pipe of various diameters. Solutions of 1 percent chlorine may be prepared with calcium hypochlorite. The solution requires 1 pound of calcium hypochlorite in 8 gallons of water.

TABLE 2
Chlorine Required to Produce 25 mg/L
Concentration in 100 feet of Pipe by Diameter

Pipe Diameter inches	100 Percent Chlorine lbs	1 Percent Chlorine Solutions gallons
4	0.013	0.16
6	0.030	0.36
8	0.054	0.65
10	0.085	1.02
12	0.120	1.44
16	0.217	2.60

d. During the application of chlorine, position valves so that the strong chlorine solution in the main being treated will not flow into water mains in active service. Do not stop the chlorine application until the entire main is filled with heavily chlorinated water. Keep the chlorinated water in the main for at least 24 hours. During this time, operate all valves and hydrants in the section treated in order to disinfect the appurtenances. At the end of this 24-hour period, the treated water in all portions of the main shall have a residual of not less than 10 mg/L free chlorine.

e. Hypochlorite solution may be applied to the water main with a gasoline or electrically powered chemical

feed pump designed for feeding chlorine solutions. Feed lines shall be of such material and strength as to safely withstand the corrosion caused by the concentrated chlorine solutions and the maximum pressures that may be created by the pumps. Check all connections shall for tightness before the solution is applied to the main.

f. If gaseous chlorine in solution is permitted by the Engineer and proposed by the contractor, the preferred equipment for the gas application employs a feed vacuum-operated chlorinator to mix the chlorine gas, in combination with a booster pump for injecting the chlorine gas solution water into the main to be disinfected. Direct feed chlorinators cannot be used. (A direct feed chlorinator is one which operates solely from the pressure in the chlorine cylinder.)

B. Slug Method

1. Setup

a. The slug method consists of placing calcium hypochlorite granules in the main during construction; completely filling the main to eliminate all air pockets, flushing the main to remove particulates, and slowly flowing a slug of water containing 100 mg/L of free chlorine through the main so that all parts of the main and its appurtenances will be exposed to the highly chlorinated water for a period of not less than 3 hours.

2. Chlorinating the main.

a. At the option of AW, place calcium hypochlorite granules in the main during construction. The purpose of this procedure is to provide a strong chlorine concentration in the first flow of flushing water especially to fill annular spaces in pipe joints. Flush the main to eliminate air and remove particulates to include management of dechlorination and discharged water.

b. At a point not more than 10 feet downstream from the beginning of the new main, dose the water entering the new main with chlorine fed at a constant rate such that the water will have not less than 100 mg/L free chlorine. Measure the chlorine concentration at regular intervals to ensure that this concentration is provided. Measure chlorine in accordance with the procedures described in the current edition of the AWWA Manual M12 or of *Standard Methods for the Examination of Water and Wastewater*. The chlorine shall be applied continuously and for a sufficient period to develop a solid column or "slug" of chlorinated water that will, as it moves through the main, expose all interior surfaces to a concentration of approximately 100 mg/L for at least 3 hours.

c. The free chlorine residual shall be measured in the slug as it moves through the main. If at any time it drops below 50 mg/L, stop the flow, relocate the chlorination equipment to the head of the slug, and as flow is resumed, apply chlorine to restore the free chlorine in the slug to not less than 100 mg/L.

d. As the chlorinated water flows past fittings and valves, operate related valves and hydrants so as to disinfect appurtenances and pipe branches.

C. <u>Tablet Method</u>

1. Setup
   a. The tablet method consists of adhering calcium tablets in the water main as it is being installed and then filling the main with potable water when installation is completed. This method may be used only if the pipes and appurtenances are kept clean and dry during construction and with permission by AW for short main installations.
2. Chlorinating the Main –
   a. Placing of calcium hypochlorite tablets - *Placing of calcium hypochlorite tablets.* During construction, 5-g calcium hypochlorite tablets shall be placed in each

section of pipe. Also, one such tablet shall be placed in each hydrant, hydrant branch, and other appurtenance. The number of 5-g tablets required for each pipe section shall be *0.0012* d^2L rounded to the next higher integer, where *d is* the inside pipe diameter, in inches, and L is the length of the pipe section, in feet. Table *1* shows the number of tablets required for commonly used sizes of pipe. The tablets shall be attached by a food-grade NSF approved adhesive. There shall be no adhesive on the tablet except on the broadside attached to the surface of the pipe and no adhesive applied or spilled on the pipe surface. Excess adhesive must be removed immediately using mechanical means or an NSF approved adhesive solvent. Attach all the tablets inside and at the top of the main, with approximately equal numbers of tablets at each end of a given pipe length. If the tablets are attached before the pipe section is placed in the trench, their position shall be marked on the section so it can be readily determined that the pipe is installed with the tablets at the top.

		Length of Pipe Section, ft (m)				
Pipe Diameter		**13(4.0) or less**	**18(5.5)**	**20(6.1)**	**30(9.1)**	**40(12.2)**
in.	(*mm*)	Number of 5-g Calcium Hypochlorite Tablets				
6	(150)	1	1	1	2	2
8	(200)	1	2	2	3	4
12	(300)	3	4	4	6	7
16	(400)	4	6	7	10	13

b. *Filling and contact.* When installation has been completed, the main shall be filled with water at a rate such that water within the main will flow at a velocity no greater than 1 ft/s (0.3 m/s). Precautions shall be taken to ensure that air pockets are eliminated. This water shall

remain in the pipe for at least 24 hours. If the water temperature is less than 41°F (5°C), the water shall remain in the pipe for at least 48 hours.

3.04 DISPOSAL OF HEAVILY CHLORINATED WATER

A. Do not keep heavily chlorinated water in contact with pipe for more than 48 hours after the applicable retention period. In order to prevent damage to the pipe lining or corrosion damage to the pipe itself, flush the heavily chlorinated water from the main fittings, valves, and branches until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the system or is acceptable for domestic use. Take all steps necessary to dechlorinate water where required per section 3.04B and 3.04C below. Contact the local sewer department to arrange for disposal of the heavily chlorinated water to the sanitary sewer if applicable.

B. Neutralize the chlorine residual of the water being disposed of by treating with one of the chemicals listed in Table 3. Select an alternative disposal site if a sanitary sewer system is unavailable for disposal of the chlorinated water.

C. The proposed alternative disposal site shall be inspected and approved of by AW. Apply a reducing agent to the chlorinated water to be wasted to completely neutralize the chlorine residual remaining in the water. (See Table 3 for neutralizing chemicals. Do not overdose neutralizing chemicals as this may result in adverse environmental impacts. Only dose the amount required to neutralize the amount of chlorine present). Contact federal, state and local regulatory agencies, where necessary, to determine special provisions for the disposal of heavily chlorinated water.

Table 3
Pounds of chemicals required to neutralize various residual chlorine concentrations in 100,000 gallons of water.

Residual Chlorine Concentration	Sulfur Dioxide	Sodium Bisulfite	Sodium Sulfite	Sodium Thiosulfate	Ascorbic Acid
mg/L	(SO_2)	($NaHSO_3$)	(Na_2SO_3)	($Na_2S_2O_3 \cdot 5H_2O$)	
1	0.8	1.2	1.4	1.2	2.1
2	1.7	2.5	2.9	2.4	4.2
10	8.3	12.5	14.6	12.0	20.9
50	41.7	62.6	73.0	60.0	104.0

D. Test for chlorine residual throughout the disposal process to be sure that the chlorine is neutralized

E. Submit a plan of disposal of flushed water to AW for approval

3.05 BACTERIOLOGICAL TESTING

A. After final flushing and before the water main is placed in service, the first of two consecutive sets of acceptable samples can be collected from the new main. The second set of samples must be taken at least 24 hours after the first set of samples. The main should not be flushed between collection of the first and second set of samples except to clear the sample site to collect the second sample. At least one set of samples shall be collected from every 1,200 feet, of the new water main, plus one set from the end of the line and at least one set from each branch when possible or as required by regulatory requirements.

B. Samples shall be collected by a person knowledgeable in collecting samples for bacteriological sampling or arrange for the Owner to collect the sample. Coordinate with Owner and submit samples to the Owner for testing of bacteriological (chemical and physical) quality. Testing will be in accordance with Standard Methods of the Examination of Water and Wastewater. Samples shall show the absence of coliform

organisms; and the presence of a chlorine residual. Samples shall also be tested for turbidity, pH, and standard heterotrophic plate count (HPC). HPC levels must be consistent with levels normally found in the distribution system to which the new main is connected.

C. Bacteriological tests must show complete absence of coliforms and acceptable HPCs. If tests show the presence of coliform or unacceptable HPCs, perform additional flushing and disinfection of the pipeline until acceptable tests are obtained, all at no cost to the Owner. The Contractor will not be charged for the additional testing performed by the Owner.

3.06 RETESTING AND TESTING SOURCE WATER

A. At the time of initial flushing the main to remove material and test for air pockets, Contractor may request AW to continue flushing until the desired chlorine residual is met at the discharge point. Notification must be provided in advance and the Contractor shall be prepared to test for chlorine at intervals of no more than five minutes as the water clears. This will provide the Contractor with some assurance that the source water is chlorinated.

B. If the subsequent tests for bacteriological contamination conducted by the Contractor fail, the Contractor may request the Owner to continue flush from the source water into the new pipe system until a chlorine residual is found at the discharge point. Notification must be provided in advance and the Contractor shall be prepared to test for chlorine at intervals of no more than five minutes as the water clears. The operation of all existing system valves shall be by the Owner at the Contractor expense and the discharge point must be opened prior to opening existing valves to avoid contamination. This will provide the Contractor with some assurance that the source water is chlorinated for subsequent tests.

END OF SECTION 33 01 10.15

SECTION 33 05 27

TRACER WIRE

PART 1 GENERAL

1.01 SCOPE

A. Install electrically continuous trace wire with access points as described herein to be used for locating pipe with an electronic pipe locator after installation.

1.02 SUBMITTALS

A. Submit shop drawings and manufacturer's literature to the Engineer for approval in accordance with Specification Section 01 33 00.

PART 2 PRODUCTS

2.01 TRACER WIRE MATERIAL

A. Trace wire to be twelve (12) gauge minimum solid copper with thermoplastic insulation recommended for direct burial. Wire connectors to be 3M DBR, or approved equal, and shall be watertight to provide electrical continuity. Each trace wire access point to be composed of one Copperhead SnakePit Magnetized Tracer Box, Test and Monitoring Station or approved equal installed in each proposed access point.

2.02 TESTING REQUIREMENTS

A. Contractor shall perform a continuity test on all trace wire in the presence of the Engineer or the Engineers' representative. If the trace wire is found to be not continuous after testing, Contractor shall repair or replace the failed segment of the wire.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL REQUIREMENTS

A. Trace wire shall be installed on all mains and services. The wire shall be installed in such a manner as to be able to properly trace all mains without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire.

B. Trace wire shall be installed in the same trench and inside bored holes and casing with pipe during pipe installation. It shall be laid in the trench below the pipe and pipe bedding being installed to ensure that the wire is not damaged during future repair operations. The trace wire shall be securely bonded together at all wire joints with an approved watertight connector to provide electrical continuity, and it shall be accessible at all trace wire access points.

C. Trace wire access points shall in general be no more than five-hundred (500) feet and at every proposed concrete valve box collar. Concentrations of multiple proposed valves near pipe intersections, i.e. tees or crosses, may require more than one access point assembly in each concrete valve box collar. Trace wire access points shall be within public right-of-way or public utility easements.

D. At the point of connection between cast or ductile iron mains, with any non iron main, the tracer wire shall be properly connected to the iron pipe with a cad weld or approved equivalent. Tracer wire welds shall be completely sealed with the use of an approved mastic type sealer specifically manufactured for underground use. Mastic shall be applied in a thick coat a minimum of 2 inches thick and shall be protected from contamination by the backfill material with the use of a plastic membrane.

E. Tracer wire shall be laid flat and securely affixed to the pipe at 10 foot intervals. The wire shall be protected from damage during the execution of the works. No breaks or cuts in the tracer wire or tracer wire insulation shall be permitted. At service saddles, the tracer wire shall not be allowed to be placed between the saddle and the main.

F. Except for approved spliced-in connections, tracer wire shall be continuous and without splices from each trace wire access point. Where any approved spliced-in connections occur, 3M DBR water tight connectors, or approved equal, shall be used to provide electrical continuity.

G. At all main end caps, a minimum of 6 feet of tracer wire shall be extended beyond the end of the pipe, coiled and secured for future connections. The end of the tracer wire shall be spliced to the wire of a six pound zinc anode and is to be buried at the same elevations as the water main.

H. For directional drilling, auguring or boring installations, four #12 tracer wires shall be installed with the pipe and connected to the tracer wire at both ends, or cad welded to the existing iron pipe at both ends.

I. Spliced connections between the main line tracer wire and branch connection tracer wire shall only be allowed at water main tees, crosses or at iron or copper water services where a portion of the branch connection water main or water service is replaced with a non iron or non copper material. The branch connection tracer wire shall be a single tracer wire properly spliced to the main line tracer wire. Where the existing branch connection is neither iron nor copper, then the new branch connection tracer wire shall be properly spliced to the existing tracer wire on the branch connection.

J. At all repair locations where there is existing tracer wire, the tracer wire shall be properly reconnected and spliced as outlined above.

END OF SECTION 33 05 27

SECTION 33 11 00

PIPING - GENERAL PROVISIONS

PART 1 GENERAL

1.01 DRAWINGS

Dimensions shown on Contract Drawings are approximate only. Verify all piping geometry in the field and to ensure proper alignment and fit of all piping consistent with the intent of the Contract Drawings. Submit field layout drawings as required for approval.

PART 2 PRODUCTS

2.01 CONTRACTOR'S RESPONSIBILITY FOR MATERIAL

A. Examine all material carefully for defects. Do not install material which is known, or thought to be defective.

B. AW reserves the right to inspect all material and to reject all defective material shipped to the job site or stored on the site. Failure of AW to detect damaged material shall not relieve the Contractor from his total responsibility for the completed work if it leaks or breaks after installation.

C. Lay all defective material aside for final inspection by AW. AW will determine if corrective repairs may be made, or if the material is rejected. AW shall determine the extent of the repairs.

D. Classify defective pipe prior to AW's inspection as follows:

1. Damage to interior and/or exterior paint seal coatings.
2. Damage to interior cement-mortar or epoxy lining.
3. Insufficient interior cement-mortar lining or epoxy thickness .
4. Excessive pitting of pipe.
5. Poor quality exterior paint seal coat.
6. Pipe out of round.
7. Pipe barrel area damaged to a point where pipe class thickness is reduced (all pipe).
8. Denting or gouges in plain end of pipe (all pipe).
9. Excessive slag on pipe affecting gasket seal (DI).
10. Any visible cracks, holes.
11. Embedded foreign materials.

12. Non-uniform color, density and other physical properties along the length of the pipe.

E. The Contractor shall be responsible for all material, equipment, fixtures, and devices furnished. These materials, equipment, fixtures and devices shall comply with the requirements and standards of all Federal, State, and local laws, ordinances, codes, rules, and regulations governing safety and health.

E. The Contractor shall take full responsibility for the storage and handling of all material furnished until the material is incorporated in the completed project and accepted by AW. Contractor shall be solely responsible for the safe storage of all material furnished to or by him until incorporated in the completed project and accepted by AW.

F. Load and unload pipe, fittings, valves, hydrants and accessories by lifting with hoists or skidding to avoid shock or damage. Do not drop these materials. Pipe handled on skidways shall not be skidded or rolled against other pipe. Handle this material in accordance with AWWA C600, C605 or C906 whichever is applicable.

G. Drain and store fittings and valves prior to installation in such a manner as to protect them from damage due to freezing of trapped water.

2.02 PETROLATUM TAPE COATING

A. The tape coating shall be a cold applied, saturant tape made from either petrolatum or petroleum wax with a noncellulosic synthetic fiber fabric. The fabric shall be encapsulated and coated on both sides with the petrolatum or petroleum wax. The thickness of the tape shall be no less than 40 mil. The petrolatum or petroleum wax shall be at least 50% of the product by weight.

B. The tape coating shall be supplied in sheets, pads or rolls. Pads and sheets shall be sized to fit the area that is to be covered, allowing for an overlap per AWWA Standards.

2.03 RUBBERIZED-BITUMEN BASED SPRAY-ON UNDERCOATING

Subject to approval by AW, an alternative corrosion protection for exposed buried metal is an aerosol applied rubberized coating. The material shall be rapid dry and specifically designed for corrosion protection. 3M Rubberized Underseal Undercoating 08883 or any equivalent rubberized-

bitumen based spray-on undercoating may be used. Follow manufacturer's recommendations for storage and application.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL REQUIREMENTS

A. Lay and maintain all pipe to the required lines and depths. Install fittings, valves and hydrants in strict accordance with the Specifications at the required locations with joints centered, spigots home, and all valve and hydrant stems plumb. Do not deviate from the required alignment, depth or grade without the written consent of AW.

B. Buried steel lugs, rods, brackets, and flanged joint nuts and bolts are not permitted unless specifically shown on the drawings or approved in writing by AW. Cover any and all buried steel lugs, rods, brackets, and flanged joint nuts and bolts with approved coating in accordance with AWWA Standard C217 prior to backfilling. Encase the same in polyethylene encased if the specifications require polyethylene encasement of the pipe.

C. Lay all pipe to the depth specified. Measure the depth from the final surface grade to the top of the pipe barrel. The minimum pipe cover shall be as shown on the Drawings or as specified in the Specifications Special Conditions.

D. Do not lay pipe in a wet trench, on subgrade containing frost, or when trench conditions are unsuitable for such work. If all efforts fail to obtain a stable dry trench bottom and AW determines that the trench bottom is unsuitable for such work, AW will order the kind of stabilization to be constructed, in writing. In all cases, water levels must be at least 6" below the bottom of the pipe.

E. Thoroughly clean the pipes and fittings before they are installed. Keep these materials clean until the acceptance of the completed work. Lay pipe with the bell ends facing in the direction of laying, unless otherwise shown on the Drawings, or directed by AW. Exercise care to ensure that each length abuts the next in such a manner that no shoulder or unevenness of any kind occurs in the pipe line.

F. Do not wedge or block the pipe during laying unless by written order of AW.

G. Before joints are made, bed each section of pipe the full length of the barrel, at the required grade, and at the invert matching the previously laid pipe. Dig bell holes sufficiently large to permit proper joint making. Do not bring succeeding pipe into position until the preceding length is embedded and secure in place.

H. Take up and relay pipe that is out of alignment or grade, or pipe having disturbed joints after laying. Take up, such in-place pipe sections found to be defective and replace them with new pipe. Take up, relaying, and replacement will be at the Contractor's expense.

I. Place enough backfill over the center sections of the pipe to prevent floating. Take all other necessary precautions to prevent the floating of the pipeline by the accumulation of water in the trench, or the collapse of the pipeline from any cause. Place enough backfill over the center sections of the pipe to prevent floating. Should floating or collapse occur, restoration will be at the Contractor's expense.

J. Contractor shall install tracer wire along all pipelines. Tracer wire to be installed in trench below both the pipe and pipe bedding to prevent the tracer wire from being disturbed during repairs.

K. Bedding materials and concrete work for the pipe bedding and thrust restraint shall be as specified.

L. Prevent foreign material from entering the pipe while it is being placed. Do not place debris, tools, clothing, or other materials in the pipe during laying operations. Close all openings in the pipeline with watertight plugs when pipe laying is stopped at the close of the day's work, or for other reasons such as rest breaks or meal periods.

M. Only cut pipe with equipment specifically designed for cutting pipe such as an abrasive wheel, a rotary wheel cutter, a guillotine pipe saw, or a milling wheel saw. Do not use chisels or hand saws. Grind cut ends and rough edges smooth. Bevel the cut end slightly for push-on connections as per manufacturer recommendations.

N. In distributing material at the site of the Work, unload each piece opposite or near the place where it is to be laid in the trench. If the pipe is to be strung out, do so in a straight line or in a line conforming to the curvature of the street. Block each length of pipe adequately to prevent movement. Block stockpiled pipe adequately to prevent movement. Do not place pipe, material, or any other object on private

property, obstructing walkways or driveways, or in any manner that interferes with the normal flow of traffic.

O. Exercise special care to avoid damage to the bells, spigots or flanged ends of pipe during handling, temporary storage, and construction. Replace damaged pipe that cannot be repaired to the AW'S satisfaction, at the Contractor's expense.

P. Remove all existing pipe, fittings, valves, pipe supports, blocking, and all other items necessary to provide space for making connections to existing pipe and installing all piping required under this Contract.

Q. Maintain the minimum required distance between the water and sewer lines and other utility lines in strict accordance with all Federal, State, and local requirements and all right-of-way limitations.

R. Provide and install polyethylene encasement for ductile iron pipe as required by the Drawing or Specification Special Conditions. See Specification Section 33 11 00.17, as applicable.

S. The maximum allowable deflection at the joints for push-on joint pipe shall be the lesser of manufacturer's recommendations or as described in the DIPRA Guideline, *Ductile Iron Pipe Joints and Their Uses*, as follows:

Size of Pipe	Deflection Angle	Maximum Deflection (18-ft. Length)	Maximum Deflection (20-ft. Length)
3"-12"	5 degrees	19"	21"
14"-42"	3 degrees	11"	12"
48"-64"	3 degrees	N/A	12"

T. The maximum allowable deflection at the joints for PVC pressure pipe shall be as follows:

Size of Pipe	Deflection Angle	Maximum Deflection (20-ft. Length)
4"-12"	2 degrees	8"
14" +	1.5 degrees	6"

U. Use short lengths of pipe (minimum length 3 feet, no more than three short sections), when approved by the Engineer, to make curves that

cannot be made with full length sections of pipe without exceeding the allowable deflection. Making these curves will be at no additional cost to the Owner.

V. Furnish air relief valve assemblies in accordance with detail drawings provided or as specified in the specification Special Conditions section. Engineer will provide standard detail for additional air release valve assemblies. Any deviation from the standard detail proposed by contractor must be approved in advance.

W. Exercise particular care so that no high points are established where air can accumulate. Install an air release valve and manhole, as extra Work to the Contract, when the Engineer determines that unforeseen field conditions necessitate a change in the pipe profile that requires the installation of an air release valve and manhole. If the Contractor requests a change in the pipe profile solely for ease of construction, and the requested change requires the installation of an air release valve and manhole as determined by the Engineer, the cost of furnishing and installing the air release valve and manhole will be at the expense of the Contractor.

X. All water mains 20” and greater in diameter shall be constructed using DIP only. Other construction materials, such as PVC and HDPE, are limited to water mains 16” and under in diameter.

Y. Marking tape to be provided along all mains and service lines installed. Marking tape to be installed 12” below grade. Foil backing is not required on marking tape. Tape shall be colored blue for water mains and green for sewer. Marking tape along pressurized force mains shall be labeled “Pressureized Wastewater”.

3.02 CONSTRUCTION METHODS TO AVOID CONTAMINATION

A. Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing such organisms. It is essential that the procedures of this Specification Section be observed to assure that a water main and its appurtenances are thoroughly clean for the final disinfection by chlorination.

B. Take precautions to protect the interior of pipes, fittings, and valves against contamination. String pipe delivered for construction so as to keep foreign material out of the pipe. Close all openings in the pipeline

with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Use rodent-proof plugs approved by AW, where it is determined that watertight plugs are not practical and where thorough cleaning will be performed.

C. Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery is correlated to the rate of pipe laying, the lower the likelihood of contamination. Complete the joints of all pipe in the trench before stopping work. If water accumulates in the trench, keep the plugs in place until the trench is dry.

D. When encountering conditions on pre-existing pipe that requires packing, employ yarning or packing material made of molded or tubular rubber rings, or rope of treated paper or other approved materials. Do not use materials such as jute, asbestos, or hemp. Handle packing material in a manner that avoids contamination.

E. Do not use contaminated material or any material capable of supporting prolific growth of microorganisms for sealing joints. Handle sealing material or gaskets in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water. Deliver the lubricant to the job in closed containers and keep it clean.

F. If dirt enters the pipe, and in the opinion of AW the dirt will not be removed by the flushing operation, clean the interior of the pipe by mechanical means, then swab with a 1% hypochlorite disinfecting solution. Clean using a pig, swab, or "go-devil" only when AW has specified such and has determined that such operation will not force mud or debris into pipe joint spaces.

G. If the main is flooded during construction, the flooded section must be isolated from the remainder of the installation as soon as practical. Submit a plan to AW on correcting the condition and do not proceed until authorized by AW. Replace or fully clean and disinfect the affected pipe at no additional cost to AW.

3.03 VALVE INSTALLATION

A. Prior to installation, inspect valves for direction of opening, freedom of operation, tightness of pressure containing bolting, cleanliness of valve ports and especially of seating surfaces, handling damage, and cracks. Correct defective valves or hold for inspection by the Engineer.

B. Set and join to the pipe in the manner specified in Specification Section 3.01. Provide valves with adequate support, such as crushed stone and concrete pads, so that the pipe will not be required to support the weight of the valve. Set truly vertical. After field installation of the valve all exposed ferrous restraint materials and external bolts except the operating nut shall receive a layer of petrolatum tape coating or, where approved, rubberized-bitumen based spray-on undercoating applied before backfill. If polyethylene is applied to the pipe, the entire valve shall be encased in polyethylene encasement prior to backfill. The polyethylene encasement shall be installed up to the operating nut leaving the operating nut exposed and free to be operated.

C. Provide a valve box for each valve. Set the top of the valve box neatly to existing grade, unless directed otherwise by AW. Do not install in a way that allows the transfer shock or stress to the valve. Center and plumb the box over the wrench nut of the valve. Do not use valves to bring misaligned pipe into alignment during installation. Support pipe in such manner as to prevent stress on the valve.

D. Provide valve marking posts, when authorized by AW, at locations designated by AW and in accordance with detail drawings.

3.04 THRUST RESTRAINT

A. Provide all plugs, caps, tees, and bends (both horizontal and vertical) with concrete thrust blocking and/or restrained joint pipe as represented on the Drawings, or specified in the Specification Special Conditions.

B. Place concrete thrust blocking between undisturbed solid ground and the fitting to be anchored. Install the concrete thrust blocking in accordance with Specification Section 03 30 00 and standard details provided. Locate the thrust blocking to contain the resultant thrust force while keeping the pipe and fitting joints accessible for repair, unless otherwise shown or directed.

C. Provide temporary thrust restraint at temporary caps and plugs. Submit details of temporary restraint to AW for approval.

D. At connections with existing water mains where there is a limit on the time the water main may be removed from service, use metal harnesses of anchor clamps, tie rods and straps; mechanical joints utilizing set-screw retainer glands; or restrained push-on joints as

permitted by AW. No restraining system can be installed without the approval of AW. Submit details of the proposed installation to AW for approval. For pipe up to 12 inches in size, use a minimum of two 3/4-inch tie rods. If approved for use, install retainer glands in accordance with the manufacturer's instructions. Material for metal harnessing and tie-rods shall be ASTM A36 or A307, as a minimum requirement.

E. Protection of Metal Harnessing: Protect ties rods, clamps and other metal components against corrosion by hand application of petrolatum tape and by encasement of the entire assembly with 8-mil thick (12 mil thick in corrosive soils) loose polyethylene film in accordance with AWWA C105. Apply tape on all exposed tie rods prior to installing polyethylene.

END OF SECTION 33 11 00

SECTION 33 11 00.11

POLYVINYL CHLORIDE (PVC) PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

PVC pressure pipe and fabricated fittings in nominal sizes 4 inches through 12 inches with cast iron pipe equivalent outside diameters.

1.02 SUBMITTALS

Submit manufacturer's product data, installation instructions and certification for all materials to be furnished in accordance with Specification Section 01 33 00. Submit classification and gradation test results for embedment and pipe backfill material.

PART 2 PRODUCTS

Research has documented that certain pipe materials (such as polyvinyl chloride, polyethylene, and polybutylene) and certain elastomers (such as those used in gasket material) may be subject to permeation by lower-molecular weight organic solvents or petroleum products. Products supplied under this Specification Section assume that petroleum products or organic solvents will not be encountered. If during the course of pipeline installation the Contractor identifies, or suspects the presence of petroleum products or any unknown chemical substance, notify AW immediately. Stop installing piping in the area of suspected contamination until direction is provided by the Engineer.

2.01 PIPE MATERIALS – WATER DISTRIBUTION

All PVC pipe shall be PVC 1120 pressure pipe made from class 12454 material as defined by ASTM D-1784 with outside diameter dimensions of steel or cast iron pipe. The PVC compounds shall be treated or certified suitable for potable water products by the National Sanitation Foundation (NSF) Testing Laboratory (NSF Standard No. 61).

PVC Pipe 4 inch through 12 inch:
AWWA Standard C900, DR14 and where permitted DR18. DR25 pipe will not be allowed. PVC pipe has recently been upgraded by pressure class, however American Water does not allow pipe in its system to be

fully subject to the revised pressures in AWWA C900. DR14 shall not be subjected to pressures exceeding 250 psi. DR18 shall not be subjected to pressures exceeding 200 psi.

2.02 GRAVITY SEWER PIPE

A. PVC gravity sanitary sewer pipe and storm sewer pipe shall be in accordance with provisions in following table except where specified differently on the drawings:

WALL CONSTRUCTION	MANUFACTURER	ASTM DESIGNATION	SDR (Max) STIFFNESS (MIN.)	DIAMETER SIZE RANGE
Solid	7-M Pipe	D3034	SDR 26 IPS 115 SDR 35 IPS 46	6" to 10"
	CertainTeed Diamond	D3034	SDR 26 IPS 115 SDR 35 IPS 46	12" & 15"
	Uponor ETI North American	F679	SDR 26 IPS 115 SDR 35 IPS 46	18" to 27"
		AWWA C900	DR 18 /NIA	4" to 12"
		AWWA C909	DR 181 NIA	4" to 12"
		AWWA C905	DR 18 /NIA	14" to 16"
Truss (Gasketed)	Contech	D2680	N/A /200 psi	8" to 15"
Profile	Contech A-2000 Contech A-2026 ETI, Ultra-Rib ETI, Ultra-Cory	F949 F949 F794 F794	N/A 46 psi N/A 115 psi N/A 46 psi N/A 46 psi	12" to 36" 8" to 10" S" to 30" 24" to 36"

B. When solid wall PVC pipe 18 inches to 27 inches in diameter is required in SDR 26, provide pipe conforming to ASTM F 679, except provide wall thickness as required for SDR 26 and pipe strength of 115 psi.

C. For sewers up to 12-inch diameter crossing over water lines, or crossing under water lines with less than 2-feet separation, provide minimum 150 psi pressure rated pipe conforming to ASTM D 2241 with suitable PVC adapter couplings.

D. Joints: Spigot and integral wall section bell with solid cross section elastomeric or rubber ring gasket conforming to requirements of ASTM D 3212 and ASTM F 477, or ASTM D 3139 and ASTM F 477. Gaskets shall be factory-assembled and securely bonded in place to prevent displacement. Manufacturer shall test sample from each batch conforming to requirements ASTM D 2444

E. Fittings: Provide PVC gravity sewer sanitary bends, tee, or wye fittings for new sanitary sewer construction. PVC pipe fittings shall be full-bodied, either injection molded or factory fabricated. Saddle-type tee or wye fittings are not acceptable.

F. Conditioning. Conditioning of samples prior to and during tests is subject to approval by AW Project Manager. When referee tests are required, condition specimens in accordance with Procedure A in ASTM D 618 at 73.4 degrees F plus or minus 3.6 degrees F and 50 percent relative humidity plus or minus 5 percent relative humidity for not less than 40 hours prior to test. Conduct tests under same conditions of temperature and humidity unless otherwise specified.

G. Pipe Stiffness. Determine pipe stiffness at 5 percent deflection in accordance with Test Method D 2412. Minimum pipe stiffness shall be 46 psi. For diameters 4 inches through 18 inches, test three specimens, each a minimum of 6 inches (150 mm) in length. For diameters 21 inch through 36 inch, test three specimens, each a minimum of 12 inch (300 mm) in length.

H. Flattening. Flatten three specimens of pipe, prepared in accordance with Paragraph 2.04F, in suitable press until internal diameter has been reduced to 60 percent of original inside diameter of pipe. Rate of loading shall be uniform. Test specimens, when examined under normal light and with unaided eye, shall show no evidence of splitting, cracking, breaking, or separation of pipe walls or bracing profiles. Perform the flattening test in conjunction with pipe stiffness test.

I. Joint Tightness. Test for joint tightness in accordance with ASTM D 3212, except that joint shall remain watertight at minimum deflection of 5 percent. Manufacturer will be required to provide independent third party certification for joint testing each diameter of storm sewer pipe.

J. Purpose of Tests. Flattening and pipe stiffness tests are intended to be routine quality control
tests. Joint tightness test is intended to qualify pipe to specified level of performance.

2.03 SANITARY SEWER FORCE MAIN PIPE

A. Provide approved PVC pressure pipe conforming to requirements for water service pipe, and conforming to minimum working pressure rating specified in Section 33 34 00 - Sanitary Sewer Force Mains.

B. Acceptable pipe joints are integral bell-and-spigot, containing a bonded-in elastomeric sealing ring meeting requirements of ASTM F 477. In designated areas requiring restrained joint pipe and fittings, use approved joint restraint device conforming to UNI-B-13, for PVC pipe 12-inch diameter and less.

C. Fittings: Provide approved ductile iron fittings as per Section 33 11 00.15 - Ductile Iron Pipe and Fittings, except furnish fittings with one of following approved internal linings:

1. Nominal 40 mils (35 mils minimum) virgin polyethylene complying with ASTM D 1248, heat fused to interior surface of fitting
2. Nominal 40 mils (35 mils minimum) polyurethane
3. Nominal 40 mils (35 mils minimum) ceramic epoxy
4. Nominal 40 mils (35 mils minimum) fusion bonded epoxy

D. Exterior Protection: Provide polyethylene wrapping of ductile-iron fittings as required by Section 33 11 00.17 - Polyethylene Wrap.

E. Hydrostatic Tests: Hydrostatically test pressure rated pipe in accordance with Specifications.

2.04 RECEIVING, HANDLING AND STORAGE

A. Inspect pipe and appurtenances for defects prior to installation in the trench. Set aside and clearly mark defective, damaged or unsound material and hold material for inspection by AW.

B. Load and unload all materials in accordance with the manufacturer's recommendations and in such a manner as to prevent damage. Do not drop pipe and accessories or handle then in a rough manner.

C. Provide safe storage for all materials. Cover stored pipe that will be exposed to sunlight for periods longer than 6 months. Cover with canvas or other opaque material with provision for adequate air circulation. PVC pipe shall not be stored close to heat sources, such as heaters, boilers, steam lines, or engine exhaust.

PART 3 EXECUTION

3.01 INSTALLATION

Follow the provisions of Specification Section 33 11 00, 33 31 00.11, and 33 34 00 in addition to the following requirements:

A. Remove all dirt and foreign matter from pipe before lowering it into the trench. Do not place debris, hand tools, clothing or other materials in the pipe. Keep pipe clean during and after laying.

B. Lay pipe with the bell end pointing in the direction of work progress. Do not roll, drop or dump pipe or appurtenances into the trench.

C. Assemble push-on joints in accordance with the pipe manufacturer's recommendations. Assemble mechanical joints in accordance with the fitting manufacturer's recommendations.

D. Cut pipe with pipe saws, circular saws, handsaws, or similar equipment. Provide a smooth end at a right angle to the longitudinal axis of the pipe. Deburr, bevel, and re-mark insertion line on spigot ends. Match factory bevel length and angle for field bevels. When connecting to certain shallow depth bells, such as those on some cast iron fittings and valves, cut off the factory bevel and prepare a deburred, square cut end with a slight outer bevel.

E. Clean the sealing surface of the spigot end, the pipe bell, the coupler or fitting, and the elastomeric gaskets immediately before assembly. Do not remove factory installed gaskets for cleaning. Keep the joint free of dirt, sand, grit, grease or any foreign material. Apply approved lubricant when assembling gasketed joints in accordance with the pipe manufacturer's requirements. The use of improper lubricants can damage gaskets. Excessive lubricant use can make disinfection more difficult and cause taste and odor problems when the line is placed in service.

F. Good pipe alignment is essential for proper joint assembly. Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly. Do not swing or "stab" the joint; that is, do not suspend the pipe and swing it into the bell. The spigot end of the pipe is marked by the manufacturer to indicate the proper depth of insertion. Avoid metal to plastic contact with the pushing the pipe home (use wood or other material to cushion moving the pipe. Neither deflection or bending of PVC pipe joints are permitted.

G. Assemble pipe using the following types of joints:

1. Gasketed bell joint – Integral with the pipe or fitting
2. Gasketed coupling – A double gasketed coupling
3. Mechanical joint – Any of the several joint designs that have gaskets and bolts manufactured in accordance with AWWA standards.

H. Tracer Wire

1. Place tracer wire in accordance with Specification Section 33 05 27.

2. The wire shall be contiguous except at test stations, valve boxes, and where splicing is required. All splices shall be encased with a 3M-Gel Pack Model No. 054007-09053, or approved equal.

I. Pressure testing of DR 14 PVC pipe should not exceed 275 psi. Pressure testing of DR 18 PVC pipe should not exceed 200 psi if approved for use.

J. PVC pipe fittings shall employ ductile iron pipe fittings per specifications 15105. See detail drawings for transitions between different pipe materials.

K. Gaskets - Gaskets shall be as provided or recommended by the manufacturer and satisfy AWWA standard C111 in all respects. Where ductile iron pipe and PVC pipe are directly connected, the appropriate gasket material for this purpose shall be employed. As noted in the products section of this specification, some gasket materials are prone to permeation of certain hydrocarbons which may exist in the soil (see part 2). Under these conditions and at the Engineer's discretion require contractor to provide FKM (Viton, Flourel) gasket material in areas of concern.

3.02 SERVICE CONNECTIONS

A. Install service connections in accordance with AWWA Standard C605 and the manufacturer's recommendations using the following methods:

Install service connections in accordance with AWWA Standard C605 and the manufacturer's recommendations using the following methods:

1. Tapping is only permitted through the use of service clamps or saddles.

2. Using injection molded couplings with threaded outlets.
3. Tapping with large service connections through appropriately sized tapping sleeves and valves.
4. Direct tapping of 1 inch and smaller service connections is not permitted. Use service saddles only for AWWA Standard C900 pipe, for nominal pipe sizes 6 inch through 12 inch. Corporation stops shall be threaded and conform to AWWA Standard C800.
5. The distance between the PVC pipe joint and a service tap (2" and smaller) shall be a minimum of 3 feet. The distance between the PVC pipe joint and a service tap (4" and larger) shall be a minimum of 4 feet. Where necessary, excavate along the pipe to confirm the acceptable distance before starting the tap.

END OF SECTION 33 11 00.11

SECTION 33 11 00.15

DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 COORDINATION OF WORK

Connection to existing pipelines may require shutdown of Owner facilities. Closely coordinate construction work and connections with the Owner through the Engineer. The Engineer, in consultation with the Owner, may select the time for connection to existing pipelines, including Saturdays, Sundays, or holidays, which, in the opinion of the Engineer, will cause the least inconvenience to the Owner and/or its customers. Make such connections at such times as may be directed by the Owner, at the Contract prices, with no claim for premium time or additional costs.

1.02 RELATED WORK

Piping - General Provisions - Specification Section 33 11 00.

1.03 SUBMITTALS

Submit shop drawings and manufacturer's literature for all Contractor supplied materials promptly to the Engineer for approval in accordance with Specification Section 01 33 00.

PART 2 PRODUCTS

Research has documented that certain elastomers (such as those used in gasket material) may be subject to permeation by lower-molecular weight organic solvents or petroleum products. Products supplied under this Specification Section assume that petroleum products or organic solvents will not be encountered. If during the course of pipeline installation the Contractor identifies, or suspects the presence of petroleum products or any unknown chemical substance, notify AW immediately. Stop installing piping in the area of suspected contamination until direction is provided by AW.

2.01 PIPE MATERIAL

A. General

Ductile iron pipe shall conform to the latest specifications as adopted by the American National Standards Institute, Inc., (ANSI) and the American Water

Works Association (AWWA). Specifically, ductile iron pipe shall conform to AWWA Standard C151.

The pipe or fitting exterior shall be coated with a bituminous coating in accordance with AWWA Standard C151. The pipe or fitting interior shall be cement mortar lined and seal coated in compliance with the latest revision of AWWA Standard C104.

B. Quality

Pipe and fittings shall meet the following minimum quality requirements by conforming to the following:

1. AWWA C105 / ANSI A21.5 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water Polyethylene Encasement for Ductile-Iron Pipe Systems
2. AWWA C110 / ANSI A21.10 Ductile Iron and Gray Iron Fittings, 3 NPS through 48 NPS for Water AWWA C111 / ANSI A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
3. AWWA C115 / ANSI A21.15 Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
4. AWWA C116 / ANSI A21.16 Protective Fusion-Bonded Epoxy Coating for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service
5. AWWA C150 / ANSI A21.50 Thickness Design of Ductile-Iron Pipe
6. AWWA C151 / ANSI A21.51 Ductile-Iron Pipe, Centrifugally Cast, for Water
7. AWWA C153 / ANSI A21.53 Ductile-Iron Compact Fittings, 3 NPS through 24 NPS and 54 NPS through 64 NPS, for Water Service

Ductile iron water pipe and fittings will be accepted on the basis of the Manufacturer's certification that the material conforms to this specification. The certification for iron fittings shall list a fitting description, quantity, bare fitting weight and source, (AWWA Standard C110, C153 or Manufacturer, if fitting is not listed in either standard). The certification shall accompany the material delivered to the project site. The Owner reserves the right to sample and test this material subsequent to delivery at the project site. If foreign manufactured fittings are provided, then the Contractor is obligated to notify AW with a submittal and provide the necessary documentation to satisfy the AW that the materials provided meet the specified AWWA standards and, among other documentation that may be required, provide certificates of compliance on the component supplied.

C. Pipe Class

The pressure class of pipe to be furnished shall be in accordance with Table 1 and the notes listed below.

Table 1
MINIMUM RATED WORKING PRESSURE
FOR DUCTILE IRON PIPE MANUFACTURED IN ACCORDANCE
WITH AWWA Standard C151

Pipe Size (Inch)	Pressure Class
6	350
8	350
12	350
16	300
20	300
24	250

NOTES:

1. Larger pipe sizes up to 54-inch can be installed as pressure Class 200 with cover up to nine (9) feet and an operating pressure of 200 psi, where approved by the Engineer. When trench depths exceed fifteen (15) feet for pipe sizes of 16-inch or larger, AW shall direct the Contractor on the proper class pipe to use.

2. The noted pressure class is adequate to support 3/4 and 1-inch corporation stops. Use a full saddle for larger taps (e.g.., air relief valves or larger corporations) due to limited wall thickness.

3. There are special conditions where a larger wall thickness is required. AW shall direct the Contractor on the proper pressure class pipe to use in specific instances; e.g. at treatment plant or booster station sites where frequent excavation can be anticipated in the vicinity of pipe, where the pipeline is laid on a river channel bottom to prevent external damage to the pipe and minimize the potential for costly pipe replacement, etc.

D. Testing

Perform a hydrostatic test of all pipe and appurtenances as required by AWWA Standard C151 and Specification Section 33 01 10.13.

E. Joints

1. Mechanical and Push-On

Mechanical and push-on joints including accessories shall conform to AWWA Standard C111.

2. Flanged

Flanged joints shall conform to AWWA Standard C110 or ANSI B16.1 for fittings and AWWA Standard C115 for pipe. Do not use flanged joints in underground installations except within structures.

Furnish all flanged joints with 1/8-inch thick, red rubber or styrene butadiene rubber gaskets. The bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions all as specified in American Standard for Wrench Head Bolts and Nuts and Wrench Openings (ANSI B18.2). For bolts of 1-3/4-inches in diameter and larger, bolt studs with a nut on each end are recommended. The high-strength, low-alloy steel for bolts and nuts shall have the characteristics listed in Table 6 of AWWA Standard C111.

3. Restrained Joint Pipe

Restrained joints for pipes shall be of the boltless push-on type which provides joint restraint independent of the joint seal. Restrained push-on joints allowed for pipe only shall have accessories conforming to AWWA Standard C111. Restrained system shall be suitable for the following minimum working pressures:

Size (Inch)	Pressure (psi)
Less than 20”	350
20”	300
24"	250
30" - 64"	200

2.02 FITTINGS

A. Ductile Iron Fittings

Standard fittings shall be ductile iron conforming to AWWA Standard C110. Compact ductile iron fittings shall meet the requirements of AWWA Standard C153.

1. Working Pressures

Fittings shall be suitable for the following working pressures unless otherwise noted in AWWA Standard C110 or C153:

	Pressure (psi)	
	Compact Fittings	Standard Fittings
Size	Ductile Iron	Ductile Iron
3" - 24"	350	250, 350 (with special gaskets)
30" - 48"	250	250
54" - 64"	150	N/A

The use of standard ductile iron fittings having a 250 psi pressure rating with ductile iron pipe (having a rating of 350 psi) is not permitted except by the expressed written approval by AW.

2. Coating and Lining

The fittings shall be coated on the outside with a petroleum asphaltic coating in accordance with AWWA Standard C110 or fusion coated epoxy in accordance with AWWA Standard C116 and lined inside with cement-mortar and seal coated in accordance with AWWA Standard C104 or fusion coated epoxy in accordance with AWWA Standard C116.

B. Joints

1. Mechanical and Push-On

Mechanical and push-on joints including accessories shall conform to AWWA Standard C111. Anti-Rotation l T-Bolts shall be used on mechanical joints shall be of domestic origin, high strength, low alloy steel bolts only, meeting the current provisions of American National Standard ANSI/AWWA C111/A21.1-90 for rubber gasket joints for cast iron or ductile iron pipe and fittings. Bolt manufacturer's certification of compliance must accompany each shipment. T-bolts shall corrosion resistant to handle corrosive conditions on any buried bolts.

2. Flanged

Flanged joints shall meet the requirements of AWWA Standard C115 or ANSI B16.1. Do not use flanged joints in underground installations except within structures. Furnish all flanged joints with a minimum

1/8-inch, thick red rubber or styrene butadiene rubber gasket. The bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions all as specified in ANSI B18.2. Xylan or FluoroKote #1 Hex Bolts (corrosion resistant) to handle corrosive conditions shall be used on any buried flanged bolts. Flange gaskets shall be rubber in composition; paper gaskets are not permitted.

Bolts and nuts hall be threaded in accordance with ASME/ANSI B1.1, Unified Inch Screw Threads (UN and UNR Thread Form) class 2A external and class 2B internal. For bolts of 1-3/4-inches in diameter and larger, bolt studs with a nut on each end are recommended. Material for bolts and nuts shall conform to ASTM A307, 60,000 PSI Tensile Strength, Grade B, unless otherwise specified. Bolt manufacturer's certification of compliance must accompany each shipment.

3. Restrained

Restrained joints for valves and fittings shall be of the boltless push-on type which provides joint restraint independent of the joint seal. Field Lok gaskets are not permitted on valves or fittings. Restrained push-on joints allowed for pipe only shall have accessories conforming to AWWA Standard C111. Restrained system shall be suitable for the following minimum working pressures:

Size	Pressure (psi)
Less than 20"	350
20"	300
24"	250
30" - 64"	250

Where adjacent fittings are to be placed (as in a mechanical joint hydrant tee and a mechanical joint hydrant valve), the use of a suitably sized Foster adaptor is permitted to facilitate restraint between the fittings.

PART 3 EXECUTION

3.01 INSTALLATION

Follow the provisions of Specification Section 33 11 00 in addition to the following requirements:

A. Push-On Joints

Clean the surfaces that the gasket will contact thoroughly, just prior to assembly using a bacteria free solution (bleach, potable water or NSF approved material). Insert the gasket into the groove in the bell. Apply a liberal coating of special lubricant to the gasket and the spigot end of the pipe before assembling the joint. Center the spigot end in the bell and push home the spigot end.

B. Mechanical Joints

Clean and lubricate all components with soapy water prior to assembly. Slip the follower gland and gasket over the pipe plain end making sure that the small side of the gasket and lip of the gland face the bell socket. Insert the plain end into socket. Push gasket into position with fingers. Seat gasket evenly. Slide gland into position, insert bolts, and tighten nuts by hand. Tighten bolts alternately (across from one another) to the recommended manufacturing rating or if not provided, to the following normal torques:

Bolt Size	Range of Torque In Foot-Pounds
5/8"	40 - 60
3/4"	60 - 90
1"	70 - 100
1-1/4"	90 - 120

After field installation, all bolts shall receive petrolatum tape or petroleum wax protection or other approved coating material. Protection shall be applied before applying polywrap per specification 33 11 00.17.

C. Restrained Joints

1. Ball and Socket

Assemble and install the ball and socket joint according to the manufacturer's recommendations. Thoroughly clean and lubricate the joint. Check the retainer ring fastener.

2. Push-On

Assemble and install the push-on joint according to the manufacturer's recommendations. Thoroughly clean and lubricate the joint. Check the retainer ring fastener.

Protect pipe from damage from the jacking device (backhoe bucket, pipe jack, etc.) when “pushing home” any pipe by using wood or other suitable (non metallic) material.

(3) Mechanical Joint

Assemble and install the mechanical joint according to the manufacturer's recommendations. Thoroughly clean and lubricate the joint. Use approved restrained joint device on fittings and valves where required and approved for use by AW.

D. Pipe Protection

Protect pipe from damage from the jacking device (backhoe bucket, pipe jack, etc.) when “pushing home” any pipe. Wood or other suitable material (non metallic) shall be used to push home the pipe.

E. Gaskets

Gaskets shall be as provided or recommended by the manufacturer and satisfy AWWA standard C111 in all respects. As noted in the products section of this specification, some gasket materials are prone to permeation of certain hydrocarbons which may exist in the soil (see part 2). Under these conditions and at AW’S discretion require contractor to provide FKM (Viton, Flourel) gasket material in areas of concern.

END OF SECTION 33 11 00.15

SECTION 33 12 16.11

GATE VALVES

PART 1 GENERAL

1.01 SCOPE

Furnish, install, and test all gate valves shown on the Drawings.

1.02 SUBMITTALS

Submit shop drawings and manufacturer's literature to the Engineer for approval in accordance with Specification Section 01 33 00.

PART 2 PRODUCTS

2.01 SMALL GATE VALVES

A. All gate valves, 3 inches through 12 inches NPS, shall be iron body, resilient-seated, nut-operated, non-rising stem gate valves suitable for buried service. The valve interior and exterior shall be epoxy coated at the factory by the valve manufacturer in accordance with AWWA Standard C550 (6-8 mil average, 4 mil minimum). The valves shall be designed for a minimum differential pressure of 250 psi and a minimum internal test pressure of 500 psi unless otherwise noted on the plans. Valves shall be designed to operate in the vertical position. All valves shall open left (CCW).

B. Valves shall comply fully with AWWA Standard C509. Valve ends shall be push on joint or MJ (when restrained), or as shown on the plans or approved in writing in accordance with AWWA Standard C111. Stems shall be made of a low zinc alloy in accordance with AWWA C509 4.2.2.4.3. Stem seals shall be double O-ring stem seals. Square operating nuts conforming to AWWA Standard C509 shall be used. Valves shall open (left or right) in accordance with the Owner's standard. All valve materials shall meet the requirements of NSF 61.

C. Test valves (Operation Test and Hydrostatic Tests) at the manufacturer's plant in accordance with AWWA Standard C509. Provide AW with certified copies of all tests prior to shipment. AW reserves the right to observe all tests.

2.02 LARGE GATE VALVES

A. Gate valves larger than 12-inches NPS shall be iron body, double disc (metal to metal seat), parallel seats, bronze mounted, rubber O-ring packing seals, epoxy coated interior and exterior meeting the requirements of AWWA Standard C550, and conforming to AWWA Standard C500. Stems shall be made of a low zinc alloy in accordance with AWWA C500 4.2.2.4.3. All valves shall have openings through the body of the same circular area as that of the pipe to which they are attached. All valves furnished shall open (left or right) in accordance with the Owner's standard. All valve materials shall meet the requirements of NSF 61. All valves shall open left (CCW).

B. Test valves (Operation Test and Hydrostatic Tests) at the manufacturer's plant in accordance with AWWA Standard C515. Provide AW with certified copies of all tests prior to shipment. AW reserves the right to observe all tests.

C. Valves shall have mechanical joint ends unless otherwise designated on the plans or approved by AW.

D. The valves shall be designed for a minimum differential pressure of 150 psi and a minimum internal test pressure of 300 psi, unless otherwise noted on the plans. Make all valves tight under their working pressures after they have been placed and before the main is placed in operation. Any defective parts shall be replaced at the Contractor's expense.

PART 3 EXECUTION

3.01 INSTALLATION

Install the valves in strict accordance with the requirements contained in Specification Section 33 11 00 and detail drawings. All large gate valves shall be restrained.

3.02 PROTECTION

After field installation of the valve all external bolts except the operating nut shall receive a layer of tape coating or approved rubberized-bitumen based spray-on undercoating applied before backfill. If polyethylene is applied to the pipe, the entire valve shall be encased in polyethylene encasement prior to backfill. The polyethylene encasement shall be

installed up to the operating nut leaving the operating nut exposed and free to be operated. Valve box shall be installed per Specification Section 33 11 00.

END OF SECTION 33 12 16.11

SECTION 33 12 16.17

TAPPING SLEEVES, SADDLES AND VALVES

PART 1 GENERAL

1.01 SCOPE

Furnish, install and test all tapping sleeves, tapping valves, and tapping saddles as shown on the Drawings.

1.02 RELATED WORK

Specification Section 33 11 00 - Piping - General Provisions

1.03 SUBMITTALS

Submit shop drawings and manufacturer's literature to the Engineer for approval in accordance with Specification Section 01 33 00.

PART 2 PRODUCTS

2.01 GENERAL

All tapping sleeves, saddles and valves shall be designed for a working pressure of at least 250 psig for 12-inch and smaller. The valves shall be designed for a minimum differential pressure of 250 psi and a minimum internal test pressure of 500 psi unless otherwise noted on the plans.

2.02 DUCTILE IRON TAPPING SLEEVES

Verify the type of existing pipe and the outside diameter of the pipe on which the tapping sleeve is to be installed.

Tapping sleeves shall be ductile iron dual compression type unless otherwise specified on the Drawings. The Drawings may require the use of corrosion resistant tapping sleeves in addition to polywrap in areas with corrosive soils. The sleeves shall be made in two halves which can be assembled and bolted around the main. Sleeves shall meet the requirements of NSF 61. Outlet flanges shall conform to the flange requirements of AWWA C110. All valves furnished shall open left in accordance with the AW's standard.

2.03 TAPPING VALVES

The horizontal tapping valve shall conform to the applicable requirements of AWWA Standard C509. All tapping valves, 3 inches through 12 inches NPS, shall be ductile iron body, resilient-seated, nut-operated, non-rising stem gate valves suitable for buried service. The valve interior and exterior shall be epoxy coated at the factory by the valve manufacturer in accordance with AWWA Standard C550 (6-8 mil average, 4 mil minimum). The tapping valves shall have flanged inlets with mechanical joint outlets, enclosed bevel gears, bypass valve, rollers, tracks and scrapers. All valves furnished shall open left in accordance with the AW's standard.

2.04 STAINLESS STEEL TAPPING SLEEVES

The stainless steel band flange shall be manufactured in compliance with AWWA C207, Class D ANSI B.16.1 drilling, recessed for tapping valve MSS-SP60. Mechanical Joint tapping sleeve outlet shall meet or exceed all material specifications as listed below and be suitable for use with standard mechanical joint by mechanical joint resilient wedge gate valves per ANSI/AWWA C509-94 and be NSF 61 approved.

A. Tapping sleeves from 4" through 12"
Tapping sleeves to be attached to 4" through 12" nominal pipe diameter shall meet the following minimum requirements.

1. The entire fitting shall be stainless steel type 304 (18-8). The body, lug, and gasket armor plate shall be in compliance with ASTM A240. The Flange shall be cast stainless steel in compliance with ASTM A743. The MJ outlet shall be one-piece casting made of stainless steel. The test plug shall be ¾" NPT in compliance with ANSI B2.1 and shall be lubricated or coated to prevent galling. All metal surfaces shall be passivated after fabrication in compliance with ASTM A-380.

2. The gasket shall provide a 360-sealing surface of such size and shape to provide and adequate compressive force against the pipe after assembly, to affect a positive seal under the combinations of joint and gasket tolerances. The materials used shall be vulcanized natural or vulcanized synthetic rubber with antioxidant and antiozonant ingredients to resist set after installation. No reclaimed rubber shall be used. A heavy-gauge-type 304-stainless armor plate shall be vulcanized into the gasket to span the lug area.

3. The lugs shall be heliarc welded (GMAW) to the shell. The lug shall have a pass-through-bolt design to avoid alignment problems and

allow tightening from either side of the main. Bolts shall NOT BE integrally welded to the sleeve. Finger Lug designs are not approved; it is the intent of these specifications to allow a tapping sleeve that has a lug design similar to the approved models.

4. Bolts and nuts shall be type 304 (18-8) stainless steel and Teflon coated or as specified in the bolt section below at the discretion of the Engineer. Bent or damaged units will be rejected.

5. Quality control procedures shall be employed to insure that the shell, Lug, (4" and Larger Nominal Pipe Diameter) armor plate, gasket and related hardware are manufactured to be free of any visible defects. Each unit, after proper installation, shall have a working-pressure rating up to 250 psi.

6. The sleeve construction shall provide a positive means of preventing gasket cold flow and/or extrusion.

7. Each sleeve shall be stenciled, coded or marked in a satisfactory manner to identify the size range. The markings shall be permanent type, water resistant, that will not smear or become illegible.

B. Tapping sleeves from 16" and larger
Tapping sleeves attached to 16" and larger nominal pipe diameter shall meet the following minimum requirements:

1. The body shall be in compliance with ASTM A285, Grade C or ASTM A36. The test plug shall be ¾" NPT conforming to ANSI B2.1.

2. The gasket shall provide a watertight sealing surface of such size and shape to provide an adequate compressive force against the pipe. After assembly, the gasket will insure a positive seal under all combinations of joint and gasket tolerances. Gaskets shall be formed from vulcanized natural or vulcanized synthetic rubber with antioxidant ingredients to resist set after installation. No reclaimed rubber shall be used.

3. Bolts and nuts shall be high strength, corrosion resistant, low alloy, pre AWWA C111, ANSI A21.11 and as specified in the subsection on bolts in this specification.

4. Quality control procedures shall be employed to insure that the shell, gaskets, and related hardware area are manufactured to be

free of visible defects. Each unit, after proper installation, shall have a working-pressure rating up to 200 psi.

5. Unless otherwise noted, unit shall be protected by electrostatically applied baked epoxy or polyurethane.

6. Units for concrete, steel cylinder pipe shall be furnished with load bearing setscrews on the gland flange to transfer loads on the outlet away from the steel cylinder and onto the sleeve. Epoxy – coated tapping sleeves do not require grout seal cavity (AWWA M-9 Manual).

7. Each sleeve shall be stenciled, coded or marked in a satisfactory manner to identify the size range. The marking shall be permanent type, water resistant, that will not smear or become illegible.

2.05 FABRICATED STEEL TAPPING SLEEVE

The fabricated steel tapping sleeve shall be manufactured in compliance with AWWA C207. Sleeves shall be fabricated of minimum three-eights (3/8) inch carbon steel meeting ASTM A285 Grade C. Outlet flange shall meet AWWA C-207, Class "D" ANSI 150 lb. drilling and be properly recessed for the tapping valve. Bolts and nuts shall be high strength low alloy steel to AWWA C111 (ANSI A21.11). Gasket shall be vulcanized natural or synthetic rubber. Sleeve shall have manufacturer applied fusion bonded epoxy coating, minimum 12 mil thickness, Class D ANSI B.16.1 drilling, recessed for tapping valve MSS-SP60. Mechanical Joint tapping sleeve outlet shall meet or exceed all material specifications as listed below and be suitable for use with standard mechanical joint by mechanical joint resilient wedge gate valves per ANSI/AWWA C509-94 and be NSF 61 approved.

2.06 TAPPING SADDLES

Unless otherwise specified by the Drawings, tapping saddles conform to the requirements of AWWA Standard C800 for the High Pressure class tapping saddles. Tapping saddles shall consist of ductile iron outlet castings, attached to the pipeline with high strength stainless steel straps. Castings shall be sealed to pipeline with O-ring seals. Saddles shall have ANSI A21.10 flanged outlets counterbored for use with tapping valves and tapping equipment.

2.07 BOLTS

All bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions all as specified in ANSI B18.2. Bolts shall be Xylan or FluoroKote #1 suitable for direct bury in corrosive soils.

PART 3 EXECUTION

3.01 INSTALLATION

Install the tapping sleeves, saddles, and valves in strict accordance with the requirements of Specification Section 33 11 00. Install the tapping sleeves, tapping saddles, and tapping valves in accordance with the manufacturer’s instructions. The tapping procedure is to be in accordance with the tapping machine manufacturer's instructions.

3.02 PROTECTION

After field installation of the valve all external bolts except the operating nut shall receive a layer of tape coating or approved rubberized-bitumen based spray-on undercoating applied before backfill. If polyethylene is applied to the pipe, the entire sleeve and valve assembly shall be encased in polyethylene encasement prior to backfill. The polyethylene encasement shall be installed up to the operating nut leaving the operating nut of the tapping valve exposed and free to be operated

3.03 PRELIMINARY TESTING

Perform a hydrostatic test of the tapping sleeve and valve assembly in accordance with Specification Section 33 01 10.13 after installation of the tapping sleeve and valve, but prior to making the tap. The test shall be made with the valve open using a tapped mechanical joint cap. No leakage is acceptable. The test pressure shall be maintained for a minimum of 15 minutes.

Perform hydrostatic test of tapping saddles in accordance with AWWA Standard C800.

END OF SECTION 33 12 16.17

SECTION 33 12 19

FIRE HYDRANTS

PART 1 GENERAL

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1.01 SCOPE

A. Fire hydrants.

B. Adjustment of fire hydrants and gate valves.

1.02 SUBMITTALS

A. Conform to requirements of Section 01 33 00 - Submittals.

B. Submit name of hydrant manufacturer, type of bonnet paint, and engineering control drawing number for hydrant proposed for use.

PART 2 PRODUCTS

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2.01 HYDRANTS

A. Provide hydrants in conformance with AWWA C 502, Standard for Dry Barrel Fire Hydrants (Latest Edition). Hydrants are approved by AW by issuance of a Certificate of Responsibility. Hydrants shall open left (counterclockwise). The following hydrant has been approved. Alternate hydrants will not be considered.

APPROVED HYDRANT TYPE

- The AW MSG approved hydrant at all locations is Mueller Model Super Centurion 250.
- Fire hydrants installed at Fort Leavenworth shall be Waterous, manufactured by American Flow Control.

B. The AW Project Manager may, at any time prior to or during installation of hydrants, randomly select furnished hydrant for disassembly and laboratory inspection, at AW's expense, to verify compliance with Specifications. When hydrant is found to be non-compliant, replace, at Contractor's expense, hydrants, with hydrants that comply with Specifications.

C. Provide lower hydrant barrel fabricated from Ductile Iron Pipe as single piece, connected to upper hydrant barrel by means of joint coupling that will provide three hundred sixty (360) degree rotation of upper barrel.

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2.02 LEADS

A. Branches (Leads): Conform to requirements of Section 33 11 00.15 - Ductile Iron Pipe and Fittings and Section 33 11 00.11 - Polyvinyl Chloride Pipe.

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2.03 HYDRANT PAINTING

A. New hydrants and refurbished hydrants shall be shop coated as specified herein.

B. Exterior Above Traffic Flange (Including Bolts & Nuts).

1. Surface preparation to be in accordance with SSPC-SP 10 (NACE 2) near white blast cleaned surface.
2. Coat with three coat alkyd/silicone alkyd system with total dry film thickness (DFT) of 6 - 9 mils as follows:
   a. Prime Coat - Oil modified alkyd primer, to be in general conformance with SSPC Paint Specification No. 25. Total dry film thickness (DFT) 2 - 3 mils.
   b. Intermediate Coat - Heavy Duty Industrial Alkyd Enamel to be in general conformance with SSPC Paint Specification No. 104, and Federal Standard A-A-2962A. Total dry film thickness (DFT) of 2 -3 mils.
   c. Finish Coat - Silicone Alkyd Resin Enamel to be in general conformance with SSPC Paint Specification No. 21. Total dry film thickness (DFT) to be 2 - 3 mils. Exception - hydrant bonnet shall not be finished shop coated, only intermediate coated. Install color coded finish coating of bonnet in field.
   d. Bonnet Paint - Field apply finish coat of Silicone Alkyd Resin Enamel to be in general conformance with SSPC Paint Specification No. 21. Dry film thickness of 2 - 3 mils. Bonnet colors are to be as specified in Paragraph 3.01 to designate the available fire flow at 20 psi residual.
3. Colors - Primer: Manufacturers standard color. Finish coat of hydrant body and connection caps, to be painted to match the color of existing in service hydrants on the base. Approval of the color paint to be used on the hydrants shall be approved by the American Water Utility Manger or Capital Project Manager prior to the final application of paint to the newly installed hydrant.

C. Field Maintenance Painting (Exterior Above Traffic Flange)

1. Surface Preparation to be in accordance with SSPC - SP2, Hand Tool Cleaning, or SSPC - SP3, Power Tool Cleaning, depending on condition of existing paint and extent of corrosion. It is not necessary to remove tightly adhered mill scale, rust, and paint. Mill scale, rust and paint are considered tightly adherent when they cannot be removed with dull putty knife. In some severe cases where it is necessary to remove majority of

existing paint, surface should be cleaned in accordance with SSPC - SP11, Power Tool Cleaning to Bare Metal.

2. When surface is cleaned to bare metal (SSPC - SP11), coat hydrant with three coat Alkyd/Silicone Alkyd system in accordance with Paragraph 2.03.B.2 as for new hydrants. When surface is cleaned to SSPC - SP2 or SSPC - SP3, coat hydrant with Silicone Alkyd Resin Enamel in general conformance with SSPC Paint Specification No. 21. Total dry film thickness of 3 - 6 mils surface is cleaned to bare metal (SSPC - SP11), coat hydrant with three coat Alkyd/Silicone Alkyd system in accordance with Paragraph 2.03.B.2 as for new hydrants.

D. Exterior Below Traffic Flange

1. Surface preparation in accordance with SSPC- SP10 (MACE 2) Near White Blast Cleaned Surface.
2. Primer and intermediate coat: coal tar epoxy in general conformance with SSPC Paint Specification No. 16. Apply two (2) coats with dry film thickness (DFT) of 8 - 10 mils each for total DFT of 16 -20 mils.
3. Finish coat: Water based vinyl acrylic mastic Apply one coat with dry film thickness of 6 - 8 mils. Color of finish coat to be same as finish coat for exterior above traffic flange, i.e., glossy Red

E. Interior Surfaces Above and Below Water Line Valve

1. Material used for internal coating of hydrant interior ferrous surfaces below water line valve must meet the requirements of local state standards.
2. Coating shall be liquid or powder epoxy system in accordance with AWWA Standard C - 550 (latest revision). Coating may be applied in two or three coats, according to manufacturer's recommendations, for total dry film thickness of 12 -18 mils.

PART 3 EXECUTION

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3.01 INSTALLATION

A. Set fire hydrant plumb and brace at locations and grades as shown on Drawings. When barrel of hydrant passes through concrete slab, place 1-inch-thick piece of standard sidewalk expansion joint material around section of barrel passing through concrete.

B. Locate nozzle center line minimum 18 inches above finish grade.

C. Place 12-inch by 12-inch yellow indicators (plastic, sheet metal, plywood, or other material approved by Project Manager) on pumper nozzles of new or relocated fire hydrants installed on new water lines not in service. Remove indicators after new water line is tested and approved by Project

Manager.

D. Do not cover drain ports when placing concrete thrust block.

E. Obtain Project Manager's approval in writing prior to installation of hydrants which require changes in bury depth due to obstructions not shown on Drawings. Unit price adjustments will not be allowed for changes in water line flow line or fire hydrant barrel length caused by obstructions.

F. Plug branch lines to valves and fire hydrants shown on Drawings to be removed. Deliver fire hydrants designated for salvage to the American Water on base depot location.

G. Install branches (leads) in accordance with Section 22 11 16.11.

H. Coating Requirements:

1. Apply coatings in strict accordance with manufacturer's recommendations. No requirements of this specification shall cancel or supersede written directions and recommendations of specific manufacturer so as to jeopardize integrity of applied system.

2. Furnish affidavit of compliance that coatings furnished complies with requirements of this specification and referenced standards, as applicable.

I. Per NFPA standards, provide a color code for the hydrant bonnet to indicate the hydrant's available flow at 20 psi according to the following table:

Supply Water Line Flow Characteristics	**Bonnet Color**
Less than 500 GPM	Red
500-999 GPM	Orange
1000-1499 GPM	Green
1500 GPM & Above	Light Blue

J. Remove and dispose of unsuitable materials and debris in accordance with requirements of Waste Material Disposal.

END OF SECTION 33 12 19

SECTION 33 12 33

WATER METERS

PART 1 GENERAL

1.01 SCOPE

A. Water meters, sub-meters, and fire service meters.

1.02 SUBMITTALS

A. Conform to requirements of Section 01 30 00 - Submittals.

B. Submit written certification of calibration and test results.

C. Submit manufacturer's certification that water meters meet applicable requirements of this Specification Section.

D. Submit accuracy registration test certification from manufacturer for each 3-inch through 10 inch diameter meter.

1.03 QUALITY CONTROL

A. Submit manufacturer's warranty against defects in materials and workmanship for one (1) year from date of Substantial Completion.

B. Provide vendor's unconditional guarantee that performance of each meter meets applicable AWWA standards and AWWA Manual M6 as follows:

1. Displacement type: 10 years from installation or register registration shown below, whichever comes first.

Size (inch)	Registration (million gallons)
5/8,3/4	1.5
1	2.5
1-1/2	5.0
2	10.5

2. Turbine type: 1 year from date of installation.
3. Compound type: 1 year from date of installation.
4. Fire service type: 1 year from date of installation,

Operations of hermetically sealed register, 5/8-inch to 2-inch diameter, shall be unconditionally guaranteed for 15 years.

C. Provide manufacturer's unconditional guarantee for each sealed register against leakage, fogging, discoloration and stoppage for 15 years from date of Installation.

D. Vendor may replace meters that become defective within guarantee period with meters that comply with this Specification. AWS will return defective meters to vendor at expense. Meters repaired or replaced under this guarantee must meet accuracy limits for new meters upon receipt and accuracy limits for remaining period of initial guarantee.

1.04 METER LOCATION REQUIREMENTS

A. Install 2-inch and smaller water meters and shut-off valves (stop boxes) at point of demarcation or as close to point of demarcation as physically possible.

B. Meters shall not be placed inside of government owned facilities. Meters located within buildings shall remain as government property and maintenance and operation of these meters shall remain the responsibility of the government.

PART2 PRODUCTS

2.01 GENERAL

A. Provide meters of type and size as indicated on Drawings, unless otherwise indicated.

B. Provide bolted split casings. Main casings of meters and external fasteners: Copper alloy with minimum 75 percent copper for 5/8 inch to 2 inches, bronze or cast iron, hot-dipped galvanized or epoxy coating for 3 inches and larger.

C. Straightening Vanes: Non-corrosive material compatible with case material.

D. Intermediate gear train shall not come into contact with water and shall operate in suitable lubricant.

E. Registers: Automatic Meter Reading (AMR) type that provides pulse, contact closure, piezo switch or encoder generated output signal, compatible with AWS radio and telephone AMR systems. Provide minimum 12-foot wire when permanently connected to register. Lens: impact resistant. Register box: tamper resistant by means of tamper screw

or plug: Register: permanently sealed, straight-reading, center-sweep test hand, magnetic driven, U.S. gallons. Digits: 6, black in color, with lowest registering 3 digits (below 1,000-gallon registration) having contrasting digit and background color. Register capacity of meters: 9.99 million gallons for 5/8 inch to 2 inches and 999.999 million gallons for 3 inches and larger.

F. Connections: 5/8 inch to 1 inch: threads at each end; 1-1/2 to 2 inches: 2-bolt oval flanges each end; 3 inches and larger: flange at each end.

G. Stamp manufacturer's meter serial number on outer case. Stamp manufacturer's meter serial number on outside of register lid when provided. Manufacturer's serial numbers shall be individual and not duplicated.

H. Water Meters:

1) Provide approved meters equipped with AMR type register to connect to American Water AMR system. Water Meters less than 1 ½" in size shall be: Neptune Model T10' (ProRead Gallon 6 wheel plastic bottom) with 'Neptune Model R900v2 – pit style MIU c/w 6-ft of antenna wire). **NO EXCEPTIONS**

Water Meter to be supplied with a 'McDonald' Cast Iron Yoke as shown on standard detail drawings for locations where directed by AW Project Manager.

2) Provide approved meters equipped with AMR type register to connect to American Water AMR system. Water Meters 1 ½" and greater shall be Neptune HP Turbine meters with 'Neptune Model R900i – pit style MIU c/w 6-ft of antenna wire). **NO EXCEPTIONS**

Water Meter to be supplied with a 'McDonald' meter setter as shown on standard detail drawings for locations where directed by AW Project Manager

I. Manufacturing Quality Control shall permit successful interchangeability from one meter to another of same size including registers, measuring chambers and units, discs or pistons as units, change gears, bolts, nuts, and washers without affecting accuracy of new meter.

J. For water meters installed on existing lines, isolation valves shall be provided upstream and downstream of the meter box to allow for maintenance and/or repair of meters.

J. For water meter vaults provide vaults in accordance with requirements set forth in Specification Section 03 48 20 – Valve Boxes and Meter Vaults.

2.02 METER APPLICATIONS

A. Sizes 5/8-inch to 2-inch Meters: Displacement type (except for constant flow where 2-inch turbine may apply).

B. Sizes 3-inch and above Meters:

1. Turbines:

Processing plants
Manufacturing facilities
Lawn sprinkler systems
Effluent water in treatment plants
Booster (pump) stations
Level controlled tank filling operations
Fire hydrants (transients)
Inter-systems sale or transfer
Sewer credit/sub-meter

2. Compounds:

Multi-family dwellings
Motels and hotels
Hospitals
Schools
Restaurants
Office buildings
Dormitories, nursing homes, department stores, shopping malls, and other commercial establishments

Note: Provide fire service type for sizes larger than 6 inches.

3. Fire Service Type: For designated fire protection lines. Provide proportional or compound type fire service meter assembly (AWWA C 703) when customer elects to use combination of potable and fire protection services in lieu of separate domestic meters and fire services.

2.03 MATERIALS

A. Cold-Water Meters:

1. Displacement Type: AWWA C 700; sizes 5/8 inch up to and including 2 inches; oscillating disc or piston of magnetic drive type; bolted split-case design, with either being removable.

2. Turbine Type: AWWA C 701; Class II; sizes 3 inches through 10 inches; flanged; straight-through measuring chamber; rotor construction: polypropylene or similar non rubber material with specific gravity of approximately 1.0, equipped with near frictionless replaceable bearings in turbine working against rotor shaft positioned thrust bearing. Transient/Fire Hydrant Meter Inlet: Female fitting for attachment to hose nozzle with National Standard Fire hose thread. Outlet: 2-inch nipple with National Pipe Thread. Include restriction plate to limit flow through meter to 400 gpm at 65 psi.

3. Compound Type: AWWA C 702; sizes 2 inches through 6 inches. Measuring chambers: For use in continuous operation; separate units of copper alloy (minimum 84 percent copper) or approved polymer material, inert in corrosive potable water; with centering device for proper positioning. Measuring pistons: Non-pilot type with division plates of rubber covering vulcanized to stainless steel or other approved material of sufficient thickness to provide minimum piston oscillation noise. Measuring discs: Flat or conical type, one piece, mounted on monel or 316 stainless steel spindle. Measuring chamber strainer screen area: Twice area of main case inlet.

4. Fire-Service Type: sizes 4 inches through 10 inches; turbine-type, compound type, proportional type; AWWA C 703, with separate check valve conforming to AWWA C 510. Determine size of fire meter by adding fire flow and domestic flow.

2.04 STRAINERS

A. Displacement Potable Water Meters 5/8 inch through 2 inches: Self-straining by means of annular space between measuring chamber and external case or with strainer screens installed in meter. Provide rigid screens which fit snugly, are easy to remove, with effective straining area at least double that of main case inlet.

B. Potable Water Meters 2-inch diameter and larger: Equip with separate external strainer with bronze body for diameters less than 8 inches. 8-inch diameter and larger may be cast iron, hot-dipped galvanized or epoxy

coating. Strainers: Bolted to inlet side of meter, detachable from meter, easily removable lid. Strainer screen: Made of rounded cast bronze, stainless steel wire, having nominal screen size of 3-1/2 mesh-per-inch (U.S. Series) not less than 45 percent clear area.

C. Provide separate approved external strainers (when required by meter manufacturer) approved for use in fire service metered connections by Underwriters Laboratories. Bodies: Cast iron or copper alloy. Ends: Flanged in accordance with ASME B 16.1, Class 125. Provide stainless steel basket. Strainers shall be detachable from meter.

2.05 CONNECTIONS AND FITTINGS

A. Provide pipe for connections in accordance with Section 33 11 00.15 - Ductile Iron Pipe and Fittings and Section 33 11 00.11 - Polyvinyl Chloride Pipe. Use restrained joints and flanged joints only.

B. Fittings:

1. For meters 2 inches and smaller: Same type of fittings as Outlet End fittings for Curb Stop in accordance with Section 22 11 16.11 - Water Tap and Service Line Installation.

2. For meters 3 inches and larger: Restrained ductile iron; push-on bell joints or mechanical joint fittings between water line and meter vault; Class 125 flanged inside meter vaults; cement mortar lined and sealed.

2.06 LAYING LENGTHS

A. Minimum laying lengths for meter and standard strainer shall be as shown on Drawings.

PART 3 EXECUTION

3.01 TAPPING AND METER SERVICE INSTALLATION

A. Meter Service Line:

1. Use pipe and fittings conforming to requirements of Section 33 11 00.15 - Ductile Iron Pipe and Fittings, or Section 33 11 00.11 - Polyvinyl Chloride Pipe.

2. Limit pulling and deflecting of joints to limits recommended by manufacturer.

3. Make vertical adjustments with offset bends where room will permit. Minimize number of bends.

4. Provide minimum of ten pipe diameters of straight pipe length upstream and downstream of meter vault.

3.02 METER FITTING HOOKUP

A. Support meter piping and meter, level and plumb, during installation. Support meters 3 inches and larger with concrete at minimum of two locations.

B. Use round flanged fittings inside meter box or vault except for mechanical joint to flange adapter. Provide full-face 1/8-inch black neoprene or red rubber gasket material on flanged joints. Provide bolts and nuts made from approved corrosion-resistant material.

C. Tighten bolts in proper sequence and to correct torque.

D. Visually check for leaks under normal operating pressure following installation. Repair or replace leaking components.

3.03 METER BOX AND VAULT INSTALLATION

A. Conform to requirements of Section 03 48 20 - Valve Boxes and Meter Vaults.

B. Perform adjustment to existing meter in accordance with Section 03 48 20 - Valve Boxes and Meter Vaults.

.04 TESTING

A. Accuracy registration tests will be conducted in accordance with latest revision of AWWA standard for type and size of meter.

1. Tests will be run on meters prior to installation at AWS meter repair shop. Meters 2 inches and smaller will be tested at random at AWS discretion. All 3 inches and larger meters will be tested.

2. Accuracy of displacement meters during guarantee period shall be as follows:
   a. Initial period: of 18 months from date of shipment or 12 months from date of installation: 98.5% to 101.5% at standard and minimum flow rates; 98% to 101% at low flow rates.
   b. Second period: AWWA new meter accuracy as tested below.

	GUARANTEE PERIOD		TEST FLOW RATE
Meter Size (inches)	Age of Meter (Years) Or	Million* Gallons	Minimum Rate (gpm)
5/8	>1 to <5	0.5	1/4
1	>1 to <5	1.0	3/4
1-1/2	>1 to <5	2.5	1-1/2
2	>1 to <5	5.5	2

* Total registration.

   c. Third period: AWWA new meter accuracy for standard flow rates and AWWA repair meter accuracy for minimum flow rate as tested below.

	GUARANTEE PERIOD		TEST FLOW RATE
Meter Size (inches)	Age of Meter (Years) Or	Million* Gallons	Minimum Rate (gpm)
5/8	>5 to <10	1.5	1/4
1	>5 to <10	2.5	3/4
1-1/2	>5 to <10	5.0	1-1/2
2	>5 to <10	10.0	2

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3. Minimal acceptable accuracy in percent of low flow registration for turbine meters:

Meter Size (inches)	Minimum Flow (gpm)	% Accuracy Required
2	3	95
3	5	95
4	15	95
6	20	95
8	20	95
10	30	95

END OF SECTION 33 12 33

C. For system operating pressures of 200 psi or less, perform the hydrostatic test at a pressure of no less than 100 psi above the normal operating pressure without exceeding the rating of the pipe and appurtenances. For system operating pressures in excess of 200 psi, perform the hydrostatic test at a pressure that is 1.5 times the normal operating pressure, but no more than the design rating of the pipe and appurtenances.

D. Valves shall not be operated in either direction at a differential pressure exceeding the rated valve working pressure. A test pressure greater than the rated valve working pressure can result in trapped test pressure between the gates of a double-disc gate valve. For tests exceeding the rated valve working pressure, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve working pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or the valve can be fully opened if desired.

E. The test pressure shall not exceed the rated working pressure or differential pressure of the valves when the pressure boundary of the test section includes closed, resilient-seated gate valves or butterfly valves.

F. Attach a tapping sleeve and valve assembly to the main. Pressure test the assembly prior to making the tap. The required test pressure shall be determined in the same manner as for pipe. The test is acceptable if there is no pressure drop in 15 minutes at test pressure.

1.02 FILLING AND TESTING

A. Slowly fill each segregated section of pipeline with water ensuring that all air is expelled. Extreme care must be taken to ensure that all air is expelled during the filling of pipe. The line shall stand full of water for at least twenty-four hours prior to testing to allow all air to escape. If necessary, tap the main at points of highest elevation to expel air as the pipe is filled. Remove the corporation stops and plug the taps after successfully filling the pipeline and expelling all air as approved by AW.

B. Apply the specified test pressure, measured at the point of lowest elevation, using a pump connected to the pipe in a manner satisfactory to the Engineer. If the elevation of the high point of the pipeline being tested is such that the pressure during testing will be below 85% of the required test pressure, AW will require a separate test to be performed on this section of pipeline. In lieu of a separate test, the test pressure measured at the lowest elevation may be increased, within the pressure rating of the

pipeline material, such that the resulting pressure at the highest point exceeds 85% of the required test pressure. The test will be conducted for at least two hours at the required test pressure ± 5 psi.

C. Conduct a leakage test concurrently with the pressure test. Leakage is defined as the volume of the water that must be supplied into the newly laid pipeline to maintain pressure within 5 psi of the test pressure after it is filled and purged of air. Measure the volume of water using a calibrated container or meter.

D. No pipeline installation will be accepted by AW if the leakage is greater than that shown in the following table:

Allowable Leakage per 1000 ft. of Pipeline*---gph

Avg. Test Pressure	Nominal Pipe Diameter—*in.*													
psi	4	6	8	10	12	14	16	18	20	24	30	36	42	48
450	0.57	0.86	1.15	1.43	1.72	2.01	2.29	2.58	2.87	3.44	4.30	5.16	6.02	6.88
400	0.54	0.81	1.08	1.35	1.62	1.89	2.16	2.43	2.70	3.24	4.05	4.86	5.68	6.49
350	0.51	0.76	1.01	1.26	1.52	1.77	2.02	2.28	2.53	3.03	3.79	4.55	5.31	6.07
300	0.47	0.70	0.94	1.17	1.40	1.64	1.87	2.11	2.34	2.81	3.51	4.21	4.92	5.62
275	0.45	0.67	0.90	1.12	1.34	1.57	1.79	2.02	2.24	2.69	3.36	4.03	4.71	5.38
250	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21	3.85	4.49	5.13
225	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04	3.65	4.26	4.86
200	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87	3.44	4.01	4.59
175	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68	3.22	3.75	4.29
150	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48	2.98	3.48	3.97
125	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27	2.72	3.17	3.63
100	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03	2.43	2.84	3.24

*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size. The table has been generated from the formula: $L = \frac{S*D*P^{1/2}}{148{,}000}$ where L is the allowable leakage in gallons per hour, S is the length of pipe in feet, D is the nominal pipe diameter in inches, and P is the test pressure in psig.

E. Should any test disclose damaged or defective materials or leakage greater than that permitted, the Contractor shall, at Contractor's expense, locate and repair and/or replace the damaged or defective materials. Materials used for repair must be approved by AW and meet the specifications. Repeat the tests until the leakage is within the permitted allowance and is satisfactory to AW

END OF SECTION 33 01 10.13

SECTION 02530 - SANITARY SEWERAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:

1. Sanitary Sewer Specifications of American Water.

SECTION 03 48 10

PRECAST CONCRETE MANHOLES

PART 1: GENERAL

1.01 SECTION INCLUDES

A. Precast concrete manholes for sanitary sewers, storm sewers, and water lines.

B. Precast concrete sanitary sewer manholes with PVC liner where corrosion resistant manholes are specifically indicated in Drawings.

C. Pile-supported concrete foundation used for unstable subgrade treatment for manhole base.

1.02 SUBMITTALS

A. Conform to requirements of Section 01 33 00 - Submittals.

B. Submit manufacturer's data and details of following items for approval:

1. Shop drawings of manhole sections, base units and construction details, including reinforcement, jointing methods, materials and dimensions.
2. Summary of criteria used in manhole design including, as minimum, material properties, loadings, load combinations, and dimensions assumed. Include certification from manufacturer that precast manhole design is in full accordance with ASTM C 478 and design criteria as established in Paragraph 2.01E of this Specification.
3. Frames, grates, rings, and covers
4. Materials to be used in fabricating drop connections
5. Materials to be used for pipe connections at manhole walls
6. Materials to be used for stubs and stub plugs, if required
7. Materials and procedures for corrosion-resistant liner and coatings, if required.
8. Plugs to be used for sanitary sewer hydrostatic testing
9. Manufacturer's data for pre-mix (bag) concrete, if used for channel inverts and benches

PART 2: PRODUCTS

2.01 PRECAST CONCRETE MANHOLES

A. Provide manhole sections, base sections, and related components conforming to ASTM C 478. Provide base riser section with integral floors, unless shown otherwise. Provide adjustment rings which are standard components of manufacturer of manhole sections. Mark date of manufacture and name or trademark of manufacturer on inside of barrel.

B. Construct barrels for precast manholes from standard reinforced concrete manhole sections of diameter indicated on Drawings. Use various lengths of manhole sections in combination to provide correct height with fewest joints. Design wall sections for depth and loading conditions in Paragraph 2.01 E, with minimum thickness of 5 inches. Base section shall have minimum thickness of 12 inches under invert.

C. Provide tops to support AASHTO HS-20 vehicle loading, and receive cast iron frame covers, as indicated on Drawings.

D. Where manholes larger than 48-inch diameter are indicated on Drawings, provide precast base sections with flat slab top precast sections used to transition to 48-inch diameter manhole access riser sections. Transition can be concentric or eccentric unless otherwise shown on Drawings. Locate transition to provide minimum of 7-foot head clearance from base to underside of transition unless otherwise approved by AW Project Manager.

E. Design Loading Criteria: Manhole walls, transition slabs, cone tops, and manhole base slab shall be designed, by manufacturer, to requirements of ASTM C 478 for depth as shown on Drawings and to resist following loads.

1. AASHTO HS-20 vehicle loading applied to manhole cover and transmitted down to transition and base slabs
2. Unit soil weight of 120 pcf located above portions of manhole, including base slab projections
3. Lateral soil pressure based on saturated soil conditions producing an at-rest equivalent fluid pressure of 100 pcf
4. Internal liquid pressure based on unit weight of 63 pcf
5. Dead load of manhole sections fully supported by transition and base slabs

F. Design: Manhole walls, transition slabs, cone tops, and manhole base slab shall be designed according to requirements of ASTM C 478 and following:

1. Design additional reinforcing steel to transfer stresses at openings. Area of steel to be no less than shown on Drawings.
2. Wall loading conditions:
   a. Saturated soil pressure acting on empty manhole
   b. Manhole filled with liquid to a halfway depth as measured from invert to cover, with no balancing external soil pressure
3. Minimum clear distance between two wall penetrations shall be 12 inches or

half diameter of smaller penetration, whichever is greater

G. Provide joints between sections with o-ring gaskets conforming to ASTM C 443.

H. When base is cast monolithic with portion of vertical section, extend reinforcing in vertical section into base.

I. Precast Concrete Base: Suitable cutouts or holes to receive pipe and connections. Lowest edge of holes or cutouts: For water line manhole, no less than 6 inches above inside surface of floor of base.

2.02 CONCRETE

A. Conform to requirements of Section 03 30 00- Cast-In-Place Concrete.

B. Channel Inverts: Use 5 sack premix (bag) concrete or Class A concrete for inverts not integrally formed with manhole base, with minimum compressive strength of 4000 psi.

C. Cement Stabilized Sand Foundation: Provide cement stabilized sand foundation under base section in lieu of foundation slab, as shown on Drawings.

D. Concrete Foundation: Provide Class A concrete with minimum compressive strength of 4000 psi for concrete foundation slab under manhole base section where indicated on Drawings.

2.03 REINFORCING STEEL

A. Conform to requirements of Section 03 30 00 – Cast-In-Place Concrete.

2.04 FRAMES AND COVERS

A. Use castings for frames, grates, rings and covers conforming to ASTM A 48, Class 35B. Provide locking covers if indicated on Drawings.

B. Use clean castings capable of withstanding application of AASHTO M306-40,000 pound proof loading without detrimental permanent deformation.

C. Fabricate castings to conform to shapes, dimensions, and with wording or logos shown on Drawings. Standard dimensions for manhole covers are 32 inches in diameter.

D. Use clean castings, free from blowholes and other surface imperfections. Use clean and symmetrical cast holes in covers, free of plugs.

E. Where indicated on Drawings, provide watertight manhole frames and covers with minimum of four bolts and gasket designed to seal cover to frame. Supply approved watertight manhole covers and frames.

F. Where shown on Drawing, provide manhole frames and covers with 48 inch diameter clear - opening, with inner cover for 22 inch diameter clear opening. Provide approved inner cover with pattern shown on Drawings.

2.05 DROP CONNECTIONS AND STUBS

A. Provide drop connections and stubs conforming to same pipe material requirements used in main pipe, unless otherwise indicated on Drawings.

2.06 PIPE CONNECTIONS TO MANHOLE

A. Sanitary Sewers.

1. Provide resilient connectors conforming to requirements of ASTM C 923. Use the following materials for metallic mechanical devices as defined in ASTM C 923:

   1. External clamps: Type 304 stainless steel

      a. Internal, expandable clamps on standard manholes: Type 304 stainless steel, 11 gauge minimum.

      b. Internal, expandable clamps on corrosion-resistant manholes:

      1) Type 316 stainless steel, 11 gauge minimum

      2) Type 304 stainless steel, 11 gauge minimum, coated with minimum 16 mil fusion bonded epoxy conforming to AWWA C 213

2. Where rigid joints between pipe and cast-in-place manhole base are specified or shown on Drawings, provide polyethylene-isoprene water-stop meeting physical property requirements of ASTM C 923, such as Press-Seal WS Series, or approved equal.

B. Storm Sewer Connections:

1. Combined sewers are strictly prohibited for all AW facilities..

C. Water Lines

1. Where smooth exterior pipes, i.e., steel, ductile iron, or PVC pipes are connected to manhole base or barrel, seal space between pipe and manhole wall with assembly consisting of rubber gasket or links mechanically compressed to form a watertight barrier. Assemblies: Press-Wedge, Res-Seal, Thunderline Link-Seal, or approved equal. See Drawings for placement of assembly in manhole sections.

2. When connecting concrete or cement mortar coated steel pipes, or as option for connecting smooth exterior pipes to manhole base or barrel, space between pipe and manhole wall may be sealed with an assembly consisting of a stainless steel power sleeve, stainless steel take-up clamp and a rubber gasket. Take-up clamp: Minimum of 9/16 inch wide. Provide PSX positive seal gasket system by Press-Seal Gasket Corporation or approved equal.

2.07 SEALANT MATERIALS

A. Submit products in accordance with Section 01 33 00 - Submittals.

B. Provide sealing materials between precast concrete adjustment ring and manhole cover frame, Adeka Ultraseal P201, or approved equal.

C. Provide approved external sealing material from Canusa Wrapid Seal manhole encapsulation system, or approved equal.

D. Provide Butyl Sealant: Provide Press-Seal EZ Stick, or equal, for HDPE rings.

2.08 CORROSION RESISTANT MANHOLE MATERIALS

A. Where corrosion-resistant manholes or PVC-lined manholes are indicated on Drawings, provide a PVC liner for precast cylindrical manhole section, base sections, and cone sections. Only plastic liners manufactured with integral locking ribs spaced at approximately 2-1/2 inches on center over entire liner is acceptable. Liners relying on mechanically fastened batten strips as primary means of anchorage are unacceptable. PVC liner shall be manufactured by Ameron Protective Linings Division; Poly-tee, Inc; or approved equal.

2.09 BACKFILL MATERIALS

A. Conform to requirements of Section 31 23 33 - Excavation and Backfill for Utilities.

2.10 NON-SHRINK GROUT

A. Provide prepackaged, inorganic, flowable, non-gas-liberating, non-metallic, cement-based grout requiring only addition of water.

B. Meet requirements of ASTM C 1107 and have minimum 28-day compressive strength of 7000 psi.

2.11 VENT PIPES

A. Provide external vent pipes for manholes where indicated on Drawings.

B. Buried Vent Pipes: Provide 3 inch or 4 inch PVC DWV pipe conforming to ASTM D 2665. Alternatively, provide FRP pipe as specified for vent outlet assembly.

C. Vent Outlet Assembly: Provide vent outlet assembly as shown on Drawings, constructed of following specified materials:

1. FRP Pipe: Provide filament wound FRP conforming to ASTM D 2996 or centrifugally cast FRP conforming to ASTM D 2997. Seal cut ends in accordance with manufacturer's recommendations.
2. Joints and Fittings: Provide epoxy bodied fittings and join pipe to fittings with epoxy adhesive
3. Flanges: Provide socket-flange fittings for epoxy adhesive bonding to pipe ends where shown on Drawings. Meet bolt pattern and dimensions for ASME B 16.1, 125-pound flanges. Flange bolts shall be Type 304 stainless steel or hot-dip zinc coated, conforming to ASTM A 307, Class A or B.
4. Coating: Provide approved 2-component, aliphatic polyurethane coating using primer or tie coat recommended by manufacturer. Provide two or more coats to yield dry film thickness of at least 3 mils. Color shall be selected by Project Manager from manufacturer's standard colors.

2.12 PROHIBITTED MATERIALS

A. Do not use brick masonry for construction of sanitary sewer manholes, including adjustment of manholes to grade. Use only specified materials listed above.

2.13 MANHOLE LADDER FOR WATERLINE MANHOLES

A. Manhole Ladder: Fiberglass with 300-lb rating at appropriate length; conform to requirements of Occupational Safety and Health Standards (OSHA), U.S. Department of Labor except where shown on Drawings

1. Use components, including rungs, made of fiberglass, fabricated with nylon or aluminum rivets and/or epoxy. Apply non-skid coating to ladder rungs. Mount ladder using manufacturer's recommended hardware.
2. Provide ladder as manufactured by Saf-Rail or approved equal. Locate ladder as shown on Drawings.
3. Fiberglass: Premium type polyester resin, reinforced with fiberglass; constructed to provide complete wetting of glass by resin; resistant to rot, fungi, bacterial growth and adverse effects of acids, alkalis and residential and industrial waste; yellow in color.

B. Provide approved petroleum-based tape encapsulating bolts in access manhole.

PART 3: EXECUTION

3.01 EXAMINATION

A. Verify that lines and grades are correct.

B. Determine if subgrade, when scarified and recompacted, can be compacted to 95 percent of maximum Standard Proctor Density according to ASTM D 698 prior to placement of foundation material and base section. When proper density is not reached, moisture condition subgrade until that density is reached or treat as unstable subgrade.

C. Do not build manholes in ditches, swales, or drainage paths unless approved by Project Manager.

3.02 PLACEMENT

A. Install precast manholes to conform to locations and dimensions shown on Drawings.

B. Place sanitary and storm manholes at points of change in alignment, grade, size, pipe intersections, and end of sewer unless otherwise shown on Drawings.

3.03 MANHOLE BASE SECTIONS AND FOUNDATIONS

A. Place precast base on 12 inch thick (minimum) foundation of crushed stone, cement stabilized sand, or concrete foundation slab. Cement stabilized sand shall be compacted.

B. Unstable Subgrade Treatment: When unstable subgrade is encountered, notify Project Manager for examination of subgrade to determine if subgrade has heaved upwards after being excavated. When heaving has not occurred, over-excavate subgrade to allow for 24inch-thick layer of crushed stone wrapped in filter fabric as foundation material under manhole base. When there is evidence of heaving, provide pile-supported concrete foundation, as detailed on Drawings, under manhole base.

3.04 PRECAST MANHOLE SECTIONS

A. Install sections, joints, and gaskets in accordance with manufacturer's printed recommendations.

B. Install precast adjustment rings above tops of cones or flat-top sections as required to adjust finished elevation and to support manhole frame.

C. Seal any lifting holes with non-shrink grout.

D. Where PVC liners are required, seal joints between sections in accordance with manufacturer's recommendations.

E. Place at least two precast concrete grade rings with thickness of 12 inches or less, under casting.

3.05 PIPE CONNECTIONS AT MANHOLES

A. Install approved resilient connectors at each pipe entering and exiting manholes in accordance with manufacturer's instructions.

1. Where smooth exterior pipes, i.e. steel, ductile iron or PVC pipes are connected to manhole base or barrel, space between pipe and manhole wall shall be sealed with an assembly consisting of rubber gaskets or links mechanically compressed to form watertight barrier. Assemblies: "Press-Wedge," "Res-Seal," "Thunderline Link-Seals," or approved equal. See Drawings for placement of assembly in manhole sections.

2. When connecting concrete or cement mortar coated steel pipes, or as an option for connecting smooth exterior pipes to manhole base or barrel, space between pipe and manhole wall may be sealed with an assembly consisting of stainless steel power sleeve, stainless steel take-up clamp and rubber gasket. Take-up clamp: Minimum of 9/16 inch wide. Provide PSX positive seal gasket system by Press-Seal Gasket Corporation or approved equal.

B. Grout storm sewer connections to manhole unless otherwise shown on Drawings. Grout pipe penetration in place on both inside and outside of manhole.

C. Ensure no concrete, cement stabilized sand, fill, or other rigid material is allowed to enter space between pipe and edge of wall opening at and around resilient

connector on either interior or exterior of manhole. If necessary, fill space with compressible material to ensure full flexibility provided by resilient connector.

D. Where new manhole is constructed on existing sewer, rigid joint pipe may be used. Install waterstop gasket around existing pipe at center of cast-in-place wall. Join ends of split waterstop material at pipe springline using an adhesive recommended and supplied by waterstop manufacturer.

E. Test connection for watertight seal before backfilling.

3.06 INVERTS FOR SANITARY SEWERS

A. Construct invert channels to provide smooth flow transition waterway with no disruption of flow at pipe-manhole connections. Conform to following criteria:

1. Slope of invert bench: 1 inch per foot minimum; 1-1/2 inches per foot maximum
2. Depth of bench to invert:
   a. Pipes smaller than 15 inches: one-half of largest pipe diameter
   b. Pipes 15 to 24 inches: three-fourths of largest pipe diameter
   c. Pipes larger than 24 inches: equal to largest pipe diameter
3. Invert slope through manhole: 0.10 foot drop across manhole with smooth transition of invert through manhole, unless otherwise indicated on Drawings.

B. Form invert channels with concrete if not integral with manhole base section. For direction changes of mains, construct channels tangent to mains with maximum possible radius of curvature. Provide curves for side inlets and smooth invert fillets for flow transition between pipe inverts.

3.07 DROP CONNECTIONS FOR SANITARY SEWERS

A. Backfill drop assembly with crushed stone wrapped in filter fabric, cement stabilized sand, or Class A concrete to form solid mass. Extend cement stabilized sand or concrete encasement minimum of 4 inches outside bells.

B. Install drop connection when sewer line enters manhole higher than 24 inches above invert of manhole.

3.08 STUBS FOR FUTURE CONNECTIONS

A. In manholes, where future connections are indicated on Drawings, install resilient connectors and pipe stubs with approved watertight plugs.

3.09 MANHOLE FRAME AND ADJUSTMENT RINGS

A. Combine precast concrete or HDPE adjustment rings so elevation of installed casting cover matches pavement surface. Seal between concrete adjustment ring and precast top section with non-shrink grout; do not use mortar between adjustment rings. Apply latex-based bonding agent to precast concrete surfaces joined with non-shrink grout. Set cast iron frame on adjustment ring in bed of approved sealant material. Install sealant bed consisting of two beads of sealant, each bead having minimum dimensions of 1/2-inch and 1/2-inch wide.

B. Wrap manhole frame and adjustment rings with external sealing material, minimum 3 inches beyond joint between ring and frame and adjustment rings and precast section.

C. For manholes in unpaved areas, set top of frame minimum of 6 inches above existing ground line unless otherwise indicated on Drawings. In unpaved areas, encase manhole frame in mortar or non-shrink grout placed flush with face of manhole ring and top edge of frame. Provide rounded corner around perimeter.

3.10 BACKFILL

A. Place and compact backfill materials in area of excavation surrounding manholes in accordance with requirements of Section 31 23 33 - Excavation and Backfill for Utilities.

B. Where rigid joints are used for connecting existing sewers to manhole, backfill existing sewer up to springline of pipe with Class B concrete or flowable fill.

C. In unpaved areas, provide positive drainage away from manhole frame to natural grade. Provide restoration of disturbed areas in accordance with Section 32 92 00 – Lawn Restoration.

3.11 DOGHOUSE MANHOLE

A. Existing sewer pipe to remain until satisfactory completion of manhole testing.

B. Crown of existing pipe shall be flush with concrete shelf that is formed within the manhole.

C. Doghouse manholes shall be constructed per the drawings.

3.12 FIELD QUALITY CONTROL

D. Conduct testing of sanitary sewer manholes in accordance with requirements of Section 33 01 30.13 (Acceptance Testing for Sanitary Sewers).

3.13 PROTECTION

A. Protect manholes from damage until work has been accepted. Repair damage to manholes at no additional cost to AW.

END OF SECTION 03 48 10

SECTION 33 01 30.13

ACCEPTANCE TESTING FOR SANITARY SEWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acceptance testing of sanitary sewers including:

1. Visual inspection of sewer pipes
2. Mandrel testing for flexible sewer pipes.
3. Leakage testing of sewer pipes.
4. Leakage testing of manholes.
5. Smoke testing of point repairs.
6. Television of sewer lines.

B. All tests listed in this Section are not necessarily required on this Project. Required tests are named in other Sections which refer to this Section for testing criteria and procedures.

1.02 PERFORMANCE REQUIREMENTS

A. Gravity flow sanitary sewers are required to have straight alignment and uniform grade between manholes.

B. Flexible pipe, including "semi-rigid" pipe, is required to show no more than 5 percent deflection. Test pipe no sooner than 30 days after backfilling of line segment but prior to final acceptance using standard mandrel to verify that installed pipe is within specified deflection tolerances.

C. Maximum allowable leakage for Infiltration or Exfiltration

1. The total exfiltration, as determined by hydrostatic head test, shall not exceed 50 gallons per inch diameter per mile of pipe per 24 hours at minimum test head of 2 feet above crown of pipe at upstream manhole or 2 feet above groundwater elevation, whichever is greater.
2. When pipes are installed more than 2 feet below groundwater level, use infiltration test in lieu of exfiltration test. Total infiltration shall not exceed 50 gallons per inch diameter per mile of pipe per 24 hours. Groundwater elevation must be at least 2 feet above crown of pipe at upstream manhole.
3. Refer to Table 33 01 30.13-1, Water Test Allowable Leakage, at end of

Section, for measuring leakage in sewers. Perform leakage testing to verify that leakage criteria are met.

D. Perform air testing in accordance with requirements of this Section and the local state environmental agency requirements. Refer to Table 33 01 30.13-2, Time Allowed for Pressure Loss from 3.5 psig to 2.5 psig, Table 33 01 30.13-3, Minimum Testing Times for Low Pressure Air Test, and Table 33 01 30.13-4, Vacuum Test Time Table, at end of this Section.

E. Perform video televising of all in-place mains.

1.03 SUBMITTALS

A. Conform to requirements of Section 01 33 00 - Submittals.

B. Test Plan: Before testing begins and in adequate time to obtain approval through submittal process, prepare and submit test plan for approval by AW Project Manager. Include testing procedures, methods, equipment, and tentative schedule. Obtain advance written approval for deviations from Drawings and Specifications.

C. Test Reports: Submit test reports for each test on each segment of sanitary sewer.

D. Video television records shall be provided on DVD medium.

1.04 GRAVITY SANITARY SEWER QUALITY ASSURANCE

A. Repair, correct, and retest manholes or sections of pipe which fail to meet specified requirements when tested.

B. Provide testing reports and video of television inspection as directed by Project Manager.

C. Upon completion of video televising reviews by AW Project Manager, Contractor will be notified regarding final acceptance of sewer segment.

1.05 SEQUENCING AND SCHEDULING

A. Perform testing as work progresses. Schedule testing so that no more than 1000 linear feet of installed sewer remains untested at one time.

B. Coordinate testing schedules with AW Project Manager. Perform testing under observation of AW Project Manager.

1.06 TELEVISION INSPECTION

A. Quality Assurance: Submit one example video dvd of previous sewer inspection work that shows operational and structural defects in sewers, complete with audio commentary and inspection log(s).

1. Video and inspection logs will be reviewed to determine if quality of CCTV image is acceptable, and if defects were properly identified and documented.

2. Modify equipment and/or inspection procedures to achieve report material of acceptable quality.

3. Do not commence Work prior to approval of report by AW project manager.

B. Inspection Logs: Unless otherwise indicated, submit inspection logs that include the following as a minimum:

1. Project title
2. Name of American Water Enterprises Inc.
3. Time of day
4. System map number
5. Manhole to manhole pipe section
6. Pipe segment length
7. Pipe material
8. Line size
9. Compass direction of viewing
10. Direction of camera's travel
11. Pipe depth
12. Operator name
13. Tape counter reading at beginning and end of each manhole to manhole pipe segment.

C. Video DVD's: Submit completed video DVD's after cleaning and rehabilitation.

D. Maintain copy of all inspection documentation (DVD's, databases, and logs) for duration of Work and warranty period.

PART 2 PRODUCTS

2.01 DEFLECTION MANDREL

A. Mandrel Sizing. Rigid mandrel shall have outside diameter (O.D.) equal to 95 percent of inside diameter (I.D.) of pipe. Inside diameter of pipe, for purpose of determining outside diameter of mandrel, shall be average outside diameter minus two minimum wall thicknesses for O.D. controlled pipe and average inside diameter for I.D. controlled pipe, dimensions shall be per appropriate standard. Statistical or other "tolerance packages" shall not be considered in mandrel sizing.

B. Mandrel Design. Rigid mandrel shall be constructed of metal or rigid plastic material that can withstand 200 psi without being deformed. Mandrel shall have nine or more "runners" or "legs" as long as total number of legs is odd number. Barrel section of mandrel shall have length

of at least 75 percent of inside diameter of pipe. Rigid mandrel shall not have adjustable or collapsible legs which would allow reduction in mandrel diameter during testing. Provide and use proving ring for modifying each size mandrel.

C. Proving Ring. Furnish "proving ring" with each mandrel. Fabricate ring of 1/2-inch-thick, 3-inch-wide bar steel to diameter 0.02 inches larger than approved mandrel diameter.

D. Mandrel Dimensions (5 percent allowance). Average inside diameter and minimum mandrel diameter are specified in Table 33 01 30.13-5, Pipe vs. Mandrel Diameter, at end of this Section. Mandrels for higher strength, thicker wall pipe or other pipe not listed in table may be used when approved by Project Manager.

2.02 XFILTRATION TEST

A. Test Equipment:

1. Pipe plugs.
2. Pipe risers where manhole cone is less than 2 feet above highest point in pipe or service lead.

2.03 INFILTRATION TEST

A. Test Equipment:

1. Calibrated 90 degree V-notch weir.
2. Pipe plugs.

2.04 LOW PRESSURE AIR TEST

A. Minimum Requirement for Equipment:

1. Control panel
2. Low-pressure air supply connected to control panel.
3. Pneumatic plugs: Acceptable size for diameter of pipe to be tested; capable of withstanding internal test pressure without leaking or requiring external bracing.
4. Air hoses from control panel to:
    a. Air supply.
    b. Pneumatic plugs.
    c. Sealed line for pressuring.
    d. Sealed line for monitoring internal pressure.

B. Testing Pneumatic Plugs: Place pneumatic plug in each end of length of pipe on ground. Pressurize plugs to 25 psig; then pressurize sealed pipe to 5 psig. Plugs are acceptable when they remain in place against test pressure without external aids.

2.05 GROUND WATER DETERMINATION

A. Equipment: Pipe probe or small diameter casing for ground water elevation determination.

2.06 SMOKE TESTING

A. Equipment:

1. Pneumatic plugs.
2. Smoke generator as supplied by Superior Signal Company, or approved equal. 3. Blowers producing 2500 scfm minimum.

2.07 TELEVISION INSPECTION MATERIALS AND EQUIPMENT

A. DVD: Standard size medium usable in laptop and television DVD players.

1. Audio portion of composite DVD shall be sufficiently free from electrical interference and background noise to provide complete intelligibility of oral report.

2. Identify each tape with tape labels showing SNL's name, Contractor's name, and each manhole-to-manhole pipe segment of sewer line represented on tape.

B. Television Inspection Camera(s): Equipped with rotating head, capable of 90-degree rotation from horizontal and 360-degree rotation about its centerline.

1. Minimum Camera Resolution: 400 vertical lines and 460 horizontal lines.

2. Camera Lens: Not less than 140 degree viewing angle, with automatic or remote focus and iris controls.

3. Focal Distance: Adjustable through range of 6 inches (152 mm) to infinity.

4. Camera(s) shall be intrinsically safe and operative in 100 percent humidity conditions.

5. Lighting Intensity: Remote-controlled and adjusted to minimize reflective glare.

6. Lighting and Camera Quality: Provide clear, in-focus picture of entire inside periphery of sewer.

C. Footage Counter: Measures distance traveled by camera in sewer, accurate to plus or minus 2 feet (0.6 m) in 1,000 feet (305 m).

D. Video Titling: Video equipment shall include genlocking capabilities to extent that computer generated data (such as footage, date, and size) as determined by SDR, can be overlaid onto video, and be indicated on television monitor and permanently recorded on inspection DVD..

PART 3 EXECUTION

3.01 REPARATION

A. Provide labor, equipment, tools, test plugs, risers, air compressor, air hose, pressure meters, pipe probe, calibrated weirs, or any other device necessary for proper testing and inspection.

B. Determine selection of test methods and pressures for gravity sanitary sewers based on ground water elevation. Determine ground water elevation using equipment and procedures conforming to Control of Ground Water and Surface Water.

3.02 VISUAL INSPECTION OF GRAVITY SANITARY SEWERS

A. Check pipe alignment visually by flashing light between structures. Verify if alignment is true and no pipes are misplaced. In case of misalignment or damaged pipe, remove and relay or replace pipe segment.

3.03 MANDREL TESTING FOR GRAVITY SANITARY SEWERS

A. Perform deflection testing on flexible and semi-rigid pipe to confirm pipe has no more than 5 percent deflection. Mandrel testing shall conform to ASTM D 3034. Perform testing no sooner than 30 days after backfilling of line segment, but prior to final acceptance testing of line segment.

B. Pull approved mandrel by hand through sewer sections. Replace any section of sewer not passing mandrel. Mandrel testing is not required for stubs.

C. Retest repaired or replaced sewer sections.

3.04 LEAKAGE TESTING FOR GRAVITY SANITARY SEWERS

A. Test Options:

1. Test gravity sanitary sewer pipes for leakage by either exfiltration or infiltration methods, as appropriate, or with low pressure air testing.

2. Test new or rehabilitated sanitary sewer manholes with water or low pressure air. Manholes tested with low pressure air shall undergo physical inspection prior to testing.
3. Perform leakage testing after backfilling of line segment, and prior to tie-in of service connections.
4. If no installed piezometer is within 500 feet of sewer segment, provide temporary piezometer for this purpose.

B. Compensating for Ground Water Pressure:

1. Where ground water exists, install pipe nipple at same time sewer line is placed. Use 1/2-inch capped pipe nipple approximately 10 inches long. Make installation through manhole wall on top of sewer line where line enters manhole.
2. Immediately before performing line acceptance test, remove cap, clear pipe nipple with air pressure, and connect clear plastic tube to nipple. Support tube vertically and allow water to rise in tube. After water stops rising, measure height in feet of water over invert of pipe. Divide this height by 2.3 feet/psi to determine ground water pressure to be used in line testing.

C. Exfiltration test:

1. Determine ground water elevation.
2. Plug sewer in downstream manhole.
3. Plug incoming pipes in upstream manhole.
4. Install riser pipe in outgoing pipe of upstream manhole when highest point in service lead (house service) is less than 2 feet below bottom of manhole cone.
5. Fill sewer pipe and manhole or pipe riser, when used, with water to point 2-1/2 feet above highest point in sewer pipe, house lead, or ground water table, whichever is highest.
6. Allow water to stabilize for one to two hours. Take water level reading to determine drop of water surface, in inches, over one-hour period, and calculate water loss (1 inch of water in 4 feet diameter manhole equals 8.22 gallons) or measure quantity of water required to keep water at same level. Loss shall not exceed that calculated from allowable leakage according to Table 15250-1 at end of this Section.

D. Infiltration test: Ground water elevation must be not less than 2.0 feet above highest point of sewer pipe or service lead (house service).

1. Determine ground water elevation.
2. Plug incoming pipes in upstream manhole.

3. Insert calibrated 90 degree V-notch weir in pipe on downstream manhole.
4. Allow water to rise and flow over weir until it stabilizes.
5. Take five readings of accumulated volume over period of 2 hours and use average for infiltration. Average must not exceed that calculated for 2 hours from allowable leakage according to Table 33 01 30.13-1 at end of this Section.

E. Low Air Pressure Test: When using this test conform to ASTM C 828, ASTM C 924, or ASTM F 1417, as applicable, with holding time not less than that listed in Table 33 01 30.13-2.

1. Air testing for sections of pipe shall be limited to lines less than 36-inch average inside diameter.
2. Lines 36-inch average inside diameter and larger shall be tested at each joint. Minimum time allowable for pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch during joint test shall be 10 seconds, regardless of pipe size.
3. For pipe sections less than 36-inch average inside diameter:
    a. Determine ground water level.
    b. Plug both ends of pipe. For concrete pipe, flood pipe and allow 2 hours to saturate concrete. Then drain and plug concrete pipe.
    c. After manhole-to-manhole section of sanitary sewer main has been sliplined and prior to any service lines being connected to new liner, plug liner at each manhole with pneumatic plugs.
    d. Pressurize pipe to 4.0 psig. Increase pressure 1.0 psi for each 2.3 feet of ground water over highest point in system. Allow pressure to stabilize for 2 to 4 minutes. Adjust pressure to start at 3.5 psig (plus adjustment for ground water table). See Table 33 01 30.13-2 at end of this Section.
    e. To determine air loss, measure time interval for pressure to drop to 2.5 psig. Time must exceed that listed in Table 33 01 30.13-2 at end of this Section for pipe diameter and length. For sliplining, use diameter of carrier pipe.

F. Retest: Repair and retest any section of pipe which fails to meet requirements.

3.05 TEST CRITERIA TABLES

A. Exfiltration and Infiltration Water Tests: Refer to Table 33 01 30.13-1, Water Test Allowable Leakage, at end of this Section.

B. Low Pressure Air Test:

1. Times in Table 33 01 30.13-2, Time Allowed For Pressure Loss From 3.5

psig to 2.5 psig, at end of this Section, are based on equation from Texas Commission on Environmental Quality (TCEQ) Design Criteria 317.2(a)(4)(B). If the state where the project is being completed has more stringent times, the local state's requirements will apply.

		T = 0.0850(D)(K)/(Q)
where:	T =	Time for pressure to drop 1.0 pounds per square inch gauge in seconds
	K =	0.000419 DL, but not less than 1.0
	D =	Average inside diameter in inches
	L =	Length of line of same pipe size in feet
	Q =	Rate of loss, 0.0015 ft^3 /min./sq.ft. internal surface

2. Since K value of less than 1.0 shall not be used, there are minimum testing times for each pipe diameter as given in Table 33 01 30.13-3, Minimum Testing Times for Low Pressure Air Test.

Notes:

1. When two sizes of pipe are involved, compute time by ratio of lengths involved.
2. Lines with 27-inch average inside diameter and larger may be air tested at each joint.
3. Lines with average inside diameter greater than 36 inches must be air tested for leakage at each joint.
4. If joint test is used, perform visual inspection of joint immediately after testing.
5. For joint test, pipe is to be pressurized to 3.5 psi greater than pressure exerted by groundwater above pipe. Once pressure has stabilized, minimum times allowable for pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch gauge shall be 10 seconds.

3.06 LEAKAGE TESTING FOR MANHOLES

A. After completion of manhole construction, wall sealing, or rehabilitation, but prior to backfilling, test manholes for water tightness using hydrostatic or vacuum testing procedures.

B. Plug influent and effluent lines, including service lines, with suitably-sized pneumatic or mechanical plugs. Ensure plugs are properly rated for pressures required for test; follow manufacturer's safety and installation recommendations. Place plugs minimum of 6 inches outside of manhole walls. Brace inverts to prevent lines from being dislodged when lines entering manhole have not been backfilled.

C. Vacuum testing:

1. Install vacuum tester head assembly at top access point of manhole and adjust for proper seal on straight top section of manhole structure. Following manufacturer's instructions and safety precautions, inflate sealing element to recommended maximum inflation pressure; do not over-inflate.
2. Evacuate manhole with vacuum pump to 10 inches mercury (Hg), disconnect pump, and monitor vacuum for time period specified in Table 33 01 30.13-4, Vacuum Test Time Table.
3. If drop in vacuum exceeds 1 inch Hg over specified time period tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

D. Perform hydrostatic exfiltration testing as follows:

1. Seal wastewater lines coming into manhole with internal pipe plug. Then fill manhole with water and maintain it full for at least one hour.
2. The maximum leakage for hydrostatic testing shall be 0.025 gallons per foot diameter per foot of manhole depth per hour.
3. If water loss exceeds amount tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

3.07 SMOKE TEST PROCEDURE FOR POINT REPAIRS

A. Application: Perform smoke test to:

1. Locate points of line failure for point repair.
2. Determine when point repairs are properly made.
3. Determine when service connections have been reconnected to rehabilitated sewer.
4. Check integrity of connections to newly replaced service taps to liners and to existing private service connections.

B. Limitations: Do not backfill service taps until completion of this test. Test only those taps in single manhole section at one time. Keep number of open excavations to minimum.

C. Preparation: Prior to smoke testing, give written notices to area residents no fewer than 2 days, nor more than 7 days, prior to proposed testing. Also give notice to local police and fire departments 24 hours prior to actual smoke testing.

D. Isolate Section: Isolate manhole section to be tested from adjacent manhole sections to keep smoke localized. Temporarily seal annular space at manhole for sliplined sections.

E. Smoke Introduction:

1. Operate equipment according to manufacturer's recommendation and as approved by Project Manager.
2. Conduct test by forcing smoke from smoke generators through sanitary sewer main
and service connections. Operate smoke generators for minimum of 5 minutes.
3. Introduce smoke into upstream and downstream manhole as appropriate. Monitor tap/connection for smoke leaks. Note sources of leaks.

F. Repair and Retest: Repair and replace taps or connections noted as leaking and then retest. Taps and connections may be left exposed in only one manhole section at time. When repair or replacement, testing or retesting, and backfilling of excavation is not completed within one work day, properly barricade and cover each excavation as approved by Project Manager.

G. Service Connections: On houses where smoke does not issue from plumbing vent stacks to confirm reconnection of sewer service to newly installed liner pipe, perform dye test to confirm reconnection. Introduce dye into service line through plumbing fixture inside structure or sewer cleanout immediately outside structure and flush with water. Observe flow at service reconnection or downstream manhole. Detection of dye confirms reconnection.

3.08 TELEVISION INSPECTION PROCEDURES

A. SEWER FLOW REQUIREMENTS

1. Do not exceed depth of flow shown in Table 1 for respective pipe sizes as measured in manhole when performing TV inspection.

2. When depth of flow at upstream manhole of sewer line section being worked is above maximum allowable for TV inspection, reduce flow to level shown in Table 1, by plugging or blocking of flow, or by pumping and bypassing of flow as specified.

TABLE 1
Maximum Depth of Flow for TV Inspection

Nominal Pipe Diameter	Maximum Depth of Flow
6” - 10”	20 percent of pipe diameter
12” - 24”	25 percent of pipe diameter

B. SEQUENCE OF WORK

Perform Work in the following sequence:

1. Clean sewer lines and manholes in accordance with requirements of specifications”.

2. Perform TV inspection to comply with requirements of this specification.

C. INSPECTION REQUIREMENTS

1. Access: AWE shall have access to observe monitor and other operations at all times.

2. DVD Commentary: Record the following information on audio track of DVD inspection tape: narrative of location, direction of view, manhole numbers, pipe diameter and material, date, time of inspection, and location of laterals and other key features

   a. DVD shall visually display this information at beginning and end of each manhole-to-manhole pipe segment.

   b. DVD between manholes shall visually display length in feet from starting point of given segment.

3. Sewer Identification: DVD and inspection documentation shall include sewer line and manhole identifiers shown on Drawings. After installation of liner, use upstream manhole as identifier in conjunction with distance meter.

4. Image Perspective: Camera image shall be down center axis of pipe when camera is in motion.

   a. Provide 360-degree sweep of pipe interior at points of interest, to more fully document existing condition of sewer.

   b. Points of interest may include, but are not limited to the following: defects, encrustations, mineral deposits, debris, sediment, and any location determined not to be clean or part of proper liner

installation, and defects in liner that include, but are not limited to bumps, folds, tears, and dimples.

c. Cabling system employed to transport camera and transmit its signal shall not obstruct camera's view.

5. Sewer Reach Length: Physically measure and record length of each sewer reach from centerline of its terminal manholes.

6. Inspection Rate: Camera shall be pulled through sewer in either direction, but both inspections are to be in same direction. Maximum rate of travel shall be 30 feet (9 m) per minute when recording.

D. FIELD QUALITY CONTROL

1. AWE will review DVD's and logs to ensure lines are clean and free of visible defects.

2. If sewer line, in sole opinion of AWE, is not adequately clean, and free of visual defects it shall be recleaned and CCTV-inspected by Contractor at no additional cost.

TABLE 33 01 30.13-1
WATER TEST ALLOWABLE LEAKAGE

DIAMETER OF RISER OR STACK IN INCHES	VOLUME PER INCH OF DEPTH		ALLOWANCE LEAKAGE*	
	INCH	GALLONS	PIPE SIZE IN INCHES	GALLONS/MINUTE PER 100FT.
1	0.7854	.0034	6	0.0039
2	3.1416	.0136	8	0.0053
2.5	4.9087	.0212	13	0.0066
3	7.0686	.0306	12	0.0079
4	12.5664	.0306	15	0.0099
5	19.6350	.0544	18	0.0118
6	28.2743	.1224	21	0.0138
8	50.2655	.2176	24	0.0158
			27	0.0177
			30	0.0197
			36	0.0237
			42	0.0276
For other diameters, multiply square of daiameters by value of 1" diameter			Equivalent to 50 gallons per inch of inside diameter per mile per 24 hours	

* Allowable leakage rate shall be reduced to 10 gallons per inch of inside diameter per mile per 24 hours, when sewer is identified as located within 25-year flood plain

TABLE 33 01 30.13-2
ACCEPTANCE TESTING FOR SANITARY SEWERS

TIME ALLOWED FOR PRESSURE LOSS FROM 3.5 PSIG TO 2.5 PSIG														
Pipe Diam. (in)	**Min. Time (min/sec)**	**Length for min. time (ft)**	**Time for Longer Length (sec)**	**Specification Time for Length (L) shown (min:sec)**										
				100 ft	**150 ft**	**200 ft**	**250 ft**	**300 ft**	**350 ft**	**400 ft**	**450 ft**	**500 ft**	**550 ft**	**600 ft**
6	5:40	398	0.854	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:25	7:07	7:50	8:33
8	7:33	298	1.519	7:33	7:33	7:33	7:33	7:36	8:52	10:08	11:24	12:40	13:56	15:12
10	9:27	239	2.374	9:27	9:27	9:27	9:54	11:52	13:51	15:50	17:48	19:47	21:46	23:45
12	11:20	199	3.419	11:20	11:20	11:20	14:15	17:06	19:57	22:48	25:39	28:30	31:20	34:11
15	14:10	159	5.342	14:10	14:10	17:48	22:16	26:43	31:10	35:37	40:04	44:31	48:58	53:25
18	17:00	133	7.692	17:00	19:14	25:39	32:03	38:28	44:52	51:17	57:42	64:06	70:31	76:56
21	19:50	114	10.47	19:50	26:11	34:54	43:38	52:21	61:05	69:48	78:32	87:15	95:59	104:42
24	22:40	99	13.67	22:48	34:11	45:35	56:59	68:23	79:47	91:10	102:34	113:58	125:22	136:46
27	25:30	88	17.30	28:51	43:16	57:42	72:07	86:33	100:58	115.24	129.49	144.14	158.40	173.05
30	28:20	80	21.36	35:37	53:25	71:14	89:02	106:51	124:39	142:28	160:16	178:05	195:53	213:41
33	31:10	72	25.85	43:06	64:38	86:11	107:44	129:17	150:50	172:23	193:55	215:28	237:01	258:34

TABLE 33 01 30.13-3
MINIMUM TESTING TIMES FOR SANITARY SEWERS - LOW PRESSURE AIR TEST

PIPE DIAMETER (inches)	MINIMUM TIME (seconds)	LENGTH FOR MINIMUM TIME (feet)	TIME FOR LONGER LENGTH (seconds)
			0.855 (L)
6	340	398	1.520 (L)
8	454	298	2.374 (L)
10	567	239	3.419 (L)
12	680	199	5.342 (L)
15	850	159	7.693 (L)
18	1020	133	10.471 (L)
21	1190	114	13.676(L)
24	1360	100	17.309 (L)
27	1530	88	21.369 (L)
30	1700	80	25.856 (L)
33	1870	72	

TABLE 33 01 30.13-4
MINIMUM TESTING TIMES FOR SANITARY MANHOLES - LOW PRESSURE AIR TEST

DEPTH IN FEET	**TIME IN SECONDS BY PIPE DIAMETER**		
	48”	60”	72”
4	10	13	16
8	20	26	32
12	30	39	48
16	40	52	64
20	50	65	80
24	60	78	96
*	5.0	6.5	8.0
***Add T times for each additional 2-foot depth. (The values listed above have been extrapolated from ASTM C 924-85)**			

TABLE 33 01 30.13-5
PIPE VS. MANDREL DIAMETER

Material and Wall Construction	Nominal Size (Inches)	Average I.D (Inches)	Minimum Mandrel Diameter (Inches)
PVC-Solid (SDR 26)6	6	5.764	5.476
	8	7.715	7.329
	10	9.646	9.162
PVC-Solid (SDR 35)12	12	11.737	11.150
	15	14.374	13.655
	18	17.629	16.748
	21	20.783	19.744
	24	23.381	22.120
	27	26.351	25.033
PVC-Truss	8	7.750	7.363
	10	9.750	9.263
	12	11.790	11.201
	15	14.770	14.032
PVC-Profile (ASTM F 794)	12	11.740	11.153
	15	14.370	13.652
	18	17.650	16.768
	21	20.750	19.713
	24	23.500	22.325
	27	26.500	25.175
	30	29.500	28.025
	36	35.500	33.725
	42	41.500	39.425
	48	47.500	45.125
HDPE-Profile	18	18.000	17.100
	21	21.000	19.950
	24	24.000	22.800
	27	27.000	25.650
	30	30.000	28.500
	36	36.000	34.200
	42	42.000	39.900
	48	48.000	45.600
	54	54.000	51.300
	60	60.000	57.000
Fiberglass (Class SN 46)	12	12.85	11.822
	18	18.66	17.727
	20	20.68	19.646
	24	24.72	23.484
	30	30.68	29.146
	36	36.74	34.903
	42	42.70	40.565
	48	48.76	46.322
	54	54.82	52.079
	60	60.38	57.361

END OF SECTION 33 01 30.13

SECTION 33 11 00.11

POLYVINYL CHLORIDE (PVC) PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

PVC pressure pipe and fabricated fittings in nominal sizes 4 inches through 12 inches with cast iron pipe equivalent outside diameters.

1.02 SUBMITTALS

Submit manufacturer's product data, installation instructions and certification for all materials to be furnished in accordance with Specification Section 01 33 00. Submit classification and gradation test results for embedment and pipe backfill material.

PART 2 PRODUCTS

Research has documented that certain pipe materials (such as polyvinyl chloride, polyethylene, and polybutylene) and certain elastomers (such as those used in gasket material) may be subject to permeation by lower-molecular weight organic solvents or petroleum products. Products supplied under this Specification Section assume that petroleum products or organic solvents will not be encountered. If during the course of pipeline installation the Contractor identifies, or suspects the presence of petroleum products or any unknown chemical substance, notify AW immediately. Stop installing piping in the area of suspected contamination until direction is provided by the Engineer.

2.01 PIPE MATERIALS – WATER DISTRIBUTION

All PVC pipe shall be PVC 1120 pressure pipe made from class 12454 material as defined by ASTM D-1784 with outside diameter dimensions of steel or cast iron pipe. The PVC compounds shall be treated or certified suitable for potable water products by the National Sanitation Foundation (NSF) Testing Laboratory (NSF Standard No. 61).

PVC Pipe 4 inch through 12 inch:
AWWA Standard C900, DR14 and where permitted DR18. DR25 pipe will not be allowed. PVC pipe has recently been upgraded by pressure class, however American Water does not allow pipe in its system to be

fully subject to the revised pressures in AWWA C900. DR14 shall not be subjected to pressures exceeding 250 psi. DR18 shall not be subjected to pressures exceeding 200 psi.

2.02 GRAVITY SEWER PIPE

A. PVC gravity sanitary sewer pipe and storm sewer pipe shall be in accordance with provisions in following table except where specified differently on the drawings:

WALL CONSTRUCTION	MANUFACTURER	ASTM DESIGNATION	SDR (Max) STIFFNESS (MIN.)	DIAMETER SIZE RANGE
Solid	7-M Pipe	D3034	SDR 26 IPS 115 SDR 35 IPS 46	6" to 10"
	CertainTeed Diamond	D3034	SDR 26 IPS 115 SDR 35 IPS 46	12" & 15"
	Uponor ETI North American	F679	SDR 26 IPS 115 SDR 35 IPS 46	18" to 27"
		AWWA C900	DR 18 /NIA	4" to 12"
		AWWA C909	DR 181 NIA	4" to 12"
		AWWA C905	DR 18 /NIA	14" to 16"
Truss (Gasketed)	Contech	D2680	N/A /200 psi	8" to 15"
Profile	Contech A-2000 Contech A-2026 ETI, Ultra-Rib ETI, Ultra-Cory	F949 F949 F794 F794	N/A 46 psi N/A 115 psi N/A 46 psi N/A 46 psi	12" to 36" 8" to 10" S" to 30" 24" to 36"

B. When solid wall PVC pipe 18 inches to 27 inches in diameter is required in SDR 26, provide pipe conforming to ASTM F 679, except provide wall thickness as required for SDR 26 and pipe strength of 115 psi.

C. For sewers up to 12-inch diameter crossing over water lines, or crossing under water lines with less than 2-feet separation, provide minimum 150 psi pressure rated pipe conforming to ASTM D 2241 with suitable PVC adapter couplings.

D. Joints: Spigot and integral wall section bell with solid cross section elastomeric or rubber ring gasket conforming to requirements of ASTM D 3212 and ASTM F 477, or ASTM D 3139 and ASTM F 477. Gaskets shall be factory-assembled and securely bonded in place to prevent displacement. Manufacturer shall test sample from each batch conforming to requirements ASTM D 2444

E. Fittings: Provide PVC gravity sewer sanitary bends, tee, or wye fittings for new sanitary sewer construction. PVC pipe fittings shall be full-bodied, either injection molded or factory fabricated. Saddle-type tee or wye fittings are not acceptable.

F. Conditioning. Conditioning of samples prior to and during tests is subject to approval by AW Project Manager. When referee tests are required, condition specimens in accordance with Procedure A in ASTM D 618 at 73.4 degrees F plus or minus 3.6 degrees F and 50 percent relative humidity plus or minus 5 percent relative humidity for not less than 40 hours prior to test. Conduct tests under same conditions of temperature and humidity unless otherwise specified.

G. Pipe Stiffness. Determine pipe stiffness at 5 percent deflection in accordance with Test Method D 2412. Minimum pipe stiffness shall be 46 psi. For diameters 4 inches through 18 inches, test three specimens, each a minimum of 6 inches (150 mm) in length. For diameters 21 inch through 36 inch, test three specimens, each a minimum of 12 inch (300 mm) in length.

H. Flattening. Flatten three specimens of pipe, prepared in accordance with Paragraph 2.04F, in suitable press until internal diameter has been reduced to 60 percent of original inside diameter of pipe. Rate of loading shall be uniform. Test specimens, when examined under normal light and with unaided eye, shall show no evidence of splitting, cracking, breaking, or separation of pipe walls or bracing profiles. Perform the flattening test in conjunction with pipe stiffness test.

I. Joint Tightness. Test for joint tightness in accordance with ASTM D 3212, except that joint shall remain watertight at minimum deflection of 5 percent. Manufacturer will be required to provide independent third party certification for joint testing each diameter of storm sewer pipe.

J. Purpose of Tests. Flattening and pipe stiffness tests are intended to be routine quality control
tests. Joint tightness test is intended to qualify pipe to specified level of performance.

2.03 SANITARY SEWER FORCE MAIN PIPE

A. Provide approved PVC pressure pipe conforming to requirements for water service pipe, and conforming to minimum working pressure rating specified in Section 33 34 00 - Sanitary Sewer Force Mains.

B. Acceptable pipe joints are integral bell-and-spigot, containing a bonded-in elastomeric sealing ring meeting requirements of ASTM F 477. In designated areas requiring restrained joint pipe and fittings, use approved joint restraint device conforming to UNI-B-13, for PVC pipe 12-inch diameter and less.

C. Fittings: Provide approved ductile iron fittings as per Section 33 11 00.15 - Ductile Iron Pipe and Fittings, except furnish fittings with one of following approved internal linings:

1. Nominal 40 mils (35 mils minimum) virgin polyethylene complying with ASTM D 1248, heat fused to interior surface of fitting
2. Nominal 40 mils (35 mils minimum) polyurethane
3. Nominal 40 mils (35 mils minimum) ceramic epoxy
4. Nominal 40 mils (35 mils minimum) fusion bonded epoxy

D. Exterior Protection: Provide polyethylene wrapping of ductile-iron fittings as required by Section 33 11 00.17 - Polyethylene Wrap.

E. Hydrostatic Tests: Hydrostatically test pressure rated pipe in accordance with Specifications.

2.04 RECEIVING, HANDLING AND STORAGE

A. Inspect pipe and appurtenances for defects prior to installation in the trench. Set aside and clearly mark defective, damaged or unsound material and hold material for inspection by AW.

B. Load and unload all materials in accordance with the manufacturer's recommendations and in such a manner as to prevent damage. Do not drop pipe and accessories or handle then in a rough manner.

C. Provide safe storage for all materials. Cover stored pipe that will be exposed to sunlight for periods longer than 6 months. Cover with canvas or other opaque material with provision for adequate air circulation. PVC pipe shall not be stored close to heat sources, such as heaters, boilers, steam lines, or engine exhaust.

PART 3 EXECUTION

3.01 INSTALLATION

Follow the provisions of Specification Section 33 11 00, 33 31 00.11, and 33 34 00 in addition to the following requirements:

A. Remove all dirt and foreign matter from pipe before lowering it into the trench. Do not place debris, hand tools, clothing or other materials in the pipe. Keep pipe clean during and after laying.

B. Lay pipe with the bell end pointing in the direction of work progress. Do not roll, drop or dump pipe or appurtenances into the trench.

C. Assemble push-on joints in accordance with the pipe manufacturer's recommendations. Assemble mechanical joints in accordance with the fitting manufacturer's recommendations.

D. Cut pipe with pipe saws, circular saws, handsaws, or similar equipment. Provide a smooth end at a right angle to the longitudinal axis of the pipe. Deburr, bevel, and re-mark insertion line on spigot ends. Match factory bevel length and angle for field bevels. When connecting to certain shallow depth bells, such as those on some cast iron fittings and valves, cut off the factory bevel and prepare a deburred, square cut end with a slight outer bevel.

E. Clean the sealing surface of the spigot end, the pipe bell, the coupler or fitting, and the elastomeric gaskets immediately before assembly. Do not remove factory installed gaskets for cleaning. Keep the joint free of dirt, sand, grit, grease or any foreign material. Apply approved lubricant when assembling gasketed joints in accordance with the pipe manufacturer's requirements. The use of improper lubricants can damage gaskets. Excessive lubricant use can make disinfection more difficult and cause taste and odor problems when the line is placed in service.

F. Good pipe alignment is essential for proper joint assembly. Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly. Do not swing or "stab" the joint; that is, do not suspend the pipe and swing it into the bell. The spigot end of the pipe is marked by the manufacturer to indicate the proper depth of insertion. Avoid metal to plastic contact with the pushing the pipe home (use wood or other material to cushion moving the pipe. Neither deflection or bending of PVC pipe joints are permitted.

G. Assemble pipe using the following types of joints:

1. Gasketed bell joint – Integral with the pipe or fitting
2. Gasketed coupling – A double gasketed coupling
3. Mechanical joint – Any of the several joint designs that have gaskets and bolts manufactured in accordance with AWWA standards.

H. Tracer Wire

1. Place tracer wire in accordance with Specification Section 33 05 27.

2. The wire shall be contiguous except at test stations, valve boxes, and where splicing is required. All splices shall be encased with a 3M-Gel Pack Model No. 054007-09053, or approved equal.

I. Pressure testing of DR 14 PVC pipe should not exceed 275 psi. Pressure testing of DR 18 PVC pipe should not exceed 200 psi if approved for use.

J. PVC pipe fittings shall employ ductile iron pipe fittings per specifications 15105. See detail drawings for transitions between different pipe materials.

K. Gaskets - Gaskets shall be as provided or recommended by the manufacturer and satisfy AWWA standard C111 in all respects. Where ductile iron pipe and PVC pipe are directly connected, the appropriate gasket material for this purpose shall be employed. As noted in the products section of this specification, some gasket materials are prone to permeation of certain hydrocarbons which may exist in the soil (see part 2). Under these conditions and at the Engineer's discretion require contractor to provide FKM (Viton, Flourel) gasket material in areas of concern.

3.02 SERVICE CONNECTIONS

A. Install service connections in accordance with AWWA Standard C605 and the manufacturer's recommendations using the following methods:

Install service connections in accordance with AWWA Standard C605 and the manufacturer's recommendations using the following methods:

1. Tapping is only permitted through the use of service clamps or saddles.

2. Using injection molded couplings with threaded outlets.
3. Tapping with large service connections through appropriately sized tapping sleeves and valves.
4. Direct tapping of 1 inch and smaller service connections is not permitted. Use service saddles only for AWWA Standard C900 pipe, for nominal pipe sizes 6 inch through 12 inch. Corporation stops shall be threaded and conform to AWWA Standard C800.
5. The distance between the PVC pipe joint and a service tap (2" and smaller) shall be a minimum of 3 feet. The distance between the PVC pipe joint and a service tap (4" and larger) shall be a minimum of 4 feet. Where necessary, excavate along the pipe to confirm the acceptable distance before starting the tap.

END OF SECTION 33 11 00.11

SECTION 33 31 00.11

GRAVITY SANITARY SEWERS

PART 1 GENERAL

1.01 SCOPE

A. Gravity sanitary sewers and appurtenances, including stacks and service connections.

1.02 SUBMITTALS

A. Conform to requirements of Section 01 33 00 Submittals.

B. Submit proposed methods, equipment, materials and sequence of operations for sewer construction. Plan operations to minimize disruption of utilities to occupied facilities or adjacent property.

C. Test Reports: Submit test reports and inspection videos as specified in Part 3 of this Section. Video tapes become property of AW.

1.03 QUALITY ASSURANCE

A. Qualifications. Install sanitary sewer that is watertight both in pipe-to-pipe joints and in pipeto-manhole connections. Perform testing in accordance with Section 33 01 30.12 - Acceptance Testing for Sanitary Sewers.

B. Regulatory Requirements.

1. Install sewer lines to meet minimum State mandated separation distance from potable water line, as scheduled below. Separation distance is defined as distance between outside of water pipe and outside of sewer pipe. Install new sanitary sewers no closer to water lines than 10 feet in all horizontal directions. Where water and sanitary sewer lines cross, a minimum of 2 feet of vertical seperation is required when the water line passes above the sanitary sewer main. Where separation distance cannot be achieved, sanitary sewers shall be constructed of ductile iron sanitary sewer piping or encased in reinforced concrete encasement (as detailed on the plans) for a minimum distance of 10 feet either side of the crossing.

2. Make notification to AW Project Manager when water lines are uncovered during sanitary sewer installation where minimum separation distance cannot be maintained.

3. Lay gravity sewer lines in straight alignment and grade.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Inspect pipe and fittings upon arrival of materials at job site.

B. Handle and store pipe materials and fittings to protect them from damage due to impact, shock, shear or free fall. Do not drag pipe and fittings along ground. Do not roll pipe unrestrained from delivery trucks.

C. Use mechanical means to move or handle pipe. Employ acceptable clamps, rope or slings around outside barrel of pipe and fittings. Do not use hooks, bars, or other devices in contact with interior surface of pipe to lift or move lined pipe.

PART 2 PRODUCTS

2.01 PIPE

A. Provide piping materials for gravity sanitary sewers of sizes and types indicated on Drawings or as specified.

B. Unlined reinforced concrete pipe is not acceptable.

2.02 PIPE MATERIAL SCHEDULE

A. Unless otherwise shown on Drawings, use pipe materials that conform to requirements specified in one or more of following Sections:

1. Section 33 11 00.15 - Ductile Iron Pipe and Fittings.
2. Section 33 11 00.11 - Polyvinyl Chloride Pipe.

B. Where shown on Drawings, provide pipe meeting minimum class, dimension ratio, or other criteria indicated.

C. Pipe materials other than those listed above shall not be used for gravity sanitary sewers.

2.03 APPURTENANCES

A. Stacks. Conform to requirements of Section 33 31 00.15 - Sanitary Sewer Service Stubs.

B. Service Connections. Conform to requirements of Section 33 31 00.15 - Sanitary Sewer Service Stubs.

C. Roof, street or other type of surface water drains shall not be connected or reconnected into sanitary sewer lines.

2.04 BEDDING AND BACKFILL MATERIAL

A. Bedding and Backfill: Conform to requirements of Section 31 23 33 - Excavation and Backfill for Utilities and Section 31 23 23 - Utility Backfill Materials.

PART 3 EXECUTION

3.01 PREPARATION

A. Prepare traffic control plans and set up street detours and barricades in preparation for excavation when construction will affect traffic. Conform to requirements of Traffic Control and Regulation.

B. Provide barricades, flashing warning lights, and warning signs for excavations. Conform to requirements of Traffic Control and Regulation. Maintain barricades and warning lights where work is in progress or where traffic is affected.

C. Perform work in accordance with OSHA standards. Employ trench safety system for excavations over 5 feet deep.

D. Immediately notify agency or company owning utility line which is damaged, broken or disturbed. Obtain approval from AW Project Manager and agency or utility company for repairs or relocations, either temporary or permanent.

E. Remove old pavements and structures including sidewalks and driveways in accordance with local base and DPW requirements.

F. Install and operate dewatering and surface water control measures in accordance with contract document requirements.

G. Do not allow sand, debris or runoff to enter sewer system.

3.02 DIVERSION PUMPING

A. All divsersion and bypass pumping shall be performed in accordance with Section 33 01 30.51 – Pumping and Bypassing.

3.03 EXCAVATION

A. Earthwork. Conform to requirements of Section 31 23 33 - Excavation and Backfill for Utilities. Use bedding as indicated on Drawings.

B. Line and Grade. Establish required uniform line and grade in trench from benchmarks identified by AW Project Manager. Maintain this control for minimum of 100 feet behind and ahead of pipe-laying operation. Use laser beam equipment to establish and maintain proper line and grade of work.

Use of appropriately sized grade boards which are substantially supported is also acceptable. Protect boards and location stakes from damage or dislocation.

C. Trench Excavation. Excavate pipe trenches to depths shown on Drawings and as specified in Section 31 23 33 - Excavation and Backfill for Utilities.

3.04 PIPE INSTALLATION BY OPEN CUT

A. Install pipe in accordance with pipe manufacturer's recommendations and as specified in following paragraphs.

B. Install pipe only after excavation is completed, bottom of trench fine graded, bedding material is installed, and trench has been approved by Project Manager.

C. Install pipe to line and grade indicated. Place pipe so that it has continuous bearing of barrel on bedding material and is laid in trench so interior surfaces of pipe follow grades and alignment indicated. Provide bell holes where necessary.

D. Install pipe with spigot ends toward downstream end of flow such that water flows into bell and out the spigot.

E. Form concentric joint with each section of adjoining pipe so as to prevent offsets.

F. Keep interior of pipe clean as installation progresses. Remove foreign material and debris from pipe

G. Provide lubricant, place and drive home newly laid sections with come-a-long winches so as to eliminate damage to sections. Install pipe to "home" mark where provided. Use of back hoes or similar powered equipment will not be allowed unless protective measures are provided and approved in advance by Project Manager.

H. Keep excavations free of water during construction and until final inspection.

I. When work is not in progress, cover exposed ends of pipes with approved plug to prevent foreign material from entering pipe.

J. Where gravity sanitary sewer is to be installed underexisting water line with separation distance of less than 2 feet , construct new sewer pipe so that 20 feet of ductile iron pipe is centered on water line crossing or encase the sewer line with reinforced concrete encasement as detailed on the plans. If gravity sanitary sewer is to be installed above existing water line, construct new sewer pipe so that 20 feet of ductile iron pipe is centered on water line crossing or encase the sewer line with reinforced concrete encasement. .

K. Where gravity sanitary sewer is to be installed under existing water line, install new sewer using ductile iron or encased in reinforced concrete encasement as shown on Drawings. Maintain minimum 2-feet separation distance.

L. Where the length of the stub is not indicated, install the stub to the right-of-way line and seal the free end with an approved plug.

3.05 PIPE INSTALLATION OTHER THAN OPEN CUT

A. For installation of pipe by augering, jacking, or tunneling, conform to requirements of specification sections on tunneling augering, jacking and microtunneling work as appropriate.

3.06 INSTALLATION OF APPURTENANCES

A. Service Connections. Install service connections to conform to requirements of Section 33 31 00.15- Sanitary Sewer Service Stubs.

B. Stacks. Construct stacks to conform to requirements of 33 31 00.15- Sanitary Sewer Service Stubs.

C. Construct manholes to conform to requirements of Section 03 48 10 - Precast Concrete Manholes.

3.07 INSPECTION AND TESTING

A. Visual Inspection: Check pipe alignment in accordance with Section 33 01 30.13 - Acceptance Testing for Sanitary Sewers.

B. Mandrel Testing. Use Mandrel Test to test flexible pipe for deflection. Refer to Section 33 01 30.13 - Acceptance Testing for Sanitary Sewers.

C. Pipe Leakage Test. After backfilling line segment and prior to tie-in of service connections, visually inspect gravity sanitary sewers where feasible, and test for leakage in accordance with Section 33 01 30.13 - Acceptance Testing for Sanitary Sewers.

3.08 BACKFILL AND SITE CLEANUP

A. Backfill and compact soil in accordance with Section 31 23 33 - Excavation and Backfill for Utilities.

B. Backfill trench in specified lifts only after pipe installation is approved by Project Manager.

C. Repair and replace removed or damaged pavement, curbs, gutters, and sidewalks as specified by local base regulations.

D. Provide hydromulch seeding in areas of commercial, industrial or undeveloped land use over surface of ground disturbed during

construction and not paved or not designated to be paved. Grade surface at uniform slope to natural grade as indicated on Drawings. Provide minimum of 4 inches of topsoil.

E. Provide sodding in areas of residential land use over surface of ground disturbed during construction and not paved or not designated to be paved. Grade surface at uniform slope to natural grade as indicated on Drawings.

3.09 POST-INSTALLATION TELEVISION INSPECTION

A. Prior to final acceptance of newly constructed gravity sanitary sewers, perform cleaning and closed circuit television inspection. Cleaning shall include utilizing variable pressure water nozzles (3000 psi) and collection, removal, transportation and disposal of sand, debris, and liquid wastes to legal disposal sites.

B. Select and use closed-circuit television equipment that will produce color video tape. Produce video tape using pan-and-tilt, radial viewing, pipe inspection camera that pans plus and minus 275 degrees and rotates 360 degrees. Use camera with accurate footage counter which displays on monitor exact distance of camera from starting manhole. Use camera with camera height adjustment so that camera lens is always centered at one-half inside diameter, or higher, in pipe being televised. Provide lighting system that allows features and condition of pipe to be clearly seen. Reflector in front of camera may be necessary to enhance lighting in dark or large diameter pipe.

C. Perform television inspection of gravity sanitary sewers as follows:

1. Videos shall pan beginning and ending manholes to demonstrate that debris has been removed. Camera operator shall slowly pan each service connection and where sewer transitions from one pipe material to another.
2. Video shall be continuous for pipe segments between manholes. Do not leave gaps in video taping of segment between manholes and do not show single segment on more than one video tape.
3. No flow is allowed in gravity sanitary sewer while performing post-installation television inspection.

D. Provide video tapes in DVD format, recorded at Standard Play (SP). Labels are required. Place one label on jewel case and other on face of DVD. Permanently label each video with following information.

<u>Spine of Tape</u>

Wastewater File No.:_____ Contractor's Name:
Inspection Type: [ ] Survey [ ] Pre-Installation [ ] Post-Installation
Tape No.:_____ Date Televised:_____ Date Submitted:

Basin No:

Face of Tape

Manhole No. From	Manhole No. To	Pipe Diameter	Pipe Length	Street
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	

E. For each video provide completed TV Inspection Report. TV Inspection Report is written/narrated log of pipe conditions and service connections, indexed to footage counter.

F. Upon completion of video reviews by AW Project Manager, Contractor will be notified regarding final acceptance of sewer segment.

END OF SECTION 33 31 00.11

SECTION 33 32 16

PACKAGED SANITARY LIFT STATIONS

PART 1 GENERAL

1.01 SCOPE

A. This specification section contains the requirements for a fully operational submersible sewage pump station.

1.02 SUBMITTALS

A. Conform to requirements of Section 01 33 00 - Submittals.

B. Submit complete shop drawings and material certification(s) for wet well(s), pumps, motors, valves, hatches, electrical materials, concrete, pipe materials, and coatings.

1.03 QUALITY OF EQUIPMENT

A. Equipment and appurtenances shall be designed for and constructed of materials for the conditions of exposure and of such strength to withstand all stresses which may occur during testing, installation, and all conditions of normal operation.

B. Exposed surfaces shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structure shapes shall be rounded or chamfered for per personnel protection.

C. All machinery and equipment shall comply in all respects with the provisions of the Occupational Safety and Health Act of 1970, and other applicable Federal, State and local Laws & Regulations.

PART 2 PRODUCTS

2.01 SEWAGE PUMPS

A. The sewage pumps shall be vertical, recessed impeller, grinder-type submersible pumping units, complete with motor and submersible rated power and control cables. The pumps shall be Myers WGL20H, Hydromatic HPGF/HPGFH or pre-approved equal by the engineer. The grinder shall be capable of grinding all materials found in normal domestic sewage, including plastics, rubber, sanitary napkins, disposable diapers, and wooden articles into a finely ground slurry with particle dimensions no greater than 1/4 inch. For serviceability and parts availability all pumps shall be standard catalog submersible pumping products.

B. Pump casings shall be completely open from suction to discharge with no wearing rings or impeller face plates required. All internal case clearances shall be equal to the discharge diameter so that all material which will pass through the discharge can pass through the pump. (Maximum sphere equal to Discharge Diameter.)

C. The impeller shall be keyed to the motor shaft and secured by an impeller bolt.

D. Pump casings and impellers shall be constructed of ASTM A48, Class 25 or 30 grey cast iron material unless specifically indicated otherwise.

E. Pumps shall be rated for operating conditions as shown in the plans.

F. Pumps shall be warranted for a period of five (5) years from date of shipment to be free from defects in material and workmanship.

2.02 MOTORS

A. Each motor shall be rated ___ H.P., ___ volts, single phase, __ hertz, _____ R.P.M. The unit shall produce ___ U.S. GPM at ___ feet TDH. All motors shall be provided with thrust and radial bearings rated for L-10 life of 17,500 hours to carry the entire load which may be imposed upon it under all operating conditions. All motors shall be of nationally known American manufacture, standard frame, and shall be listed by Underwriters Laboratories for operation in a Class I, Division 1, Group D hazardous location. All motors shall be mounted using manufacturers standard bolt hole pattern. No additional holes shall be made in the motor mounting. The stator, rotor and bearings shall be mounted in a sealed submersible type housing. The stator windings shall have Class F insulation and a dielectric oil filled motor, NEMA L design.

1. Motor locked rotor NEMA code shall be H or better for motors less than 15 h.p. and shall be G or better for motors 15 h.p. and above.

B. Each motor shall have two (2) tandem mounted mechanical seals, the lower one outside the motor and protecting the upper one which shall be in an oil-filled chamber. The lower, primary seal shall consist of one stationary silicon carbide or tungsten carbide ring and one positively driven (rotating) silicon carbide or tungsten carbide ring. The upper seal between the oil and motor housing shall consist of one stationary stainless steel or tungsten carbide ring and one positively driven (rotating) carbon ring. Each interface shall be held in place by its own independent spring system.

1. Moisture detector probes in the oil-filled seal chamber shall be connected to an alarm indicating the presence of moisture in the seal chamber. Thermal overload protectors shall be imbedded in

the motor windings and connected to the control to disconnect the motor in the event of overheating.

C. Each motor shall be equipped with heavily jacketed submersible cables of the length required to reach the control panel without splices or strain and allowing a minimum of 4 feet of slack. Short cables will be rejected.

D. All motors shall be sized according to the information shown on the plans.

2.03 PIPING

A. Piping, including fittings, shall be as shown on the drawings.

2.04 CHECK VALVES

A. The Check valves shall be Ball type and manufactured by Zurn Company or engineer approved equal. The valve shall be cast iron-body and rated for 150 psi working pressure. Construction and materials shall be such that the valve shall be suitable for raw sewage service.

1. Check valve for valve box drain shall be as shown on the drawings.

2.05 GATE VALVES

A. Gate valves shall be resilient seat AWWA Specification valves brass body non-rising stem "O" Ring seals and 150 PSI working pressure. The valve shall be epoxy coated inside and be equipped with a stem thrust bearing.

2.06 COUPLING SYSTEM (GUIDE RAIL)

A. A guide rail system shall be furnished and installed for each pump designed to operate under the expected head and flow conditions. The system shall be designed such that the pumps can be easily removed from the wet well without entering the well or disconnecting piping.

B. The system shall consist of a 90E discharge elbow with support leg, stationary base support, slide rail pump assembly, dual stainless steel guide rails, upper, lower and intermediate stainless steel guide rail supports, and stainless steel lifting yoke, cable and eyes. The foot-mounted discharge elbow and adapter shall conform to ASTM A48 Class 25 or 30 grey iron.

C. The stationary base shall be constructed of ductile iron, integrally cast. The slide face shall be constructed of Class 35 cast iron. The coupling shall incorporate a self-energizing gasket to provide positive sealing under all conditions. All bolts, nuts, screws, and miscellaneous accessories not otherwise noted shall be 304 stainless steel.

D. The guide rail system shall be a standard product of the pump manufacturer.

2.07 ALUMINUM ACCESS DOORS

A. Door leaf shall be minimum ¼" aluminum pattern plate reinforced to withstand a live load of 300 pounds per square foot. Frame shall be ¼" aluminum with an anchor flange around the perimeter. Doors shall be equipped with heavy forged brass or stainless steel hinges, stainless steel pins, and an automatic hold-open arm with release handle. Provide a staple for padlock and an aluminum lifting handle. The lifting handle shall recess into the door when not in use. Hardware shall be cadmium plated and factory finish. The frame shall be mill finish with bituminous coating applied to exterior channels where they come in contact with the frame. Doors shall be hinged as shown in the plans. Where opposite opening doors are indicated, safety chains shall be provided. Door assemblies shall meet OSHA Requirements. On all door leafs with any dimension greater than 36 inches, supply compression springs to assist opening.

2.08 FIBERGLASS WET WELL SECTIONS AND VAULT

A. Unless otherwise indicated, the plastic terminology used in this specification shall be in accordance with the definitions given in American Society for Testing and Materials (ASTM) designations D3299-81. This specification is for the hand lay-up, chopped spray technique and filament wound methods for manufacturing of vertical underground fiberglass basins. Other methods of manufacturing shall not be acceptable.

B. The resin used shall be of a commercial grade and shall be evaluated as a laminate by test or determined by previous service to be acceptable for the environment. The resins used may contain the minimum amount of fillers or additives required to improve handling properties. Up to 5% by weight of thixotropic agent which will not interfere with visual inspection may be added to the resin for viscosity control. Resins may contain pigments and dyes by agreement between fabricator and engineer, recognizing that such additions may interfere with visual inspection of laminate quality.

C. The reinforcing material shall be a commercial grade of glass fiber having a coupling agent which will provide a suitable bond between the glass reinforcement and the resin.

D. The laminate shall consist of an inner surface, an interior layer, and a filament-wound structural exterior layer of laminate body.

E. The inner surface shall be free of cracks and crazing with a smooth finish and with an average of not over two pits per square foot, providing the pits are less than 1/8" in diameter with not over 1/32" deep and are covered

with sufficient resin to avoid exposure of inner surface fabric. Some waviness shall be permissible as long as the surface is smooth and free of pits. Between 0.100 and 0.020 inches of resin-rich surface shall be provided.

F. A minimum of 0.100 inch of the laminate next to the inner surface shall be reinforced with 30% by weight of chopped-strand fiber having fiber lengths from 0.5 to 2.0 inches.

G. Subsequent reinforcement shall be continuous-strand roving fiberglass. The thickness of the filament-wound portion of the tank shell shall vary with the tank height to provide the aggregate strength necessary to meet the tensile and flexural requirements. If additional longitudinal strength is required, the use of other reinforcement, such as woven fabric, chopped-strand mat, or chopped strands shall be interspersed in the winding to provide additional strength. Glass content of this filament-wound structural layer shall be 50 to 80% by weight. The exterior surface shall be relatively smooth with no exposed fibers or sharp projections. Hand work finish shall be present to prevent fiber exposure.

H. The tank walls must be designed to withstand wall collapse based on the assumption of hydrostatic type loading by backfill with a density of 120 lb./cu.ft. The tank wall laminate must be constructed to withstand or exceed two times the assumed loading for any depth of basin.

I. For the tank bottoms, subsequent reinforcement shall be of 1.5 oz./sq.ft. chopped strand fiber or woven roving to a thickness to withstand applicable hydrostatic uplift pressure, with a safety factor of 2. In saturated conditions, the center deflection of any empty tank bottom shall be less than 3/8" (elastic deflection) and will not interfere with bottom pump mounting requirements nor rail system.

J. The width of the first layer of joint overlay shall be 3" minimum. Successive layers shall uniformly increase in width to form a smooth contour laminate that is centered on the joint ±½". A highly filled resin paste may be placed in the crevices between joined shall be roughened to expose glass fiber. This roughened area shall extend beyond the lay-up areas so that no reinforcement is applied to an unprepared surface. Surfaces shall be clean and dry before lay-up. The entire roughened area shall be coated with resin after joint overlay is made.

K. The finished laminate shall be as free as commercially practicable from visual defects such as foreign inclusions, dry spots, air bubbles, pinhole, pimples, and delamination.

L. The surfaces shall be relatively smooth, hand finish is acceptable, with no exposed fibers or sharp projections.

M. Tanks shall be mounted on cradles if shipping is horizontal, or on a suitable skid or pallet if shipping in the vertical position. The tank shall be secured to the cradles or skid so that there can be no movement of the tank in relation to the skid or cradle under normal handling.

N. The tank bottoms shall extend past the tank walls so that the O.D. is approximately 4" larger in diameter than the O.D. of the sidewalls. This larger diameter shall serve as an anti-flotation flange. Contractor shall place the tanks on concrete pads and secure with stainless steel clips catching the anti-flotation flange and anchored to the concrete pad. Anti-flotation flange shall not require bolt holes to secure the tank to the concrete pad.

O. Both tanks shall include NPT discharge fittings. The wet-well tank shall include a 4 caulking type bolt-on thermoplastic influent hub for mounting in the field. The hub shall be beveled approximately three degrees to accommodate gravity pipe coming in from various angles. The influent hub shall have a textured surface in order to provide better caulking adhesion. The valve vault tank shall include NPT influent fittings. Both tanks shall include appropriate NPT fitting for the valve box drain.

P. The top flange and cover O.D. shall assure a tight fit and afford ease of access not possible with recessed covers. Noncorroding stainless steel heli-coils shall be inserted in all bolt holes of the top flange and shall be positively locked with threads and resin to prevent stripping. A 10-hole pattern shall accommodate the mounting of the cover.

Q. Covers shall be of fiberglass with an O.D. equal to the O.D. of the top flange on the basin. Cover shall be secured by stainless steel bolts. Covers shall be designed for live load of 350 lb./sq.ft.

2.09 PRESSURE TEST VALVE AND GAUGE

A. Pressure test valve shall be a brass curb stop of the oroseal or Teflon coated ball-type with a brass saddle and fitting for pressure gauge connection. Pressure gauge shall be 0-40 psi range, 4½” liquid-filled gauge with stainless steel dial and bourdon tube and ½” ANPT stainless steel connection stem. Gauge to be Ametek Model 1931L or equal.

PART 3 EXECUTION

3.01 PUMP STATION (GENERAL)

A. Construct wet well and valve pit as shown in the plans and specified herein. Compact clean subgrade under wet well to 100% of maximum density at optimum moisture content as determined by AASHTO T-99, Method A. Place 6" minimum of #57 crushed stone properly compacted under wet well anti-buoyancy slab. Compact clean backfill around the

station in 8-inch lifts to not less than 95% of the maximum density at optimum water content as determined by AASHTO T-99, Method A. Access door units shall be flush with concrete surface and in alignment to permit unobstructed removal of pumps and valves. Complete the pump station piping and fittings in accordance with the plans and specifications relating thereto. Remove all lifting eyes etc. from precast units, rub all joints, coat interior of pump station wet wells, clean hatches to bare metal, touch up paint on electric panels, clean wet well, valve pit and drains and grade site.

3.02 INSTALLATION OF EQUIPMENT

A. The Contractor shall install equipment as required by the manufacturer's written installation instructions and approved shop drawings unless otherwise directed by the Engineer.

B. The floor of the pump station shall be constructed level to a point 6 inches outside of all pump supports before installing pumps. Pump piping shall be completely made up and secured to prevent any excess movement. Provide permanent supports, and wedges as indicated to restrain movement.

C. Excess motor and control wire shall be carefully coiled and hung inside the wet well. These wires shall not be cut and all identification tags shall be in place. Cables shall be supported with S.S. basket weave type strain reliefs hung in wet well and be routed in a manner that will not interfere with access to any equipment or terminals in the control panels

3.03 CONTROLS INSTALLATION

A. Field Calibration: All instrumentation shall be calibrated in the presence of the Engineer in accordance with the range and accuracy specified herein.

1. All equipment shall be calibrated using a standard calibration sheet which has been approved by the Engineer. This calibration sheet shall be filled out identifying the instrument or item to be calibrated and signed with date and initials of the person calibrating the device.

3.04 START-UP, TESTING, AND TRAINING

A. The Contractor shall retain a factory certified technician(s) that is(are) fully familiar with the equipment installed to startup and completely check out the pump station. The technician shall first perform a pre-start check to include, at a minimum, proper impeller rotation, proper service voltage, and proper operation of the phase monitor. Then the technician shall

perform start-up checking for, at a minimum, proper operation, including all control functions, motor operation, and measurements of vibration, current, pressures and flows to verify compliance with the plans and specifications. Amp readings on each motor lead shall be recorded on the start-up report. Final technical checkout (with technician(s) present) will be made in the presence of the Engineer and Owner. The Contractor shall furnish all materials, equipment, including test gauges calibrated in feet, and incidentals to conduct the tests.

B. Before the main circuit breaker is energized to allow power to the control panel, verify incoming service voltage is within normal range on all phases.

C. The factory certified technician shall also instruct the Owner and Engineer in the operation of the controls, including changing all settings, and shall set all settings for proper operation of the pump station and record these initial settings on the start-up report form.

D. A written report by the factory certified technician shall be given to the Engineer and this report shall include, at a minimum, the results of all tests and instructions indicated above.

END OF SECTION 33 32 16

SECTION 02722 - SITE STORM SEWERAGE SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Site storm sewerage drainage piping, fittings and accessories, and bedding.

B. Connection of drainage system to existing system.

C. Catch basins, paved area drainage, and site surface drainage.

1.2 REGULATORY REQUIREMENTS/REFERENCES

A. AASHTO M198 - (1990;R 1993) Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets.

B. ACPA 01-102 - (1988) Concrete Pipe Handbook

C. ACPA 01-103 - (1990) Concrete Pipe Installation Manual

D. ASTM A 497 - (1990; Rev B) Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement

E. ASTM A 615/A 615/M - (1993) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

F. ASTM C 76 - (1990) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

G. ASTM C 139 - (1973; Rev. 1989) Concrete Masonry Units for Construction of Catch Basins and Manholes

H. ASTM C 270 - (1994) Mortar for Unit Masonry

I. ASTM C 443 - (1985; Rev. A, R 1990) joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets

J. ASTM C 476 - (1991) Grout for Masonry

K. ASTM D 3212 - (1992) Joints for Drain and Sewer Plastic Pipes Using Flexible Elastometric Seals.

L. ASTM D 4101 - (1992; Rev. B) Propylene Plastic Injection and Extrusion Materials

M. ASTM F 477 - (1993) Elastometric Seals (Gaskets) for Joining Plastic Pipe

N. ASTM F 794 - (1993; Rev. A) Polyvinyl Chloride (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

O. FS RR-F-621 - (Rev. E) Frames, Covers, Gratings, Steps, Sump and Catch Basin, Manhole

P. Maryland Department of Transportation. Standard Specifications for Construction and Materials, Latest edition.

1.3 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.

B. Test Reports: Certified copies of test reports demonstrating conformance to the applicable pipe specifications shall be submitted to the Contracting Officer for review before the pipe is installed.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Manufacture's product data on all pipe.

E. As-Built Survey indicating Catch Basin and Pipe locations and Inverts.

F. Certification: Certify that materials comply with specification requirements.

G. Soil Conditions

H. Section 01700 - Contract Closeout: Procedures for submittals.

I. Accurately record actual locations of pipe runs, connections, catch basins, curb inlets, cleanouts, and invert elevations.

J. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material with manufacture's tags and labels intact.

B. Handle and store so as to avoid damage.

1.5 COORDINATION

A. Coordinate the Work with termination of storm sewer connection outside building, trenching, and connection to building drainage piping.

B. Accurately record actual locations of pipe runs, connections, catch basins, curb inlets, cleanouts, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

A. Except as modified herein or as indicated, work and materials shall be performed in accordance with the MDOT Standard Specifications for Construction and Materials. The provision therein for method of measurement and payment do not apply. Reference to “Engineer” and “State” shall be interpreted to mean “contracting officer” and “Federal Government” respectively.

PART 2 - PRODUCTS

2.1 PIPELINE MATERIALS

A. Concrete Pipe and Fittings: Storm drainage pipe shall be reinforced concrete pipe conforming to ASTM C 76, Class III.

B. Joint Sealants: Provide primers and lubricants as recommended by the manufacturer. Concrete pipe joints shall be suitable for use with the joint sealants specified.
1. Butyl gaskets.
2. ASTM C 443 rubber O-ring gaskets.
3. AASHTO M 198, Type B preformed plastic gaskets.

C. Ductile Iron Pipe and Joint Devices:
1. Pipe: ASTM A746, service type, plain end.
2. Joint Device: ANSI A21.11, rubber gasket joint devices.

D. Corrugated Plastic Pipe (Smooth Interior) and Fittings: Use for pipes 10 inches (250 mm) in diameter or smaller. Corrugated Polyvinyl chloride (PVC) pipe shall conform to ASTM F 794. PVC fittings shall conform to ASTM D 1784.

E. HDPE Corrugated Plastic Pipe "S" Type shall conform to AASHTO-M-252 for 4"-10" (100 mm to 250 mm) pipe and AASHTO-M-294 for 12" (300 mm) pipe.

F. Slotted Drain - Fully Bituminous Coated. AASHTO M 190 Type A and ASTM A 760/A 760M zinc or aluminum (Type 2) coated pipe :
1. Type II pipe with annular 2-2/3 by 1/2 inch corrugations.

G. Joints and Jointing Materials: ASTM D 3212 for PVC pipe joints with ASTM F 477 elastomeric seals.

H. Mortar: ASTM C 270, Type M.

I. Water: Water for masonry mortar shall be fresh, clean and potable.

J. Grout: ASTM C 476.

2.2 ACCESSORIES

A. Pipe Joints: Mechanical clamp ring type, expanding and contracting sleeve, neoprene ribbed gasket for positive seal.

B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

C. Grout: as required in specification Section 03300 – Cast-In-Place Concrete.

2.3 DRAINAGE STRUCTURES

A. Precast Concrete Structures: ASTM C 478, except as specified herein. Provide an air content of 6 percent, plus or minus 3 percent and a minimal wall thickness of 5 inches (125 mm). ASTM A 615/A 615M reinforcing bars. ASTM A 497 welded wire fabric. ASTM C 443 or AASHTO M 198, Type B gaskets for joint connections. Provide a 4-inch (100mm) layer of clean gravel bedding with a maximum size of 2 inches (50 mm).

B. Concrete Headwalls: Provide cast in place concrete and steal reinforcement in accordance with specification Section 03300 – Cast-In-Place Concrete.

C. Masonry Materials: Shall conform to the following specifications and other requirements specified hereunder.

2.4 METAL ITEMS

A. Frames, Covers and Gratings: Traffic rated. Provide cast iron conforming to CID A-A-60005, sizes as detailed.

B. Drainage Structure Steps: Zinc-coated steel conforming to ANSI A14.3. Plastic or rubber coating pressure-molded to the steel. Plastic coating shall conform to ASTM D 4101, copolymer polypropylene. Rubber shall conform to ASTM C 443, except shore A durometer hardness shall be 70, plus or minus 5. Steps are not required in manholes, curb inlets or catch basins less than 4 feet (1.22 M) in depth.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with coarse aggregate.

B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

C. Prior to the construction of any storm sewer, the Contractor's surveyor shall place adequate line and grade stakes and shall also set stakes and furnish grades so that all structure tops can be set to finish grade, in accordance with the approved plans.

3.3 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

A. Location: The work covered by this section shall terminate at a point approximately 5 feet (1.52 M) from the building.

B. Earthwork: Perform earthwork operations in accordance with specification Section 02300 - Earthwork.

C. Pipe Laying and Jointing: Replace, by one of the proper dimensions, any pipe or fitting that does not allow sufficient space for proper caulking or installation of joint material. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads.

D. Connections to Existing Lines: Notify the Installation Engineer in writing at least 10 days prior to the date that connections are to be made. Obtain approval of the Installation Engineer before interrupting service. Conduct work so that there is a minimal interruption of service on existing lines.

E. Special Requirements of Installation of Concrete Piping: Install pipe and fittings in accordance with the general requirements and procedures for the installation of piping and with the provisions for rubber gasket jointing and jointing procedures of ACPA 01-103 or of ACPA 01-102, Chapter 9. Make joints with the gaskets previously specified for joints with this piping. Clean and dry surfaces receiving lubricants, cements or adhesives. Affix gaskets to pipe not more than 24 hours prior to the installation of the pipe. Protect gaskets from the sun, blowing dust and other deleterious agents at all times. Before installation of the pipe, inspect gaskets and remove and replace loose or improperly affixed gaskets. Align each pipe section with the previously installed pipe section, and pull the joint together. If while pulling the joint, the gasket becomes loose and can be seen through the exterior joint recess when the pipe is pulled up to within one inch of closure, remove the pipe and remake the joint.

F. Special Requirements of Installation of Corrugated Plastic Piping: Install pipe and fittings in accordance

with the general requirements and procedures for the installation of piping and with the recommendations of the PVC pipe manufacturer. HDPE Pipe and fittings shall be installed in accordance with the recommendations of the HDPE pipe manufacturer.

3.4 PIPELINE TESTING

A. Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line.

3.5 PIPE BEDDING

A. See specification Section 02300 – Earthwork, for pipe bedding requirements.

END OF SECTION

SECTION 02740 - BITUMINOUS PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Aggregate base course
2. Tack Coat.
3. Asphalt concrete paving, wearing binder and base course.
4. Surface sealer.
5. Pavement Marking.

1.2 REFERENCES

A. Federal Specifications (FS)
1. FS TT-P-1952B, Type 1 – Paint, Traffic and Airfield Marking, Waterborne
2. FS TT-B -1325C, Beads (Glass Spheres) Retro-Reflective

B. Maryland Department of Transportation, State Highway Administration
1. Standard Specifications for Construction and Materials
a. The provision therein for method of measurement and payment do not apply. Reference to “Engineer” and “State” shall be interpreted to mean “contracting officer” and “Federal Government” respectively.

1.3 PERFORMANCE REQUIREMENTS

A. Paving: Designed for parking and movement of trucks up to 60,000 lbs.

1.4 SUBMITTALS

A. All submittals shall be made in accordance with Section 01300 Submittals.

B. Product Data: Submit product information and mix design

1.5 QUALITY ASSURANCE

A. Perform work in accordance with MDDOT Standard Specifications for Construction and Materials.

B. Qualifications of Asphalt Concrete Producer: Use only materials which are furnished by a bulk asphalt concrete producer regularly engaged in production of hot-mix, hot-laid asphalt concrete.

1.6 SUBMITTALS

A. Job Mix Design.

B. Samples: Provide samples of materials for laboratory testing and job-mix design.

C. Certificates:
1. Provide certificates, in lieu of laboratory test reports.
2. Certify that materials comply with specification requirements.
3. Signed by asphalt concrete producer and Contractor.

1.7 SOURCE QUALITY CONTROL

A. Job-mix Criteria:
1. Provide job-mix formulas for each required asphalt-aggregate mixture.
2. Establish a single percentage of asphalt cement to be added to aggregate, and a single temperature at which asphalt concrete is to be produced.
3. Comply with the mix requirements of the MDDOT Standard Specifications for Construction.
4. Maintain material quantities with allowable tolerances of the governing standards.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Graded Aggregate Base Course.
   1. MDDOT Standard Specifications for Construction and Materials Section 501,

B. Asphalt Concrete Surface Course – All Areas.
   1. MDDOT Standard Specifications for Construction and Materials Section 504,

C. Asphalt Concrete Base Course – Driveways and Heavy Duty
   1. MDDOT Standard Specifications for Construction and Materials Section 504,

2.2 RECYCLED ASPHALT MATERIAL

A. Material
   1. Asphalt concrete mix may contain a maximum of 25 percent by weight of the total aggregate material, reclaimed asphalt pavement (RAP).
   2. Material shall be in accordance with MDDOT Standard Specifications for Construction and Materials

B. Mix Design
   1. Mix design shall meet the requirements for the type of asphalt concrete specified. Clearly state the viscosity of reclaimed asphalt cement, grade of new asphalt cement, properties of recycling agent if used, and percentage of each in the mix. Furnish a new job mix formula for each change in percentage of RAP material used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that compacted base course is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.2 EQUIPMENT

A. Provide size and quantity of equipment to complete the work specified within the project time schedule.

B. Bituminous Pavers; Self-propelled that spread hot asphalt concrete mixtures without tearing, shoving or gouging surfaces, and control pavement edges to true lines without use of stationary forms.

C. Rolling Equipment:
   1. Self-propelled, steel-wheeled and pneumatic-tired rollers that can reverse direction without backlash.
   2. Other type rollers may be used if acceptable to the Contracting Officer.

D. Hand Tools: Provide rakes, lutes, shovels, tampers, smoothing irons, pavement cutters, portable heaters, and other miscellaneous small tools to complete the work specified.

E. Bituminous Distributor:
   1. Distributor shall be mounted on pneumatic tires of such size and number to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure.
   2. The distributor shall be designed and equipped to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths.
   3. Distributor equipment shall include a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gages, volume-measuring devices, adequate heaters for heating for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor.
   4. The distributor shall be equipped to circulate and agitate the bituminous material during the heating process.

F. Power Brooms and Power Blowers:

1. Power brooms and power blowers shall be suitable for cleaning the surfaces to which the tack coat is to be applied.

3.3 TRANSPORTING

A. Transport asphalt concrete mixtures from mixing site in trucks having tight, clean compartments.

B. Coat hauling compartments with a lime-water mixture to prevent asphalt concrete mixture from sticking.

C. Elevate and drain compartment of excess solution before loading mix.

D. Provide covers over asphalt concrete mixture when transporting to protect from weather and to prevent loss of heat.

E. During periods of cold weather or for long distance deliveries, provide insulation around entire truck bed surfaces.

3.4 AGGREGATE PLACEMENT

A. Begin spreading base material at the point nearest the source of supply. Permit traffic and hauling over the base. Fill ruts formed by traffic and re-roll. After base course placement, continue machining and rolling until surface is smooth, compacted, well bonded, and true to the designed cross section. Compact to 100 percent ASTM D 698 maximum dry density. Maintain the base smooth and true to grade and cross section until bituminous concrete placement.

B. Where the required thickness is more than 6 inches, the material shall be spread and compacted in 2 or more layers of approximately equal thickness, the maximum compacted thickness of any one layer not to exceed 6 inches. When vibrating or other approved types of special compacting equipment are used, the compacted depth of a single layer of base course may be increased to 8 inches upon approval by the Contracting Officer.

C. Not more than one sample in every 5 shall have a density of less than that specified and the density of such sample shall not be more than 2 percent below that specified.

D. If the surface of the base becomes uneven, or distorted and sets up in that condition, it shall be scarified, reshaped and recompacted. If the subbase, when compacted and shaped, shows a deficiency in thickness or if depressions occur in the surface, the Contractor shall scarify such sections before additional material is added and allowance will not be made for such scarifying.

3.5 FRAME ADJUSTMENTS

A. Set frames of subsurface structures to final grade as a part of this work.

B. Placing frames:
   1. Surround frames set to elevation with a ring of compacted asphalt concrete base prior to paving.
   2. Place asphalt concrete mixture up to 1 inch below top of frame, slope to grade, and compact by hand tamping.

C. Adjust frames to proper position to meet paving or grade indicated.

D. If permanent covers are not in place, provide temporary covers over openings until completion of rolling operations.

E. Set cover frames to grade, flush with surface of adjacent pavement.

3.6 TACK COAT:

A. Bituminous material for the tack coat shall be applied in quantities of not less than 0.05 gallon per square yard no more than 0.15 gallon per square yard of pavement surface. The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the Contracting Officer.

B. Cutback asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 centistokes, kinematic. The temperature viscosity relation shall be furnished to the Contracting Officer.

C. Following preparation and subsequent inspection of the surface, the tack coat shall be applied at the specified rate with uniform distribution over the surface to be treated. All areas and spots missed by the distributor shall be properly treated with the hand spray.

D. Following application of the tack material and prior to application of the succeeding layer of pavement, the tack shall be allowed to cure and obtain evaporation of any volatiles or moisture.

E. Until the succeeding layer of pavement is placed, and tacked area shall be maintained by protecting the surface against damage and by repairing the retacking deficient areas at no additional cost to AAFES.

F. If required, clean dry sand shall be spread to effectively blot up any excess bituminous material.

G. No smoking, fires, or flames other than the heaters that are a part of the equipment shall be permitted within 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions.

3.7 PLACEMENT

A. Install work in accordance with MDDOT Standard Specifications for Construction and Materials Section 504.

B. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

C. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

D. Place asphalt concrete mixture on prepared surface, spread and strike-off using paving machine.

E. Spread mixture at a minimum temperature of 225 degrees F.

F. Inaccessible and small areas may be placed by hand.

G. Place each course at thickness so that when compacted it will conform to the indicated grade, cross-section, finish thickness, and density indicated.

H. Hand Placing:
1. Spread, tamp, and finish mixture using hand tools in areas where machine spreading is not possible, as acceptable to Contracting Officer.
2. Place mixture at a rate that will insure handling and compaction before mixture becomes cooler than acceptable working temperature.

I. Joints:
1. Carefully make joints between old and new pavements, or between successive days work, to ensure a continuous bond between adjoining work. All joints shall be sealed with a protective coating of liquid asphalt sealer.
2. Construct joints to have same texture, density and smoothness as adjacent sections of asphalt concrete course.
3. Clean contact surfaces free of sand, dirt, or other objectionable material and apply tack coat.
4. Offset transverse joints in succeeding course not less than 24 inches (600 mm).
5. Cut back edge of previously placed course to expose an even, vertical surface for full course thickness.
6. Offset longitudinal joints in succeeding courses not less than 6 inches (150 mm).
7. When the edges of longitudinal joints are irregular, honeycombed, or inadequately compacted, cut back unsatisfactory sections to expose an even, vertical surface for full course thickness.

3.8 COMPACTION

A. Provide sufficient rollers to obtain the required pavement density.

B. Begin rolling operations as soon after placing when the mixture will bear weight of roller without excessive displacement.

C. Do not permit heavy equipment, including rollers to stand on finished surface before it has thoroughly cooled or set.

D. Compact mixture with hot hand tampers or vibrating place compactors in areas inaccessible to rollers.

E. Start rolling longitudinally at extreme lower side of sections and proceed toward center of pavement.

Roll to slightly different lengths on alternate roller runs.

F. Do not roll centers of sections first under any circumstances.

G. Breakdown Rolling:
1. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.
2. Operate rollers as close as possible to paver without causing pavement displacement.
3. Check crown grade and smoothness after breakdown rolling.
4. Repair displaced areas by loosening at once with lutes or rakes and filling, if required, with hot loose material before continuing rolling.

H. Second Rolling:
1. Follow breakdown rolling as soon as possible while mixture is hot and in condition for compaction.
2. Continue second rolling until mixture has been thoroughly compacted.

I. Finish Rolling:
1. Perform finish rolling while mixture is still warm enough for removal of roller marks.
2. Continue rolling until roller marks are eliminated and course has attained specified density.

J. Patching:
1. Remove and replace defective areas.
2. Cut-out and fill with fresh, hot asphalt concrete.
3. Compact by rolling to specified surface density and smoothness.
4. Remove deficient areas for full depth of course.
5. Cut sides perpendicular and parallel to direction of traffic with edges vertical.
6. Apply tack coat to exposed surfaces before placing new asphalt concrete mixture.

3.9 PAVEMENT MARKING

A. Cleaning:
1. Sweep surface with power broom supplemented by hand brooms to remove loose material and dirt.
2. Do not begin marking asphalt concrete pavement until acceptable to Contracting Officer.

B. Apply paint with mechanical equipment:
1. Provide uniform straight edges.
2. Apply in accordance with manufacturer's recommended rates.

3.10 TOLERANCES

A. Aggregate Base
1. Flatness: Maximum variation of 1/2 inch measured with 10 foot straight edge.
2. Scheduled Compacted Thickness: Within 1/2 inch.
3. Variation From Design Elevation: Within 1/2 inch.

B. Bituminous Pavement
1. Surface Tolerance: The surface will be tested using a 10-foot (3.05 M) straightedge. The variation of the surface from the testing edge of the straightedge between any two contacts with the surface shall not exceed 1/4-inch (6 mm). All humps or depressions exceeding the specified tolerance shall be corrected or the defective work removed and replaced with new material.
2. Thickness Tolerance: It is the intent of these specifications that the base course shall be constructed in accordance with the thickness shown on the plans and the binder and surface courses constructed in accordance with the rate of application shown on the plans. Where any such courses are found not so constructed, the rules for correction provided herein shall govern.

3.11 FIELD QUALITY CONTROL:

A. The Contractor will employ, and pay for, services to perform asphalt concrete testing and inspection service. Contractor is responsible to include sampling and testing of asphalt concrete materials proposed, and tests and calculations for asphalt concrete mixtures.

B. Asphalt testing shall be done in accordance with the requirements of the MDDOT Standard

Specifications for Construction and Materials, latest edition.

C. Field testing shall include the following:
   1. Thickness: In-place compacted thickness shall not be acceptable if exceeding 1/2 inch allowable variation from thickness shown on drawings.
   2. Density:
   3. Surface Smoothness: Inspect finished surface of each asphalt concrete course for smoothness, using a 10-foot straightedge applied parallel to and at right angles to centerline of paved areas. Surfaces will not be acceptable if the base course smoothness exceeds 1/4 inch in 10 feet:

D. Test locations will be taken in the new pavement area.

E. Contractor shall repair holes from test specimens as specified for patching defective work.

3.12 CLEANING AND PROTECTION

A. Cleaning: After completion of paving operations, clean surfaces of excess or spilled asphalt materials to the satisfaction of Contracting Officer.

B. Protection:
   1. After final rolling, do not permit vehicular traffic on asphalt concrete pavement, until is has cooled and hardened, and in no case sooner than 6 hours.
   2. Provide barricades and warning devices as required to protect pavement and the general public.
   3. Cover openings of structures in the area of paving until permanent coverings are placed.

3.13 PREPARATION OF SURFACE:

A. Immediately before applying the tack coat all loose material, dirt, clay, or other objectionable material shall be removed from the surface to be treated. The area to be tacked shall also be dry and clean.

END OF SECTION

SECTION 02750 – SITE CONCRETE WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:
1. Concrete Pavement
2. Curbs
3. Sidewalks
4. Jointing Materials

1.2 REFERENCES

A. American Concrete Institute (ACI)
1. ACI 318 Building Code Requirements for Reinforced Concrete.

B. ASTM International
1. ASTM A 185 - Welded Steel Wire Fabric for Concrete Reinforcement
2. ASTM A 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement, Grade 60
3. ASTM C 33 - Concrete Aggregate
4. ASTM C 94 - Ready-Mixed Concrete
5. ASTM C 143 - Slump of Hydraulic Cement Concrete
6. ASTM C 150 - Portland Cement
7. ASTM C 171 - Sheet Materials for Curing Concrete
8. ASTM C 172 -Sampling Freshly Mixed Concrete
9. ASTM C 173 - Air Content of Freshly Mixed Concrete by the Volumetric Method
10. ASTM C 309 - Liquid Membrane-Forming Compounds for Curing Concrete
11. ASTM D 422 - Particle-Size Analysis of Soils
12. ASTM D 1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

C. Federal Specifications (FS)
1. FS SS-S-1401 - (Rev. C) Sealants, Joint, Non-Jet-Fuel-Resistant, Hot-Applied, for Portland Cement and Asphalt Concrete pavements.

D. Maryland Department of Transportation, State Highway Administration
1. Standard Specifications for Construction and Materials.
a. The provisions therein for method of measurement and payment do not apply. References to “Engineer” and “State” shall be interpreted to mean “Contracting Officer” and “Federal Government” respectively.

1.3 PERFORMANCE REQUIREMENTS

A. Paving: Designed for parking, light duty commercial vehicles, and movement of trucks up to 60,000 lbs

1.4 SUBMITTALS

A. Section 01310 - Submittals: Procedures for submittals.

B. Product Data: Provide data on joint filler.

C. Certify that materials comply with specification requirements.

D. Concrete Mix Design

1.5 QUALITY ASSURANCE

A. Except as modified herein or as indicated, work and materials shall be performed in accordance with the MDDOT Standard Specifications for Construction and Materials.

1.6 JOB CONDITIONS

A. Weather Limitations
1. The temperature of the concrete as deposited in the forms shall not be less than 50 degrees F

nor more than 85 degrees F.

2. Concrete shall not be placed when the ambient atmospheric temperature is less than 40 degrees F, nor when the concrete is likely to be subject to freezing weather before final curing unless specifically authorized by the contracting officer. When authorized, heating of concrete will be required and all methods and equipment for heating shall be subject to approval.
3. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 AGGREGATE BASE COURSE:

A. See Section 02740, Bituminous Paving, Article 2.01, for aggregate base course material requirements

B. Sub Base material shall have a minimum California bearing ratio (CBR) of 10.

2.2 FORMWORK

A. Form Materials: Conform to ACI 301.

B. Forms shall be of steel, except that wood forms may be used on curves having a radius of 150 feet or less, and for fillets.

C. Forms shall be equal in depth to the edge thickness of the slab as shown on the drawings.

D. Forms shall be in one piece for the full depth required except where the drawings require several different slab thicknesses, forms may be built-up with metal or wood to provide an increase in depth of not more than 26 percent.

1. Steel forms shall be furnished in sections not less than 10 feet in length, except that on curves having a radius of 150 feet or less, the length of the sections shall be 5 feet unless the sections are flexible or curved to the proper radius. Each 10-foot length of form shall be provided with at least three form braces and pin sockets so spaced that the form will be rigidly braced throughout its length. Lock joints between form sections shall be free from play or movement. Forms shall be free of warps, bends, or kinks. The top surface of a form shall not vary more than 1/8 inch in 10 feet from a true line. The face of the form shall not vary more than 1/4 inch in 10 feet from a true plane. Forms with battered top surfaces or distorted faces or bases shall be removed from the project.
2. Wood forms for curves and fillets shall be made of well-seasoned, surfaced plank or plywood, straight, and free from warp or bend. Wood forms shall be adequate in strength and rigidly braced.

2.3 REINFORCEMENT

A. Reinforcing Steel: ASTM A615; 60 ksi yield grade; deformed billet steel bars; unfinished finish.

B. Welded Steel Wire Fabric: Plain type, ASTM A185; in flat sheets; unfinished.

C. Dowels: ASTM A615; 60 ksi yield grade, plain steel, unfinished finish.

2.4 CONCRETE MATERIALS

A. Portland Cement
1. ASTM C150, Type I or II, at the contractor's option.
2. Temperature of cement shall not be over 140 degrees F when delivered to the batching plant.

B. Aggregates:
1. Fine Aggregate - ASTM C33, Clean and graded from 1/4 inch to fines.
2. Coarse Aggregate - ASTM C33, clean and graded in conformance with size No. 57.

C. Air Entraining Admixture:
1. The admixture shall be free of chlorides with formulation being adjusted to provide the recommended percentage of free air.

D. Water:
1. Clean and Potable, free of impurities detrimental to concrete.

E. Curing Materials:

1. The use of covering material that contains or becomes contaminated with sugar in any form, tannic acid or any other substance detrimental to Portland Cement concrete will not be permitted.
   a. Polyethylene Sheeting shall be white, opaque, free of visible defects, uniform in appearance, and shall be not less than 0.004 inch thick. Polyethylene sheeting shall conform to the water retention requirements of ASTM C171.
   b. Waterproof paper shall conform to ASTM C171. The top side of the waterproof paper shall be white.

2.5 JOINT FILLER

A. For expansion joints.
   1. Shall conform to Section “Joint Materials" of the MDDOT Standard Specifications for Roads and Structures, latest addition, for the type specified on the plans or in the Contract.

B. Sealant, Joint, Non Fuel Resistant, Hot Applied
   1. FS SS-S-1401, for Portland Cement and Asphalt Concrete Pavements.

2.6 CONCRETE MIX DESIGNS:

A. General:
   1. For additional requirements see paragraph herein entitled “Inspection and Testing”.
   2. Laboratory test reports shall be identified with project location and submitted to the Architect for approval.
   3. The contractor shall be responsible to coordinate testing procedures with the laboratory and be responsible for incorporating into the paving concrete of the minimum strengths specified.

B. Concrete Mix Design:
   1. Strength and Slump: 4000 PSI at 28 days
   2. Air Entrainment: 5 to 7%
   3. Slump: 3 to 5 inches
   4. The water content of the concrete will be the minimum necessary to obtain the workability required for the specific conditions and methods of placement.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before commencing the placement of base course, the previously constructed subgrade, as specified in Section 02300 - Earthwork, shall be inspected for surface tolerances and shall be cleaned of all foreign substances.

3.2 INSTALLATION OF BASE COURSE

A. See Section 02740, Article 3.04 for base course installation requirements.

B. No work shall proceed on pavement course until the base has been satisfactorily installed and inspected.

3.3 FORM SETTING

A. The forms shall be set in firm soil cut true to grade so that each form section when placed will be firmly in contact with the underlying layer for its entire length and base width.

B. The form sections shall be staked into position and tightly locked together.

C. The length of pins and quantity provided in each section shall be sufficient to hold the form at the correct line and grade.

D. When tested by a 10 foot straightedge the top of the form shall conform to the requirements specified for the finished surface of the concrete, and the longitudinal axis of the upstanding leg shall not vary more than 1/4 inch from the straightedge.

E. Conformity to the alignment and grade elevations shown on the drawings shall be checked, and necessary corrections shall be made immediately prior to placing the concrete.

F. The forms shall be cleaned and coated with non-staining form oil before being set in place.

3.4 PLACING CONCRETE

A. Place concrete in accordance with MDDOT Standard Specifications for Construction and Materials Section 520 Plain and Reinforced Portland Cement Concrete Pavement.

B. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.

C. Items to be embedded in the concrete shall be positioned accurately before placing concrete and held securely in position.

D. No concrete shall be placed until preparatory work (forms, reinforcement, subgrade, etc) has been approved by the project inspector. Each time the contractor intends to place concrete he shall notify the inspector and obtain approval. The contractor shall notify the inspector at least 24 hours before the intended time for placement.

E. Prior to placement of concrete the forms and subgrade shall be free of debris, ice, snow, extraneous oil, or other harmful substances or coatings. Any oil on the reinforcing steel or other surfaces required to be bonded to the concrete shall be removed. Rock surfaces shall be cleaned by wire brush scrubbing, as necessary, and shall be wetted immediately prior to placement of concrete. Placement of concrete on mud, dried earth, uncompacted fill or frozen subgrade will not be permitted.

F. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

G. Concrete shall be distributed so that when consolidated and finished, the grade, surface elevation, and dimensions at all points are as required.

H. All edges that will be exposed to view when the structure is completed shall be given a 3/4 inch chamfer unless the edge is indicated to be rounded by a finishing tool. Chamfers shall be made by placing suitable forming strips inside the forms.

I. Concrete shall be deposited in the forms as closely as possible to its final position. Concrete shall not be dropped from higher than 2 feet above the surface where it is being deposited. Chutes, pipes or "elephant trunks" will be used where required to distribute the concrete and to avoid dropping the concrete. Concrete shall be thoroughly distributed and worked into corners and around reinforcement as required to prevent formation of voids in the concrete.

J. Concrete shall be thoroughly consolidated by vibrating, rodding, or tamping. Mechanical vibrators shall be used wherever possible. Vibration shall not be applied directly to the reinforcing steel or to the forms.

K. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete damaged in form removal shall be repaired promptly by the contractor at no cost to AAFES.

L. After removal of forms, formed surfaces shall be patched as follows: Remove loose material, cut back unsound concrete, and voids fill holes with a stiff Portland cement mortar mix. Make patching mortar using some white cement with the regular cement and sand. Mix patching mortar to match surrounding concrete.

3.5 JOINTS

A. Joints shall conform to the details indicated and shall be perpendicular to the finished grade of the pavement.

B. Transverse expansion and contraction joints shall be straight and continuous from edge of the pavement.

C. Expansion Joints shall be formed of preformed filler material. The filler shall be securely held in position by means of approved metal supports which shall remain in the pavement. A removable metal channel cap bar shall be used to hold the parts of the joint in proper position and protect the filler from damage during concreting operations. The cap bar shall be removable without damage to the pavement to provide a space for sealing of the joint. Adjacent sections of filler shall be fitted tightly together and the filler shall extend across the full width of the paving lane in order to prevent entrance of concrete into the expansion space. Expansion joints shall be formed about structures and features that project through, into, and against the pavement, using joint filler of the type, thickness, and width

indicated, and installed in such a manner as to form a complete, uniform separation between the structure and pavement.

D. Construction Joints: Provide if an emergency stop occurs. Remove the concrete back to indicated location of expansion joint and install dowelled construction joint as shown.

E. Sealing Joints: Joints shall be sealed immediately following curing of the concrete or as soon thereafter as weather conditions permit, as directed. Crimping or sawing of filler-type joints shall be accomplished immediately before sealing of the joints.

F. Grooving and Sealing Cracks: Random cracks, except those specifically excluded by the Architect, that occur in the pavement during construction shall be grooved and sealed. The top of the crack shall be grooved to a depth of 3/4 inch and to a width not less than 3/8 inch nor more than 5/8 inch by means of an approved mechanical grooving machine. The grooving tool shall be capable of following closely the path of the crack and of widening the top of the crack to the required section without damaging the concrete. Loose material shall be removed and the groove shall be completely sealed with an approved type of joint sealing material.

3.6 FINISHING

A. Formed Surfaces: Fins and loose material shall be removed. Unsound concrete and voids shall be cut back to solid concrete, reamed, brushed-coated with cement grout, and filled solid with a stiff Portland-cement-sand mortar mix. Patchwork shall finish flush with adjoining concrete surfaces and, where exposed, shall match adjoining surfaces in texture and color. Patchwork shall be cured for 72 hours. White Portland cement shall be used as needed to attain color match.

B. Unformed Surfaces: Surfaces shall be finished to a true plane with no deviation exceeding 5/16 inch when tested with a 10-foot straightedge. Surfaces shall be pitched to drains. Surfaces shall be screeded and floated to the required level with no coarse aggregate visible before finishing as specified below.

1. Monolithic Finish: Monolithic finish shall be given to slabs unless otherwise specified. After the surface moisture has disappeared, floated-surfaces shall be steel-troweled to a smooth, even, dense finish free from blemish including trowel marks.
2. Nonslip Finish: Nonslip finish shall be given to stair treads, landings, exterior building entrances, vestibules, and sidewalks so indicated by brooming with a fiber-bristle brush in a direction transverse to that of main traffic.

3.7 PATCHING

A. Patch to match material, color and texture of surrounding area.

B. Replace defective work if patching is not acceptable to Contracting Officer.

3.8 CURING AND PROTECTION

A. Curing:

1. Immediately after the finishing operations, the exposed concrete surface shall be cured.
2. Immediately after finishing the concrete, the exposed surfaces shall be coated with a membrane-forming curing compound. The compound shall be applied in 2 coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet per gallon for each coat. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above at no additional cost to the Government. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected for seven days from pedestrian and vehicular traffic and from any other action which might disrupt the continuity of the membrane.

B. Backfilling: After curing, debris shall be removed, and the area adjoining the sidewalk shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with the lines and grades indicated.

C. Protection: The completed sidewalk shall be protected from damage until accepted. The Contractor

shall repair damaged concrete and clean concrete discolored during construction. Sidewalk that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed by the Contracting Officer.

3.9 CONCRETE INSPECTION AND TESTING

A. The Contractor will employ and pay for concrete testing services as follow:
   1. Perform concrete inspection and tests as listed in “Methods and sampling and Testing”, ASTM C94 latest edition, ACI 301, Chapter 16; and as specified, all in accordance with specification Section 01410 – Testing Services. The more stringent requirements shall be followed.

B. Concrete Test:
   1. Air content test shall be made in accordance with ASTM C 173. Test for determining air content shall be made each time test beams are fabricated.
   2. Slump test of concrete shall be made in accordance with ASTM C 143. At least one slump test shall be made each time test beams are fabricated.

END OF SECTION

SECTION 02820 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Fence framework, fabric, and accessories.
2. Excavation for post bases.
3. Concrete foundation for posts and center drop for gates
4. Manual gates and related hardware.

1.2 SUBMITTALS

A. General:
1. Section 01310 - Submittal Procedures: Requirements for submittals.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
a. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
2. VOC Compliance - Submit documentation indicating VOC content of adhesives.

C. Shop Drawings:
1. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.

D. Product Data:
1. Submit data on fabric, posts, accessories, fittings and hardware.

E. Samples:
1. Submit two samples of fence fabric illustrating construction and finish.

F. Manufacturer's Installation Instructions: Submit installation requirements.

1.3 QUALITY ASSURANCE

A. Supply material in accordance with CLFMI - Product Manual.

B. Perform installation in accordance with ASTM F567.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum 5 years documented experience and approved by manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

A. Section 01600 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.

C. Identify each package with manufacturer’s name.

D. Store fence fabric and accessories in secure and dry place.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Framing (Steel): ASTM F1083 Schedule 40 galvanized steel pipe, welded construction,; coating conforming to ASTM F1043 Type A on pipe exterior and interior.

B. Fabric Wire (Steel):
   1. Base Bid - ASTM A392 Zinc Coated Wire Fabric
   2. Bid Option 1 - ASTM F668 PVC coated.

C. Barbed Wire: ASTM A121 galvanized steel; 12 gage thick wire, 3 strands, 4 points at 3 inch o.c.

D. Concrete: Type specified in Section 03300.

2.2 COMPONENTS

A. Line Posts: 1.9 inch diameter.

B. Corner and Terminal Posts: 3.5 inch.

C. Gate Posts: 3.5 inch diameter.

D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.

E. Gate Frame: 1.66 inch diameter for welded fabrication.

F. Fabric: CFFMI Standard Industrial, 2 inch diamond mesh interwoven wire, 9 gage thick, top salvage knuckle end closed, bottom selvage knuckle end closed.

G. Tension Wire: 6 gage thick steel, single strand.

H. Tension or Stretcher bars: Hot-dip galvanized steel with a minimum length 2 inches less than the full height of fabric, a minimum cross section of 3/16 inch by 3/4 inch, and a minimum of 1.8 oz. of zinc coating per sq. ft.

I. Tension and Brace Bands: 3/4-inch-wide minimum hot-dip galvanized steel with a minimum of 1.8 oz. of zinc coating per sq. ft.
   1. Tension Bands: 0.074 inch thick (14 gage) minimum.
   2. Brace Bands: 0.105 inch thick (12 gage) minimum.

J. Tie Wire: Aluminum alloy steel wire.

2.3 ACCESSORIES

A. Caps: Cast or malleable steel galvanized; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; galvanized steel.

C. Extension Arms: Galvanized pressed steel, to accommodate 3 strands of barbed wire, single arm, sloped to 45 degrees.

D. Gate Hardware: Center gate stop and drop rod; two 180 degree gate hinges for each leaf and hardware for padlock. Padlock specified in Section 08710.

2.4 GATES

A. General:
   1. Gate Types, Opening Widths and Directions of Operation: As indicated on Drawings.
   2. Factory assemble gates.
   3. Conform to requirements specified for PVC coated steel chain link fence except that PVC coated aluminum alloy framing conforming to ASTM B429 may be used.
   4. Design gates for operation by one person.

B. Swing Gates:
   1. Fabricate gates to permit 180 degree swing.
   2. Gates Construction: ASTM F900 with welded corners. Use of corner fittings is not permitted.

2.5 FINISHES

A. Components and Fabric: Galvanized to ASTM A123/A123M; ASTM A153/A153M for components; ASTM A392 for fabric; 1.8 oz/sq ft coating.

B. Components and Fabric: Vinyl coating, in accordance with ASTM F934 over coating of 1.8 oz/sq ft galvanizing. Color as indicated on the exterior finish material schedule.

C. Hardware: Galvanized to ASTM A153/A153M, 1.8 oz/sq ft coating.

D. Accessories: Same finish as framing and fabric.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ASTM F567.

B. Set line, end, and gate posts plumb, in concrete footings with top of footing 6 inches below finish grade. Slope top of concrete for water runoff.

C. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.

D. Install top rail through line post tops and splice with 6 inch long rail sleeves.

E. Install brace rails on corner gate leaves.

F. Place fabric on outside of posts and rails.

G. Do not stretch fabric until concrete foundation has cured 7 days.

H. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

I. Position bottom of fabric 2 inches above finished grade.

J. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

K. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

L. Install bottom tension wire stretched taut between terminal posts.

M. Install support arms sloped outward and attach barbed wire; tension and secure.

N. Install gate with fabric and barbed wire overhang to match fence. Install three hinges on each gate leaf, latch, catches, drop bolt retainer and locking clamp.

O. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

P. Connect to existing fence at existing or new terminal posts.

Q. Install posts with 6 inches maximum clear opening from end posts to buildings, fences and other structures.

R. Excavate holes for posts to diameter and spacing indicated on drawings without disturbing underlying materials.

S. Reuse holes resulting from removal of existing post footings for installation of new posts.

T. Center and align posts. Place concrete around posts, and vibrate or tamp for consolidation. Verify vertical and top alignment of posts and make necessary corrections.

U. Extend concrete footings 1inch above grade, and trowel, forming crown to shed water.

V. Allow footings to cure minimum 7 days before installing fabric and other materials attached to posts.

3.2 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From Indicated Position: 1 inch.

END OF SECTION

SECTION 02870 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Bicycle rack.
2. Trash/Ash Receptacles.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Shop Drawings: Indicate size, method of fabrication, and color.

C. Product Data: Provide data on materials and finish.

D. Manufacturer's Installation Instructions: Indicate site preparation, installation and assembly instructions, and methods of fabrication.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver items in manufacturer's original unopened protective packaging.

B. Store materials in original protective packaging to prevent soiling, physical damage, or wetting.

C. Handle so as to prevent damage to finished material.

D. Maintain protective covers on all items until installation is complete.

PART 2 - PRODUCTS

2.1 BICYCLE RACK

A. Bicycle rack shall be formed from a single 2-3/8 inch diameter ASTM Schedule 40 steel pipe, color to be custom color Brown to match chain link fence. Pedestal mount with matching base covers as per manufacturer's recommendations.

B. Manufacturer
1. Columbia Cascade Company - Original Cycloops" #2170-9-P-C
2. Brandir International Inc.
3. Creative Pipe, Inc.
4. Substitutions - See SECTION 00404 – PRODUCT SUBSTITUTION.

2.2 TRASH/ASH RECEPTACLE

A. Description
1. Vented metal barrel with cast aluminum lid.
2. Liner - removable steel liner.
3. Size: 22 inch diameter x 34 ½ inch high.

B. Product
1. Silhouette Combination Trash and Ash - Canterbury International
2. Substitutions - See SECTION 00404 – PRODUCT SUBSTITUTION.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install bicycle rack and trash/ash receptacle where indicated on the drawings and in accordance with approved shop and installation drawings.

3.2 ADJUST AND CLEAN

A. After completion of installation clean all exposed surfaces.

END OF SECTION

SECTION 02923 - LANDSCAPE GRADING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Final grade topsoil for finish landscaping.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Topsoil: Provide Topsoil as specified in Specification SECTION 02205 - SOIL MATERIALS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that building and trench backfilling have been inspected.

B. Verify that substrate base has been contoured and compacted.

3.2 SUBSTRATE PREPARATION

A. Eliminate uneven areas and low spots.

B. Remove debris, roots, branches, stones, in excess of ½ inch in size.

C. Scarify surface to depth of 6 inches (150 mm) where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.3 PLACING TOPSOIL

A. Place topsoil in areas where seeding and planting is required to thickness as scheduled.

B. Place topsoil during dry weather.

C. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.

D. Remove roots, weeds, rocks, and foreign material while spreading.

E. Manually spread topsoil close to existing plant life and building to prevent damage.

F. Lightly compact placed topsoil.

G. Surplus imported subsoil and topsoil shall be removed from Government Property.

H. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.4 TOLERANCES

A. Top of Topsoil: Plus or minus ½ inch.

3.5 PROTECTION

A. Protect landscaping and other features remaining as final work.

B. Protect existing structures, fences, sidewalks, utilities, paving, and curbs.

3.6 SCHEDULES

A. Compacted topsoil thickness at the following areas:
   1. Lawn: 4 inches.
   2. Landscape Beds: 8 inches.

END OF SECTION

SECTION 02936 - SEEDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Seeding, optional Hydroseeding, mulching, and fertilizing.

B. Maintenance.

1.3 REFERENCES

A. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.4 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.5 SUBMITTALS

A. Submit under provisions of Specification SECTION 01700 - PROJECT CLOSEOUT.

B. Maintenance Data: Submit maintenance instructions, recommended cutting methods and maximum grass height, types, application frequency, and recommended coverage of fertilizer.

C. Product Data: Submit seed vendors' certified statement for grass seed mixture required, stating botanical and common names, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

D. Certificate of Compliance: See Regulatory requirements.

1.6 QUALITY ASSURANCE

A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.7 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

B. Provide certificate of compliance from Project Manager indicating approval of seed mixture.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Transport, handle, store, and protect products in accordance with Specification SECTION 01600 - MATERIAL AND EQUIPMENT.

B. Deliver grass seed mixture in sealed containers. Seed that is wet or moldy or that has been otherwise damaged in transit or storage will not be acceptable.

C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.9 MAINTENANCE SERVICE

A. SECTION 01730 - OPERATION AND MAINTENANCE DATA.

B. Provide lawn maintenance including, but not limited to watering, cutting, weeding, fertilizing, re-seeding areas that are not taking hold for all seeded areas for sixty (60) days after the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SEED MIXTURE

A. Seed Mixture: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination

established by U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act.

B. Seed mix required as follows:
80% Turf Type Tall Fescue
10% Kentucky Blue Grass
10% Perennial Ryegrass

2.2 SOIL MATERIALS

A. Topsoil: As specified in Specification SECTION 02205 - SOIL MATERIALS.

2.3 ACCESSORIES

A. Mulching Material: Wood cellulose fiber, free of growth or germination inhibiting ingredients.

B. Fertilizer: FS O-F-241, recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil ,as indicated in analysis to the following proportions: Nitrogen 12 percent, phosphoric acid 12 percent, soluble potash 12 percent.

C. Water: Clean, fresh, potable, and free of substances or matter which could inhibit vigorous growth of grass.
1. Water will be provided to the Landscape Contractor at the building hose bibbs.
2. The Landscape Contractor shall furnish all equipment and hose as required to properly water the seeded areas.

D. Herbicide: Teflan or approved equal.

E. Protection Stakes: Softwood lumber, chisel pointed.

F. Protection String: Inorganic fiber.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that prepared topsoil base is ready to receive the work of this Specification Section.

3.2 PREPARATION OF SUBSOIL

A. Prepare subsoil as per Specification SECTION 02923 - LANDSCAPE GRADING.

3.3 PLACING TOPSOIL

A. Place topsoil as per Specification SECTION 02923 - LANDSCAPE GRADING.

3.4 FERTILIZING

A. Apply fertilizer at a rate of 30 pounds per 1,000 square feet.

B. Apply after smooth raking of topsoil and prior to roller compaction.

C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.

D. Mix thoroughly into upper 2 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.5 SEEDING

A. Apply seed at a rate of 8 lbs per 1000 sq ft evenly in two intersecting directions. Rake in lightly.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Planting Season: As established by the Project Manager.

D. Do not sow immediately following rain, when ground is too dry, or during windy periods.

E. Roll seeded area with roller not exceeding 112 lbs.

F. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches . Maintain

mulch clear of shrubs and trees.

G. Apply water with a fine spray immediately after each area has been mulched. Saturate the depth of the topsoil.

3.6 OPTIONAL HYDROSEEDING

A. Apply seeded slurry with a hydraulic seeder at a rate of 6 lbs per 1000 sq ft evenly in two intersecting directions.

B. Do not hydroseed areas in excess of that which can be mulched on the same day.

C. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain mulch clear of shrubs and trees.

D. Apply water with a fine spray immediately after each area has been mulched. Saturate to the depth of the topsoil.

3.7 SEED PROTECTION

A. Identify seeded areas with stakes and string around area periphery. Set string height to 36 inches. Space stakes at 60 inches.

3.8 MAINTENANCE

A. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.

B. Neatly trim edges and hand clip where necessary.

C. Immediately remove clippings from Government Property after mowing and trimming.

D. Water to prevent grass and soil from drying out.

E. Roll surface to remove minor depressions or irregularities.

F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

G. Immediately reseed areas which show bare spots.

H. Protect seeded areas with warning signs during maintenance period.

3.9 SCHEDULE

A. All project disturbed areas not scheduled to receive impervious materials, or plant bed areas, as shown on drawings, shall receive grass seed in accordance with this Specification Section. Verify extend of work with Project Manager.

END OF SECTION

SECTION 02950 - TREES, PLANTS, AND GROUND COVER

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Preparation of subsoil and topsoil.

B. Topsoil bedding.

C. New trees, plants, and ground cover.

D. Mulch and fertilizer.

E. Maintenance.

F. Tree Pruning.

1.2 REFERENCES

A. ANSI Z60.1 - American Standard for Nursery Stock.

B. NAA (National Arborist Association) - Pruning Standards for Shade Trees.

1.3 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

B. Plants: Living trees, plants, and ground cover specified in this Section.

1.4 SUBMITTALS

A. Section 01300 - Submittals: Procedures for Submittals.

B. Certificate of Inspection of Plant Material by State or Federal Authorities.

C. Maintenance Data: Include pruning and trimming method; types, application frequency, and recommended coverage of fertilizer for all installed plants.

D. Submit list of plant material sources.

1.5 QUALITY ASSURANCE

A. Nursery Qualifications: Company specializing in growing and cultivating the plants with minimum five years experience.

B. Installer Qualifications: Company specializing in installing and planting the plants with minimum three years experience and approved by nursery.

C. Tree Pruner Qualifications: Company specializing in pruning trees with proof of Arborist Certification.

D. Tree Pruning: NAA - Pruning Standards for Shade Trees.

E. Maintenance Services: Performed by qualified installer.

F. Plant Materials: Nursery grown trees and shrubs grown in a recognized nursery in accordance with good horticultural practice with healthy root systems developed by transplanting or root pruning. Provide only healthy, vigorous stock, free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1.6 SUBSTITUTIONS

A. *Do not make substitutions* of tree and shrub materials. If required landscape material is not obtainable, submit proof of non-availability to Project Manager and a proposal for use of equivalent material.

1.7 INSPECTION

A. The Project Manager may inspect trees and shrubs either at the place of growth or at site before

planting for compliance with requirements for genus, species, variety, size and quality. Project Manager retains the right to inspect trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site and replace with new material.

1.8 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of plants, fertilizer and herbicide mixture.

C. Plant Materials: Certified by federal or state department of agriculture Described by ASTM Z60.1; free of disease or hazardous insects.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01600.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, name of manufacturer, and certification of conformance to State regulations.

C. Protect and maintain plant materials until planted.

D. Deliver plant life materials immediately prior to placement. Do not deliver more plant material than can be planted in one day. Keep plants moist.

E. Label at least one tree and one shrub of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name. Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread.

F. Prune, thin out, and shape trees and shrubs in accordance with standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by the Project Manager, do not cut tree leaders, and remove only injured or dead branches from trees. Required shrub sizes indicated are size after pruning. Prune shrubs to retain natural character. *Any shrubs sheared into smooth regular shapes will be rejected.*

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not install plant materials when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F; where soil is frozen or muddy.

B. Do not install plant life when wind velocity exceeds 30 mph.

1.11 WARRANTY

A. Provide one-year warranty.

B. Warranty: Include coverage for one continuous growing season after all plant materials are installed; replace dead or unhealthy plants, or plants dead beyond normal pruning limits.

C. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

1.12 MAINTENANCE SERVICE

A. Maintain plant life for sixty (60) days after Date of Substantial Completion.

B. Maintain plant life immediately after placement until plants are well established and exhibit a vigorous growing condition. Continue maintenance until termination of warranty period.

C. Maintenance to include:
1. Cultivation and weeding plant beds and tree mulch rings.
2. Applying herbicides for weed control in accordance with manufacturer's instructions. Remedy damage resulting from use of herbicides.
3. Remedy damage from use of insecticides.
4. Water sufficient to saturate root system.
5. Pruning, including removal of dead or broken branches.

6. Disease control.
7. Replacement of mulch.

D. Inspect plant life at a minimum of once per week. Perform maintenance promptly.

PART 2 - PRODUCTS

2.1 TREES, PLANTS, AND GROUND COVER

A. Trees, Plants, and Ground Cover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.

2.2 SIZE

A. Provide trees and shrubs of the sizes indicated in plant list and in accordance with dimensional relationship requirements of ANSI Z60.1 for kind and shape of trees and shrubs required. Trees and shrubs of larger size than specified may be used if approved by the Project Manager. Size of roots or balls shall be increased proportionately.

2.3 MEASUREMENTS

A. Measure trees and shrubs with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4 inches caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread dimensions: do not measure from branch or root tip to tip.

2.4 SOIL MATERIALS

A. Provide topsoil that is fertile, friable, naturally loamy, surface soil; reasonably free of subsoil, clay lumps, brush, weeds, and other litter and free of roots, stumps, stones larger than 2 inches in any dimension, and other extraneous or toxic matter harmful to plant growth. On-site soil may be used, if it is determined acceptable by the Project Manager.

B. If on-site is not suitable, obtain topsoil from local sources or from areas having similar soil characteristics to that found at site of work. Obtain topsoil from naturally well-drained sites where topsoil is at least 4 inches deep; do not obtain from bogs or marshes.

2.5 SOIL AMENDMENT MATERIALS

A. Fertilizer: Containing fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil to the following proportions: Nitrogen 11 percent, phosphoric acid 8 percent, soluble potash 4 percent.

B. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight, pH range of 4 to 5; moisture content of 30 percent.

C. Bone Meal: Raw, finely ground, commercial grade, minimum of 3 percent nitrogen and 20 percent phosphorous.

D. Lime: Ground limestone, dolomite type, minimum 95 percent carbonates.

E. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of plants.
1. Water will be provided by the contractor at the nearest available source in the vicinity of the project. Contractor to furnish hose and other equipment.

2.6 MULCH MATERIALS

A. Mulching Material: Mulch shall be fine grade of shredded hardwood bark, 'Paygro' or an approved equal. Mulch shall be free of foreign matter and wood particles over 6" in length or 2" in width.

2.7 ACCESSORIES

A. Anti-desiccant: Emulsion type, film-forming agent designed to permit transpiration, but retard excessive loss, of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.

2.8 PLANT SOIL MIX

A. A uniform mixture of 1 part sphagnum peat moss and 2 parts topsoil by volume, or as noted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that prepared subsoil is ready to receive work; coordinate with lawn work; install plant materials after lawn grading, but prior to seed or sod work. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

B. Saturate soil with water to test drainage.

3.2 PREPARATION OF SUBSOIL

A. Prepare subsoil as per Specification Section 02923.

B. Dig pits and beds 6 inches larger than plant root system.

3.3 PLACING TOPSOIL

A. Place topsoil as per Specification Section 02923.

3.4 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after initial raking of topsoil.

C. Mix thoroughly into upper 2 inches of topsoil.

D. Lightly water to aid the dissipation of fertilizer.

3.5 PLANTING

A. Place plants for best appearance for review and final orientation by Project Manager.

B. Space plants in beds as shown on drawings. Set minimum 3' from structures, pavement edges, buildings, face of curb or as noted on drawings.

C. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth of 6 inches under each plant. Remove all twine, bags and roping from base of trunks. Remove top 1/3 of the wire from root balls having wire baskets. Remove all rot-proof burlap.

D. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

E. Stake as shown on landscape drawing details.

3.6 TREE PRUNING

A. Prune trees to NAA Class 1 - Fine Pruning.

B. Remove and replace excessively pruned or malformed stock resulting from improper pruning.

3.7 FIELD QUALITY CONTROL

A. Section 01400 - Quality Assurance: Field inspection and testing.

B. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

3.8 MAINTENANCE

A. Neatly trim plants where necessary removing dead or broken branches. Do not sheer plants into smooth, regular shapes.

B. Immediately remove clippings after trimming.

C. Water to prevent soil from drying out.
   1. Water will be provided to the Landscape Contractor at the building hose bibbs.

2. The Landscape Contractor shall furnish equipment and hose as needed.

D. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.

E. Apply pesticides in accordance with manufacturer’s instructions.

3.9 SCHEDULE - PLANT LIST

A. See schedule on Landscape Plan.

3.10 SITE RESTORATION

A. Daily: At the end of each day, the grounds shall be cleaned of all landscape contractor-related refuse and debris.

B. **Upon completion**:
All paved surfaces affected by planting operations will be swept and hosed off.
All plant beds shall be free of weeds.

END OF SECTION

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section shall include the following:
1. Formwork for cast-in place concrete, bracing and anchorage.
2. Gasoline Island Forms.
3. Form accessories.
4. Cast-in-place Concrete Foundation Walls.
5. Floors and Slabs on Grade.
6. Control, Expansion and Contraction Joints Associated with Concrete Work.
7. Equipment Pads.
8. Vapor Barrier.
9. Concrete Sealer.

1.2 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.3 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Recycled Content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials – Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
3. VOC Compliance - Submit documentation indicating VOC content of curing compound and floor sealer.

C. Shop Drawings:
1. Shop drawings for gasoline island forms
2. Submit drawings that indicate bar sizes, spacings, locations, placement, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices.
3. Submit two paper copies and one reproducible.

D. Product Data:
1. Joint devices, admixtures, and vapor barrier.
2. Gasoline island forms

E. Design Data: Provide concrete mix designs. Indicate amount of fly ash included in design mix.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Concrete:
1. The provisions of ACI-306 shall be followed for all concrete placed or cured when the average daily temperature is below 40° F. The methods of protection used for cold weather concreting shall be submitted in writing to the Architect for review at least one week prior to cold weather placement.
2. Plan construction schedule and obtain needed materials and equipment on the job site in advance of cold weather.
3. All reinforcement, formwork and subgrades shall be clear of ice and snow, and be above 40° F. at time of placement of concrete.
4. The concrete temperature as discharged shall not be less than 50° F. nor greater than 70° F. The temperature of the concrete being discharged shall be tested by the testing agency whenever cylinders are cast, and hourly by the Contractor. The Contractor shall maintain and submit same to the Architect weekly

B. Hot Weather Concrete:

1. The provisions of ACI-305 shall be followed for all concrete placed when the air and/or form temperature is greater than 90° F. NOTE: Concrete protection during windy conditions combined with hot and/or low humidity shall also conform to ACI-305. The methods of protection used for hot weather concreting shall be submitted in writing to the Architect for review at least one week prior to hot weather placement.
2. Plan construction schedule and obtain needed materials and equipment on the job site in advance of hot weather.
3. The Contractor and ready-mix supplier shall review concrete mixes for use in hot weather with respect to placing requirements, strength and durability.
4. Concrete temperatures as discharged from the truck shall not exceed 80° F. Ice, if used, shall be considered part of the total mix water (50 lbs. ice = 6 gallons of water).
5. Cool and moisten formwork and subgrade by sprinkling with water prior to placing concrete.
6. Placement and Finishing:
   a. Concrete shall be discharged from truck a maximum of one hour after the introduction of mix water to cement and aggregates.
   b. Strike off and screed slabs immediately. Protect slab's surface against moisture loss prior to final finishing.
   c. Thoroughly vibrate through all wall and column lift lines and adjacent slab placements, to prevent cold joints.
7. Finishing operations should be started as soon as concrete is ready. Should plastic shrinkage cracking occur, fog sprays should be available.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301.

B. Acquire cement and aggregate from same source for all work.

PART 2 - PRODUCTS

2.1 FORMWORK

A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

C. Earth Forms: Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

D. Gasoline Island Formwork:
   1. Gasoline island forms shall be fabricated from 12 gauge (.1046) hot-rolled steel. Form shall have a 1-1/4” top bead. Form shall be primer-coated on both sides.
   2. Fabricate gasoline island forms to the configuration indicated on the drawings.

E. Formwork Accessories:
   1. Form Ties: Snap-off type, plastic, fixed length, cone type free of defects.
   2. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture , or impair natural bonding or color characteristics of coating intended for use on concrete.
   3. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

2.2 REINFORCEMENT

A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars.

B. Welded Steel Wire Fabric: ASTM A185 Plain Type; in flat sheets or coiled rolls; unfinished.

C. Tie Wire: Minimum 16 gage annealed type.

D. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I - Normal.

B. Cementitious Material:
1. Use 40% less Portland cement than a traditional concrete by using less cement, or substituting 40% of the cementitious material with slag cement or other recycled cementitious material. If fly ash is used as a replacement for Portland cement at the 40% level, provide test data demonstrating compatibility and performance satisfactory to Architect.

C. Fly Ash: Comply with ASTM C618, Type C. Report the chemical analysis of the fly ash in accordance with ASTM C311. Evaluate and classify fly ash in accordance with ASTM D5759.
1. Recycled Content: Minimum 20 percent pre-consumer recycled content at contractor's option.

D. Slag Cement: Comply with ASTM C989.
1. Recycled Content: Minimum 20 percent pre-consumer recycled content at contractor's option.

E. Fine and Coarse Aggregates: ASTM C33.

F. Water: Clean, potable, and not detrimental to concrete.

2.4 ADMIXTURES

A. Air Entrainment: ASTM C260.

2.5 ACCESSORIES

A. Vapor Barrier under all concrete slabs.
1. Vapor barrier shall be an approximate 12 mil thick reinforced polyethylene membrane. Membrane shall have a water permeance less than .03 perms.
2. Manufacturer:
a. Fortifiber Corp. - Moistop
b. Raven Industries - Duraskrim 12 BBR
c. Approved Equal
3. Joints shall be sealed with moisture resistant self-adhesive tape.

B. Curing Membrane:
1. All curing membranes shall be sheet plastic of 6 mil weight.
2. A combination sheet plastic and paper or equal conforming to ASTM C-171.

C. Non-Shrink Grout:
1. Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.6 JOINT DEVICES AND FILLER MATERIALS

A. Joint Filler Type A: ASTM D994; Asphalt impregnated fiberboard or felt, 1/4 inch thick.

B. Construction Joint Devices: Integral extruded plastic; formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches; ribbed steel spikes with tongue to fit top screed edge; manufactured by Vinyex or approved equal.

2.7 CURING COMPOUND

A. Membrane curing compound shall be a water-based, dissipating resin type complying with ASTM C309 Type 1 Class B resin type, clear and translucent, VOC compliant.

B. Curing compound shall be one of the following:
1. Day-Chem Rez Cure (J-11-W) - Dayton Superior Chemical Operation
2. Kurez DR - Euclid Chemical Co.
3. 1100-Clear - W.R. Meadows
4. Approved Equal

C. Water: Clear, potable, and not detrimental to concrete.

2.8 CONCRETE SEALER

A. Floor sealer shall be a siloxane-based, anti-spalling penetrating sealer conforming to ASTM C-957. Floor sealer shall be compatible with the curing compound.

B. Subject to compliance with requirements, products that will be incorporated into the work included, but are not limited to the following:
   1. As indicated on Finish Plan (CS-1)
      a. Euclid Chemical Company, Euco-Guard VOX Siloxane
      b. Approved Equal

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions prior to the start of the work.

B. Verify requirements for concrete cover over reinforcement.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with the manufacturer's instructions.

B. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

3.3 FORMWORK

A. Erect formwork and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping.

D. Keep form joints to a minimum.

E. Forms for “Smooth Finish” Concrete:
   1. Use steel, plywood or lined board forms.
   2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
   3. Install form lining with close-fitting square joints between separate sheets without springing into place.
   4. Use full size sheets of form lines and plywood wherever possible.
   5. Tape joints to prevent protrusions in concrete.
   6. Use care in forming and stripping wood forms to protect corners and edges.
   7. Level and continue horizontal joints.
   8. Keep wood forms wet until stripped.

F. Install gasoline island forms in accordance with manufacturers written instructions.

G. Apply form release agent on formwork in accordance with manufacturer's recommendations.

H. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight.

I. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

J. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

3.4 REINFORCEMENT PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Conform to applicable code for concrete cover over reinforcement.

3.5 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.

C. Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by taping edges and ends. Tape and seal all penetrations such as conduit and plumbing pipes.

D. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.

E. Separate slabs on grade from vertical surfaces with 1/4 inch thick joint filler.

F. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

G. Extend joint filler from bottom of slab to within ½ inch of finished slab surface. Conform to requirements of Specification SECTION 07900 - JOINT SEALERS.

H. Install joint devices in accordance with the manufacturer's installation instructions.

I. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

J. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor finish.

K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

L. Place concrete continuously between predetermined expansion, control, and construction joints.

M. Do not interrupt successive placement; do not permit cold joints to occur.

N. Place floor slabs in checkerboard or saw cut pattern.

O. Saw cut joints within 24 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness or as indicated on the Contract Documents.

P. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 feet.

3.6 CONCRETE FINISHING

A. Rough form finish shall be used on all surfaces not exposed to view.

B. Smooth form finish shall be used where membrane waterproofing is applied to foundation wall.

C. Provide formed exposed concrete walls with smooth rubbed finish. Finish shall be applied no later than the day after form removal. Rub surface with abrasive until a uniform color and texture is achieved. No grout should be used other than the cement paste that is drawn from the concrete by the rubbing process.

*** Coordinate Smooth Rubbed Finish with Drawings ***

D. Troweled finish shall be used for all interior floor slabs. Where required by ceramic floor tile setting material manufacturer, provide wood float or steel trowel with light broom finish. Coordinate with tile contractor..

E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal or as indicated on the Contract Documents.

3.7 CURING AND PROTECTION

A. Concrete floors shall be cured by resin based chemical curing compound, by wet curing, by moisture-retaining cover or by combination thereof. Curing method shall be approved by the Architect prior to placement of concrete slabs on grade. If curing compound is used, it shall be applied in accordance with the manufacturer's written instructions.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.8 CONCRETE SEALER

A. Prepare surface in accordance with manufacturer's written recommendations. Do not acid etch surface. Surface to be free of all dirt and debris. All joint sealants and caulks shall be in place prior to application of sealer.

B. Apply 1 coat of sealer in accordance with manufacture's written recommendations.

3.9 FIELD QUALITY CONTROL

A. Provide free access to Work and cooperate with appointed Testing Agency.

B. Submit proposed mix design of each class of concrete to inspection and Testing Agency for review prior to commencement of Work.

C. Test cylinders will be made, for every 100 cubic yards or fraction thereof of each mixture design of concrete, during the progress of the work. Each test will consist of four cylinders, two for 7 day and two for 28-day strength determinations. One 7-day cylinder shall be field cured in accordance with ASTM C31. General Contractor shall provide a protected storage area for field cured cylinders.

D. Testing will be performed in accordance with ASTM C39 by an independent testing laboratory meeting the requirements of ASTM E 329.

E. Strength level of the concrete will be considered satisfactory so long as the averages of all sets of three consecutive strength test results equal or exceed the specified strength and no individual strength test result falls below the specified strength by more than 500 psi.

F. If 28-day concrete strengths do not satisfy paragraph C., additional testing of concrete will be required; these tests shall be at the Contractor's expense.

G. All concrete that does not meet the strength requirements of this specification is subject to be removed and replaced at no additional expense to the Owner. The General Contractor shall bear all costs of correcting such rejected work, including all embedded items, additional testing and inspections and compensation for the Architect's and/or Engineer's services and expenses made necessary thereby.

3.10 PATCHING

A. Allow Architect to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect upon discovery.

C. Patch imperfections in accordance with ACI 301.

3.11 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by the Architect and AAFES Project Manager.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of the Architect and AAFES Project Manager for each individual area.

3.12 SCHEDULE - CONCRETE TYPES AND FINISHES

A. All concrete shall achieve the minimum compressive strengths at 28 days and shall be proportioned per the requirements indicated on the structural drawings. The maximum water/cement ratio shall be 0.50. The air content in exterior slabs shall be between 4.5% and 7.5%

3.13 SCHEDULE - CONTROL JOINTS

A. Control joints shall be placed as indicated on the Contract Documents or as approved by the Architect.

END OF SECTION

SECTION 03345 - CAST IN PLACE – INTEGRAL COLORED CONCRETE

PART 1 - GENERAL

1.1 Scope of Work

A. Include all labor, materials and appliances, and perform all operations in connection with the installation of full depth integral colored concrete and related work incidental to the completion thereof, as shown on the structural drawings and as specified herein.

B. Work includes:
1. Base preparation
2. Formwork
3. Reinforcing
4. Accessories
5. Cast-in-place integral colored concrete
6. Placing, finishing and curing.
7. Testing and Inspection by Owner.

1.2 SUBMITTALS

A. Concrete Supplier
1. Submit State Department of Transportation and/or National Ready Mixed Concrete Association Plant Certification.

B. Concrete Contractor's Certification
1. Submit ACI floor finisher current certification document for at least one (1) finisher who will be installing slab placements.

C. Concrete Mix Design
1. Submit attached Concrete Mix Design Submittal Form for interior slabs.
   a. Fill out completely all information indicated on the form
   b. Submit only one mixture design form indicating same mix design for all interior slabs.
2. Attachments to Concrete Mix Design:
   a. Cementitious materials mill test reports and other test reports for the following:
      1) Portland cement
      2) Fly Ash
      3) Ground Granulated Blast Furnace Slag
   b. Designation, type, quality, geological description, and source (natural or manufactured) of coarse and fine aggregate materials.
   c. Sieve Analysis Reports
      1) Provide separate sieve analysis of percentages passing for coarse and fine aggregate. Show values for each sieve size shown on the mix design form. Do not leave any line blank. Sieve analysis sampling and testing for each aggregate source shall be conducted within 60 days of concrete submittal date.
   d. Aggregate Supplier Statement:
      1) Stating if aggregate is possibly alkali-reactive, based on tests or past service
      2) Stating if aggregate can possibly cause pop-outs, “D” cracking, hexagonal cracking, or other disruptions due to moisture gain, freezing, or other mechanisms, based on tests or past service.
   e. Product data for the following concrete materials admixtures:
      1) Liquid color
      2) Water reducing
      3) Set retarding
      4) Set accelerating
      5) Data indicating chloride ion content information for each admixture
   f. Concrete compressive strength data as required by ACI 318.

D. Slab Joint and Placement Plan:
1. Submit pour plan identifying the following:
   a. Interior and exterior walls and column grid locations.
   b. Extent of pours including width, length, slab placement area and volume.

c. Locations of sawn contraction joints
d. Location of construction joints.

E. Delivery Tickets:
1. Submit copies of delivery tickets for each load of concrete delivered to site.
2. Indicate information required by ASTM C 94 on each ticket.

1.3 TESTING

A. Owner Independent Testing Company (ITC) will perform concrete testing and inspection specified at no cost to the Contractor.

B. ITC is neither authorized to change any specified requirement nor to approve any portion of the work.

C. Failure to detect defective material or Work will neither prevent rejection when defects are discovered later nor will it obligate Owner to make final acceptance.

D. Responsibilities and Duties of Contractor Relative to Owner Testing:
1. Notify Owner's agency in advance of concrete placement to allow sufficient time to prepare for required testing.
2. Assist Owner's agency in securing field specimens
3. Provide and maintain for sole use of ITC, facilities for safe storage and proper curing of concrete test cylinders at project site as required by ASTM C31.

1.4 QUALITY ASSURANCE

A. Tolerances:
1. Conform to the requirements of ACI 117 and ACI 301 except as specified herein.
2. Formwork
a. Comply with ACI 347 for vertical and horizontal alignment of edge forms.
3. Finished Surface Flatness and Levelness:
a. The minimum local area shall be bound on each side by column lines.
b. Interior Floor Slabs
1) Specified Overall Value (SOV) $F_{F\ 30}$ / $F_{L\ 20}$ and Minimum Local Value (MLV) $F_{F\ 20}$ / $F_{L\ 13}$ tolerance for troweled floors in accordance with ACI 117.
c. Remedies for Out-of -Tolerance Work
1) Remove and replace slabs-on-grade measuring below either (or both) of specified minimum local F-numbers.
2) At option of Owner, Contractor may be allowed to submit alternatives for remediation.
d. Costs for corrective work, remedies for out-of-tolerance work, and extra testing as required by defective work shall be borne by Contractor.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unopened, undamaged containers with labels identifying manufacturers name, product name and batch numbers. Keep containers closed and upright to prevent leakage.

B. Mark reinforcing, accessories and embedded items for proper identification and placement location.

C. Store materials off ground in dry area and in manner to prevent damage. Protect liquid materials from freezing.

D. Stockpile concrete aggregates in manner to prevent contamination with other materials or with other sizes of aggregates. Conduct tests for determining conformance to requirements at point of batching.

E. Store admixtures in manner to prevent contamination. Protect admixtures from extreme temperatures which would adversely affect their characteristics.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Concreting in Hot, Dry or Windy Weather:
1. Employ precautions to avoid cracking when the concrete rate of evaporation exceeds 0.1 pounds per square foot per hour or when any combination of concrete materials and weather conditions are favorable for the formation of plastic shrinkage cracks.
2. Maintain an accurate reading thermometer at the job site to check temperature of concrete

3. Reject concrete if more than one slump adjustment, as defined in ASTM C 94, is required.
4. Do not place concrete when forms, substrate or reinforcing bars are more than 120 F or the temperature differential between the forms, substrate or reinforcing bars and concrete will create conditions favorable for settlement cracks or thermal cracking.

B. Concreting in Cold Weather:
1. Conform to ACI 306.1 when temperature and other environmental conditions are as noted therein.
2. Minimum substrate surface temperature and ambient building air temperature shall be 55°-F during placement and maintained through curing period.
3. Do not place slabs on substrate that is more than 20°-F cooler than concrete. Warm substrate to decrease temperature differential to 20°-F or less.
4. Minimum concrete temperature as measured at the point of discharge shall be 65°-F.
5. Do not use unvented combustion heaters during concrete placement so as to prevent exposure of concrete to excessive exhaust gases containing carbon dioxide (CO_2) or carbon monoxide (CO).
6. During slab placement and curing periods, maximum CO_2 levels shall be 4,500 parts per million and maximum CO levels shall be 15 parts per million at concrete surface within 5 feet of any source of exhaust gases to minimize potential damage to concrete.

C. Precipitation Protection:
1. Concrete shall be placed under watertight roof membrane
2. Concrete shall be protected from precipitation until adequate strength is gained to prevent damage.

1.7 PROJECT CONDITIONS

A. Protect concrete slabs from staining, gouges and scratching.
1. Do not permit foot traffic on slabs from time of placement until 24 hours after application of wet curing blankets.
2. Do not permit wheeled traffic (scissor lifts, dolly's, wheeled carts, etc) on slabs from time of placement until wet curing blankets have been removed and the floor slab has been cleaned by floor scrubber and is dry.
3. Locate at least 2-spill kits adjacent to work.
4. Diaper hydraulic powered equipment.
5. Do not charge battery powered equipment over integral colored concrete.
6. Place drop cloths or other breathable slab protection under parked vehicles.
7. Do not store structural steel or metal fabrications on slab.
8. Do not allow pipe cutting machine on slab.

PART 2 - PRODUCTS

2.1 FORMWORK

A. Forms:
1. Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces.
2. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on the drawings.
3. Provide lumber dressed on at least two edges and one side for tight fit.
4. Bevel top outside edge of form.

2.2 REINFORCEMENT

A. Reinforcing Bars:
1. ASTM A615, deformed, Grade 60.
2. ASTM A706, deformed, Grade 60.

B. Tie Wire:
1. Minimum 16 gage annealed type.

C. Reinforcing Support Devices:
1. Manufacturer support devices of metal (wire bar), concrete, or recycled plastic devices

conforming to CRSI Manual of Standard Practice.

2. Precast concrete bar supports shall have minimum compressive strength of 3500 psi.
3. Do not use wood, clay brick, and other devices that can expand due to moisture gain.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I, II or V. Use only one brand and source throughout project. Flyash or slag not permitted except where noted below, where concrete is in contact with soils having severe or very severe sulfate content and Type V cement is not readily available, or to mitigate concrete against potential aggregate reactivity.

B. Class F or C fly ash (or Class N pozzolan) per ASTM C 618, except loss on ignition to be 3% maximum.
   1. Use of fly ash <u>only</u> permitted for the following conditions:
      a. If Type V cement is unavailable or is insufficient to mitigate by itself, then fly ash can be used to mitigate sulfate exposure or as a means of mitigation of potential aggregate reactivity. To mitigate potential aggregate reactivity, the fly ash is to have the following properties.
         1) Maximum 1.5% available alkali
         2) Maximum 8% CaO (up to 10% CaO if a minimum replacement of 30% by weight of Type F fly ash is used)

C. Ground-Granulated-Blast-Furnace Slag (GGBF) per ASTM C 989.
   1. Use of slag only permitted for the following conditions:
      a. If Type V cement is unavailable or is insufficient to mitigate by itself, then slag can be used to mitigate sulfate exposure or as a means of mitigation of potential aggregate reactivity.
      b. Slag to have the following properties: Grade 100 or 120

D. Aggregates
   1. ASTM C33 with following requirements:
      a. No coal or lignite in concrete that will not be covered by building materials or soil.
      b. Fine aggregate grading requirements as defined in section 6.1 of ASTM C 33 shall be strictly met without deviation unless approved by the Structural Engineer.
   2. If manufactured sand is used, blend with minimum 25% natural sand unless otherwise approved by Structural Engineer.
   3. Coarse Aggregate Size:
      a. Nominal maximum coarse aggregate size shall be size #67 (3/4 inch) maximum for slabs ≤ 4 inch thick.
      b. The nominal maximum size of an aggregate is the smallest sieve size through which the major portion of the aggregate must pass, with a minimal amount retained on the maximum sieve size. Maximum 4% shall be retained on the nominal maximum size sieve.

E. Water: ASTM C 1602 Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.

2.4 CHEMICAL ADMIXTURES

A. Provide admixture products as specified below. Within each product listing, provide one of the products specified. When specifically allowed within each product listing, equivalent admixture products by other manufacturers meeting the specified ASTM standards may be used upon submittal of product data and approval by the engineer.

B. Water Reducing Admixture: ASTM C494, Type A.

C. Water Reducing and Retarding Admixture: ASTM C494, Type B or D.

D. Accelerating Admixture: ASTM C494, Type C or E.

E. Integral Color Admixture (Liquid Coloring Agent):
   1. Davis Colors - Mesa Buff # 5447.
   2. The same manufacturer and integral color shall be used throughout entire integrally colored concrete floor.

2.5 RELATED MATERIALS

A. Evaporation Retardant: Water-based polymer, sprayable.
   1. Euco-Bar, by Euclid
   2. Confilm, by BASF Admixtures (Master Builders).
   3. Aquafilm, by Dayton Superior.

2.6 CONCRETE CURING MATERIALS

A. Sheet Materials: Natural fiber / plastic sheet, ASTM C171. White natural fiber matting securely attached to plastic sheet backing.
   1. UltraCure by McDonald Technology.
   2. HydraCure S16.1, by PNA Construction Technologies.

2.7 CONCRETE MIX

A. General:
   1. Use only materials and their proportions included on Concrete Mix Design Submittal Forms included at the end of this section.
   2. Maintain same source of cement, fly ash, slag, chemical admixtures, coarse and fine aggregates for entire colored floor slab. Do not change mix proportions of integral color admixture and cementitious materials.
   3. Measure and mix ingredients in accordance with most stringent requirements of ASTM C94 except where stated herein.
   4. Ready Mix supplier may proportion materials by field experience or proportion concrete materials by laboratory trial batches per ACI 318 for strength compliance.

B. Strength: 3,500 psi minimum

C. Workability: Concrete shall be of a consistency to be worked readily into forms and around reinforcement without segregation, voids, or excessive bleeding.

D. Minimum Cementitious Materials Content (Portland Cement and SCM): Use 520 pounds cementitious minimum for all full depth integral colored concrete mixes.

E. Supplementary Cementitious Materials (SCM), if required:
   1. Fly Ash: Substitute fly ash for Portland cement at a minimum of 15% to a maximum of 20% of the total cementitious content.
      a. If used to mitigate potential aggregate reactivity, only Type F fly ash may be used and shall have the following maximum properties: 1.5% available alkali and 8.0% CaO.
   2. Ground Granulated Blast Furnace Slag (GGBFS): Substitute GGBFS for Portland cement at a minimum of 25% to a maximum of 30% of the total cementitious content. If required to mitigate potential sulfate exposure or aggregate reactivity, up to 50% GGBFS substitution for Portland cement may be used.

F. Water/Cementitious Materials Ratio: Interior Floor Slabs: 0.55 maximum.

G. Air-Entraining Admixture: Do not air-entrain interior floor slabs with troweled finish.

H. Slump: Slump at the point of placement shall not exceed 6 inches subject to the requirement that concrete shall be of a consistency to be worked readily into forms and around reinforcement without segregation, voids, or excessive bleeding. Maximum slump variance shall be 2 inches.

I. Admixtures:
   1. Water-reducing admixture may be added to improve workability for minimal water content.
   2. Use admixtures in accordance with manufacturer's recommendation.

2.8 BATCHING AND MIXING

A. Ready-Mixed Concrete: Mix and transport in accordance with ASTM C 94 and ACI 211.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Conform to manufacturer's printed instructions for materials and equipment.

3.2 PREPARATION

A. Notify AFFES Construction Manager, ITC and SSI a minimum of 48 hours prior to commencement of concreting operations.

B. Ensure that all work is properly coordinated:
   1. Structural Drawings and Specifications with those of other disciplines.
   2. Use final corrected Shop Drawings, placing Drawings and material / equipment Drawings

C. Verify anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, held securely, and will not cause difficulty in placing concrete.

D. Roof construction, RTUs, skylight installation, overhead painting, and roof drainage system shall be complete and weather tight prior to placement integral color floor slabs.

3.3 AGGREGATE BASE PLACEMENT

A. Unless otherwise specified on the Drawings, place aggregate base as specified herein.

B. Aggregate Base:
   1. Install aggregate base where shown on Drawings.
   2. Compact to final thickness shown in layers not to exceed 6 inches with minimum of 2 passes per layer with vibratory compactor.
   3. Compact fill to 98% of aggregate's Standard Proctor as determined by Method D of ASTM D698.

C. Aggregate Base Fine Grading:
   1. Compact to final thickness noted with 2 passes minimum vibratory compactor to produce smooth, flat, dense surface.
   2. Do not allow excess moisture or soft soil beneath vapor retarder at time of placing concrete.
   3. Level off aggregate base top surface with aggregate choker material as necessary as follows:
      a. To reduce surface friction and to meet specified fine grade tolerances specified below
      b. Where aggregate base material does not have sufficient fine particles to produce a surface that is free of exposed aggregate or surface voids greater than 3/8" in wise at time of slab installation.
   4. Use laser guided equipment to establish specified base elevation
   5. Provide dry, smooth, flat, dense surface.
   6. Proof-roll 48 hours maximum prior to concrete placement. Depression under fully loaded ready mix truck shall not exceed 1/2".

D. Slab on Ground Aggregate Base Fine Grade Tolerance: +1/2 inch, -1/2 inch with transition no greater than 3/4 inch vertically to 8 inches horizontally for level slab.

3.4 FORMWORK

A. Form vertical surfaces of concrete work.

B. Design, construct, and remove formwork and related items in accordance with most stringent requirements of ACI 117 and 347.

C. Form Preparation
   1. Clean formwork.
   2. Remove rust from steel formwork.

D. Erecting Forms:
   1. Butt joints and provide backup splice at joints as required to prevent faulting at form.
   2. Do not tape formwork joints.
   3. Just before placing concrete, clean forms and adjacent surfaces again as necessary. Remove wood, sawdust, chips, dirt, sunflower seeds and other debris from work area.

E. Provide slab side forms such that by placing a 10-foot straightedge, form does not exceed 1/8 inch variation.

3.5 VAPOR RETARDER INSTALLATION

A. Install vapor retarder directly under slabs where shown on drawings

B. Lap vapor retarder not less than 6 inches with top lap placed in direction of placing concrete.

C. Seal laps continuously with specified tape.

D. Seal punctures and tears in membrane caused by reinforcement bar feet, screed anchors, formwork stakes, or utility penetrations with specified tape.

3.6 PLACING REINFORCEMENT

A. Place reinforcing in accordance with most stringent requirements of ACI 117, 301 and 318 and CRSI Manual of Standard Practice and Placing Reinforcing Bars. See Structural Details for reinforcement specifications.

B. Accurately place and secure reinforcement against displacement by firmly wiring at intersections and splices with not less than No. 18 U.S. Standard Gauge annealed wire.

C. Ensure reinforcing is clean, free from defects and kinks, loose mill or rust scale or coatings that will reduce bond.

D. Protect exposed reinforcing bars, inserts and plates intended for bonding with future expansion from corrosion.

E. When welding of reinforcement is specified, comply with AWS D1.4. Do not tack weld crossing bars for assembly of reinforcement, supports or embedded items.

3.7 EMBEDMENTS

A. Install anchor bolts and embedded bearing devices provided by others.

B. Provide other anchor bolts and bearing devices shown on Drawings or anchor bolt setting plans or required equipment installation.

C. Use templates as required for spacing between anchor bolts and set elevations with surveying equipment.

D. Position and anchor steel shapes, anchor bolts, casings, conduit sleeves, masonry anchorages and other materials embedded in concrete.

E. Place and secure against displacement miscellaneous steel, pipe sleeves, inserts, anchors, stair abrasive nosings, preformed joint fillers, and miscellaneous embedded items.

F. Secure embedments to formwork when possible.

G. Install clean embedments. After concrete placement, clean embedment exposed surfaces of concrete splatter and other foreign substances.

H. Unless noted otherwise on the Drawings, ensure corner protection angles, bars and other similar embedded metal items are continuous between concrete joints. If shorter lengths are required for metal items, connect the ends by butt-welding entire joint and grinding smooth exposed surface. Ensure embedded metal items are discontinued at construction, contraction and isolation joints.

I. Temporarily fill voids in sleeves and inserts with easily removable materials.

J. Allow sufficient time between erection of forms and placing concrete for other trades to install and test their work.

K. Before placing concrete on substrate, piping and other utilities within concrete shall be inspected and tested.

3.8 JOINTS

A. Joints
   1. Provide construction, isolation and contraction joints as indicated on Drawings and as noted below.
   2. Bulkheads for construction joints shall be 1-1/2 inch minimum lumber with top outside edge beveled 30 degrees minimum, leaving 1/4 to 3/8 inch level surface.
   3. Provide full depth wood bulkheads
   4. Maximum length to width ratio for concrete panels defined by construction or contraction joints shall not exceed 1-1/2:1.
   5. Do not locate longitudinal construction joints in action alleys.

3.9 CONVEYING

A. Handle concrete from mixer to place of final deposit as rapidly as practicable and in manner which will assure obtaining specified quality of concrete.

B. Re-tempering: Discard concrete which has already begun to set. Do not re-temper with water.

C. Equipment: Provide mixing and conveying equipment of proper size and design to ensure a continuous flow of concrete to delivery end. Do not use aluminum pipe or equipment in contact with concrete.
   1. Mixers, agitators and non-agitating units: Conform to ASTM C94 and current certification requirements of Department of Transportation in state where concrete plant is located.

3.10 PLACING CONCRETE

A. Unless otherwise specified, place concrete in accordance with the requirements of ACI 301.

B. Ensure concrete supplier has a quality control representative at site for concrete placements.

C. Ensure General Contractor and/or the Concrete Floor Subcontractor representative is on site during placement of the concrete.

D. Depositing
   1. Do not deposit concrete which has partially hardened or has been contaminated by foreign matter.
   2. Deposit concrete continuously in layers of such thickness that no concrete will be deposited which has hardened sufficiently to cause seams or planes of weakness.
   3. Between construction joints, place concrete in a continuous operation such that concrete is plastic at all times and flows readily into spaces between reinforcement.
   4. Use placement procedures to avoid segregation.
   5. Deposit concrete as near as possible to its final position.
   6. Integral color concrete floor slabs:
      a. Clean tools to prevent contamination.
      b. Clean and bag boots when working on surface.
      c. Employ methods to prevent dust, efface and air-born debris from entering building and settling on slab surface during finishing operations.
   7. Do not place concrete over standing water, mud, frost, ice or snow.

E. Consolidation:
   1. Consolidate concrete complying with ACI 301 by vibrating, spading or rodding so that concrete is thoroughly worked around reinforcing, embedded items and into the corner of forms.
   2. Consolidate each layer of concrete with previously placed layers in manner that will eliminate air or stone pockets which may cause honeycombing, pitting or places of weakness.
   3. Do not insert vibrator into portions of concrete that have begun to set.
   4. Do not use vibrators to transport concrete.
   5. Keep spare vibrator on job site during concrete operations.
   6. Use internal vibrator for formed elements, not form vibrators.
   7. Slabs:
      a. Consolidate slabs with vibrating laser screed, truss screed, bridge screed or utility screed.
      b. Use internal vibration along construction joints at both formed and slab abutments.
      c. Mark forms before concreting to properly locate sawn construction joints.
      d. Do not use grate tampers, jitterbugs, or mesh rollers.

F. After concrete placement, adjust forms and bracing as necessary to maintain proper alignment and eliminate leakage of cement paste.

3.11 FLOOR SLAB AND PAVEMENT FINISHING PROCEDURES

A. General:
   1. Do not add water to any slab surface during finishing operations.
   2. Do not add cement to any slab surface during finishing operations.
   3. Perform no finishing operation while water is present on slab surface.

B. Initial Leveling:
   1. Complete bull floating, darbying and straight-edging before any bleed water is present on slab

surface.

2. Use a checkrod or highway straightedge 10 feet wide minimum for initial and later leveling instead of short bull float where overall floor tolerances specified are greater than F_F 20 / F_L15.

C. Hand and Power Floating:

1. Do not start floating until following conditions are met:
   a. Bleeding is complete and water is gone, including water sheen on slab surface.
   b. Concrete will sustain the weight of finishers without creating more than 1/8 to 1/4 inch indentations.
   c. Mortar is not thrown by rotating blades of power float.
2. The finisher shall determine the proper time to start finishing procedures for interior slab placements on the basis the above conditions. It is noted for advisory purposes, however, that typical setting characteristics of concrete materials will allow for initial power floating to begin 3-1/2 hour's ± 1 hour after initial strike-off (screeding), at which time the concrete should support a finisher on foot without more than approximately a 1/4 inch indentation in the slab surface. Variations in concrete materials, nature and proportion of supplementary cementing materials, and concrete temperature will cause setting behavior to vary.
3. Float three times minimum with each floating at right angles to previous floating, and final pass at 45 degrees to previous pass.

D. Troweling for Interior Slabs:

1. Hand or power float floor before starting troweling.
2. For first troweling, keep blade as flat as possible and use low speed, minimizing "washboard" or "chatter marks" and "pitting".
3. Trowel two times minimum with first two trowelings at right angles. Some burn marks are acceptable. Cease troweling before trowel blades scratch surface.
4. Allow time between trowelings for concrete to stiffen and water sheen to disappear.
5. Do not add water to slab surface during troweling.
6. Do not ride trowels on existing hardened concrete slabs. Trowels shall be carried off of slab surfaces. When parking power trowels on fresh concrete, place on top of plywood or other protective material.

E. Additional Integral Colored Floor Troweling Requirements:

1. Use steel reinforced plastic finish blades for the final passes and after such time as slab surface exhibits some degree of sheen from steel blades.
2. Trowel as many times as possible to enhance surface sheen, without scratching the slab surface.
3. Ensure lead finisher/foreman who finished the field sample is present for entire fresh concrete finishing process until final troweling is completed.

3.12 CONCRETE FINISHES

A. Troweled Finish:

1. After floating, as specified, power trowel or hand trowel surface.
2. Ensure kneeboard impressions, trowel marks or chattered areas are not evident after floor is finished.
3. Finish surface to produce maximum sheen free of scratches and trowel marks.

3.13 FLOOR SLAB CONTRACTION JOINTS

A. General:

1. Provide slab joints as indicated on Drawings.
2. Immediately clean slab surface of all sawing residues.
3. Employ sufficient number of saws and workers to complete cutting saw joints before shrinkage produces cracking.
4. Saw cut to width of 1/8 inch by 1" in depth, unless noted otherwise on drawings.

B. Sawed Contraction Joints:

1. Use saws, blades, skid plates, and accessories by Soff-Cut International, Inc. or approved equal
2. Start cutting sawed joints as soon as concrete has hardened sufficiently to prevent raveling or dislodging of aggregates. This will typically be from 1 hour in hot weather to 4 hours in cold

weather after completing finishing of slab in that joint location.

3. Provide at least two “Soff-Cut” saws on site with blades capable of achieving the required depth of saw cut.
4. Extend sawed joint to the slab boundaries and abutments, including columns, drains, and other penetrations in the path of a defined joint using off-set grinder or Soff-Cut X-50. Implement methods and timing of the saw cut beyond the limits of the Soff-Cut saw reach to provide a consistent depth of cut with minimal raveling of joint edges.

C. Saw-Cut Control Joint Dust Collection
1. Attach dust collection system directly to each Soff-Cut saw being used.
2. Dust Collection System:
   a. ProVac Dust Collection System by Glad Tech Inc.
   b. SoffVac by Soff-Cut International, Inc.
   c. PulseVac by The PulseVac Company
3. Remove all saw debris, either loose or compacted, from slab surface and joints prior to curing cover installation.

3.14 CONCRETE CURING

A. Application Instructions
1. Clean up saw cut residue from the surface using vacuums, sweepers, blowers, brooms or water.
2. Wet surface of slab-on-grade with 1/8" to 1/4" inch of water to cover entire surface area of slab.
3. Unroll the specified wet curing blanket onto slab using the roller squeegee applicator.
4. No portion of this product shall be reused once it has been put into use on a slab on grade or other concrete application.
5. Place wet cure covering in widest practical width as soon as concrete has hardened sufficiently to prevent surface damage. Sides and end shall be lapped at least 3".
6. Repair any holes or tears during curing period using wet cure material and water.
7. Cover entire surface area including edges.

B. Removal and Cleaning
1. After 72-HRS of wet curing, use appropriate scrubber equipment with soft finishing pads or brushes and potable water to clean surface.

3.15 FORM REMOVAL

A. Do not remove forms until concrete has hardened sufficiently to support its own weight and imposed construction loads.

B. Remove forms in manner to avoid damage to concrete.

C. Formwork for slabs and pavements, curbs and other parts not supporting vertical load of concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations, but in no case sooner than 12 hours.

3.16 JOINT FILLING

A. Joint filling and sealing of concrete floors is specified in Section 07900 Joint Sealers.

3.17 CONCRETE FLOOR POLISHING & SEALING

A. Polishing concrete floor slabs which have received Hardener/Densifier is specified in Section 03357 New Integral Colored Polished Concrete Floor Finish.

3.18 CONCRETE PROTECTION

A. Adequately protect concrete inserts and other embedded items from movement, mechanical injury, or from damage by elements.

B. Protect wet cured or impervious sheet cured surfaces as follows:
1. Barricade concrete surfaces immediately after finishing.
2. Barricades may be removed 24 hours after installation of wet curing blankets.
3. Do not allow heavy traffic on concrete surface until concrete has obtained, by test, its design

strength as noted on drawings.

C. General Contractor shall provide a “Concrete Floor Protection Plan” to AAFES Construction Manager prior to placement of interior slabs that addresses how the following tasks will be implemented:
   1. Communication of protection plan to subcontractors and vendors, including those directly contracted by the Owner.
   2. Keeping the slab clean of dirt and grime.
   3. Prevention of stored materials in exposed floor areas until completion of construction.
   4. When and how floor covering protection will be provided in high traffic areas.
   5. Condition, inspection, and operational procedures for construction equipment allowed on the slab surface, including but not limited to:
      a. Diapering to contain any potential fluid leaks.
      b. Use of non-marking tires
      c. Inspection of tire treads for any debris that may mar the slab surface.
   6. Procedures for cleaning up slab spills, including use of and availability of cleaning chemicals and absorptive materials at the site.

D. Provide access ramps of compacted earth or other means along exposed concrete edges of floor slabs to prevent equipment and machinery from impacting edges. Barricade other exposed edges to vehicular traffic which may damage edges.

END OF SECTION

AAFES

CONCRETE SLAB MIX DESIGN SUBMITTAL FORM

(Section 03345 – Cast-in-Place Integral Colored Concrete) Date

SUBMITTED MIX DESIGN

Interior Building Slabs

☐ 03345 Integrally **Colored** Concrete

Mix ID # _____

STORE INFORMATION

STORE # _____

ADDRESS _____

CITY, ST _____

GENERAL CONTRACTOR

COMPANY _____

JOBSITE PHONE _____

A. CONCRETE INFORMATION

Design Strength (f'c) _____ psi

Water / Cementitious Ratio _____

Total Air Content _____ %

Mix Developed From

☐ Trial Mix Test Data (*attach test data*)

☐ Field Experience (*attach data*)

Density

Wet _____ pcf Dry _____ pcf

Slump

"_____ (± 1") **WITHOUT** WR Admixture

"_____ (± 1") **WITH** WR Admixture

B. ADMIXTURE INFORMATION

	ASTM Designation	**Product** (Manufacturer/Brand)	**Dosage (ounces)** oz / cy	oz / cwt
Water Reducing				
Accelerating				
Retarding				
Liquid Color				

C. MIX DESIGN

Mix Proportions (per cubic yard)

	Identification (Type, size, source, geology, etc.)	**Weight** (pounds)	**Density** (SSD)	**Volume** (cubic feet)	**% Aggregate Absorption**
Cement					
Fly Ash					
Slag (GGBFS)					
Coarse Aggregate					
Fine Aggregate #1					
Water					
Air Content					
Liquid Color					
	TOTALS				

Coarse & Fine Aggregate Gradation Information

	% Passing Each Sieve (All Sieve Sizes must be entered)						**Combined % Retained**	
Sieve Size	**Coarse Agg. # 1**	**Coarse Agg. # 2**	**Coarse Agg. # 3**	**Fine Agg. # 1**	**Fine Agg. # 2**	**Combined % Passing**	**Cumulative**	**Individual**
1-1/2"								
1"								
3/4"								
1/2"								
3/8"								
# 4								
# 8								
# 16								
# 30								
# 50								
# 100								
# 200								
% of Vol								

D. ATTACHMENTS: Include the following with this Mix Design Report.

☐ Mill test reports for Portland cement, fly ash, and ground granulated blast furnace slag materials

☐ Designation, type, quality, and source (natural or manufactured) of coarse and fine aggregate materials

☐ Separate aggregate gradation reports including all required sieve sizes

- Gradation sieve report tests dated within 60 days of this report
- Report for each coarse and fine aggregate material in mix

☐ Statement if possible reactivity of aggregate, based on tests or past service

☐ Statement if possible aggregate pop-outs or their disruptions, based on tests or past service

☐ Product data for the following admixtures:

- Liquid color
- Water reducing, set retarding, set accelerating, etc.

☐ Concrete compressive strength data used for standard deviation calculations

☐ Measured water-soluble chloride ion content. (percent by weight of cement)

E. CONCRETE SUPPLIER INFORMATION

Company Name _____ **Tel. #** **( )** _____

Address _____

City, ST Zip _____

Technical Contact _____ **Cell #** **( )** _____

e-mail _____

Sales Contact _____ **Cell #** **( )** _____

	PRIMARY PLANT	**SECONDARY PLANT**
Plant Location:		
Miles from Site:		
Travel Time to Site:		
NRMCA Certified:	☐ **YES** ☐ **NO**	☐ **YES** ☐ **NO**
State DOT Certified:	☐ **YES** ☐ **NO**	☐ **YES** ☐ **NO**
Batch Mixing Type:	☐ **DRY** ☐ **CENTRAL MIX**	☐ **DRY** ☐ **CENTRAL MIX**

CONCRETE CONTRACTOR'S QUALIFICATION STATEMENT OF CONFORMANCE
SECTION 03345
CAST-IN-PLACE INTEGRAL COLORED CONCRETE

Project Location:_____Date: _____

Project Number:_____

By signing below as approved, the Contractor hereby confirms that the qualifications of the concrete finishing subcontractor conforms to the qualifications as follows:

The concrete floor finishing subcontractor Lead Finisher is currently certified under the Concrete Flatwork Finisher Training and Certification Program as granted by the American Concrete Institute. (Attach Current Certificates)

The concrete floor finisher subcontractor has experience in finishing interior floors of similar size and scope in at least 5 previous projects. Projects name and location are identified as follows

1. _____

2. _____

3. _____

4. _____

5. _____

Concrete Finishing Contractor Company Name and Address:

_____

_____

_____

Signature of Responsible Officer: _____

Typed Name and Title of Officer: _____

Telephone Number: (_____) _____

General Contractor Company Name and Address:

_____

_____

Signed by: _____ Date:_____

Work experience to be confirmed by the General Contractor.

Submit one copy of this Statement to the Contracting Officer

SECTION 03354 - INTERIOR CONCRETE SLAB REPAIRS AND JOINT FILLER REPLACEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Joint filler removal and replacement, with or without metal keyway.
2. Spalled joint repair or joint with metal keyway (less than 3/4")
3. Spalled joint repair, joint with metal keyway or self-leveling compound removal (great than 3/4")
4. Crack repair.
5. Surface defect repair, including pop-outs, spalls, and gouges.
6. Surface embed repair, including cleanouts, in-floor electrical outlets and Walker Duct access holes.
7. Large area surface repair, existing underlayment removal and replacement
8. Grout coat surface enhancement, including micro-pin holes, pitting and other shallow surface deficiencies.
9. Full Grind, Densify, Dye and Polish portions of the project not currently indicated on the drawings.

1.2 SUBMITTALS

A. Section 01310 - Submittals: Procedures for Submittals.

B. Joint Filler Installer Qualification Certification:
1. Company branch or regional office shall provide a list of five projects minimum performed within the last three years of similar type, size and complexity as this contract. Provide project names, addresses, contact names and phone numbers for each project. General Contractor to validate the abilities of the subcontractor prior to submitting bid.
2. Submit letter of certification, identifying specific individuals that are currently certified installers of the specified materials and are familiar with proper procedures and installation methods as required by the specified product manufacturers.

C. Product data for:
1. All products and primary equipment used for repair of existing concrete slab defects.

1.3 QUALITY ASSURANCE

A. EXCHANGE reserves the right to engage the services of a Concrete Consultant to review, observe and inspect the work in progress.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Limit and control damage from excessive dust caused by demolition, preparation, and installation of all Work.

B. Limit and control damage from moisture.

C. All replaced concrete shall be cured a minimum of 8 calendar days prior to joint filler installation.

D. Concrete repair area shall be closed to traffic during preparation and repair for a time as recommended by manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Subject to compliance with project requirements, provide products as manufactured by the following to the extent as specified hereinafter:
1. Metzger/McGuire
2. Roadware

3. Hi-Tech Systems
4. VersaFlex Incoproated
5. CTS Cement Manufacturing Corporation
6. Ardex Engineered Cements
7. Husqvarna Construction Products

B. Polyurea Joint Filler: Rapid setting, two-component polyurea polymer liquid of 100% solids content, Shore hardness 85-90, compatible with construction materials in contact.
1. RS 88 Polyurea in complementary darker color to match Dyed Polished Concrete, by Metzger/McGuire.
2. HT-PE85 Polyurea in complementary darker color to match Dyed Polished Concrete, by Hi-Tech Systems
3. SL/85 Polyurea in complementary darker color to match Dyed Polished Concrete, by VersaFlex Incorporated
4. Colors to be reviewed and approved by EXCHANGE Project Manager in mock-up.

C. Joint Filler Stain Preventing Film:
1. SPF by Metzger/McGuire.

D. Low Viscosity Crack and Spall Repair:
1. Rapid ReFloor in complementary matching color, by Metzger/McGuire.
2. HT Spall-FX2 in complementary matching color, by Hi-Tech Systems
3. Quick-Mender in complementary matching color, by VersaFlex Incorporated
4. 10 Minute Mender or Matchcrete by Roadware
5. Colors to be reviewed and approved by EXCHANGE Project Manager in mock-up.

E. Wide Area Surface Repairs
1. TRU Self Leveling, by CTS Cement Manufacturing Corporation
2. Diama-Top by Ardex Engineered Cements
3. Color after application of Specified Dye to be reviewed and approved by EXCHANGE Project Manager in mock-up.

F. Pin Hole and Surface Pitting Grout Coat
1. GM 3000, by Husqvarna Construction Products
2. StarSeal Fusion, by Vexcon Chemicals, Inc
3. Diama-Fill, by Ardex Engineered Cements
4. Color after application of Specified Dye to be reviewed and approved by EXCHANGE Project Manager in mock-up.

G. Silica Sand
1. Dry 00 Sandblasting sand.

2.2 EQUIPMENT

A. Subject to compliance with project requirements, provide equipment manufactured by the following:
1. HTC
2. Concrete Polishing Technologies
3. Joe Due Blades and Equipment
4. Pulman-Ermator
5. SASE Company, Inc.
6. U.S. Saws
7. Diamatic
8. VIC International Corporation
9. Engrave-a-Crete

B. Dust extraction system for grinding/sawing:
1. HEPA filtration vacuum, designed for use with all hand tools when grinding or sawing concrete (minimum 125CFM air flow).
2. Provide one of the following:

a. 26D, by HTC.
b. S2400, by Pullman-Ermator.
c. Bull 50, by SASE Company, Inc.
d. Approved equal.

C. Joint Filler Removal and Preparation
1. Humpback Cutter Complete, by Joe Due.
2. Dust Buggy, by U.S. Saws.
3. The Mongoose, by Engrave-a-Crete
4. Approved equal.

D. Crack Repair:
1. 5” Dustmizer 007, by Joe Due.
2. 5” Crack Attacker, by Joe Due.
3. 7” Handheld Crack Chaser, by Joe Due.
4. SawTec 5” Tile Vac, by U.S. Saws.
5. SawTec 7” Crac-Vac, by U.S.Saws.
6. Approved equal.

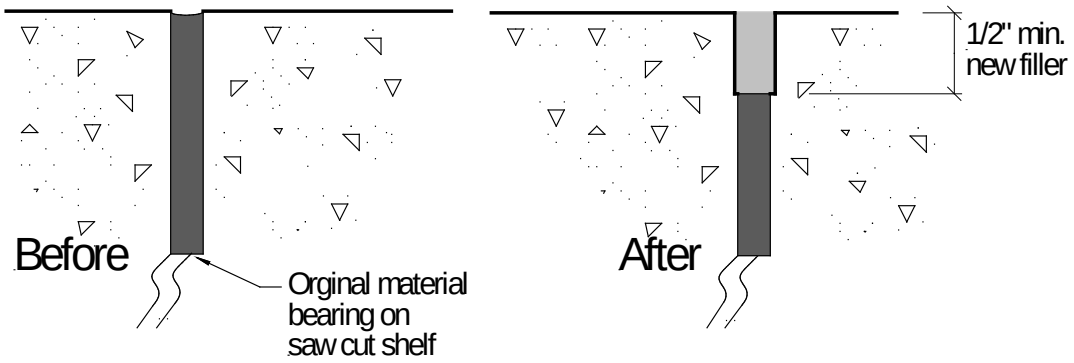
E. Surface Grinder: Handheld 5”-7” electric surface grinder with dustless shroud/housing.
1. Dust Avenger 5, by Joe Due.
2. Dust Avenger 7, by Joe Due.
3. SawTec 5” Grinder Vac, by U.S. Saws.
4. SawTec 7” Grinder Vac, by U.S. Saws.
5. Approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect surface of slab immediately adjacent to defect under repair.

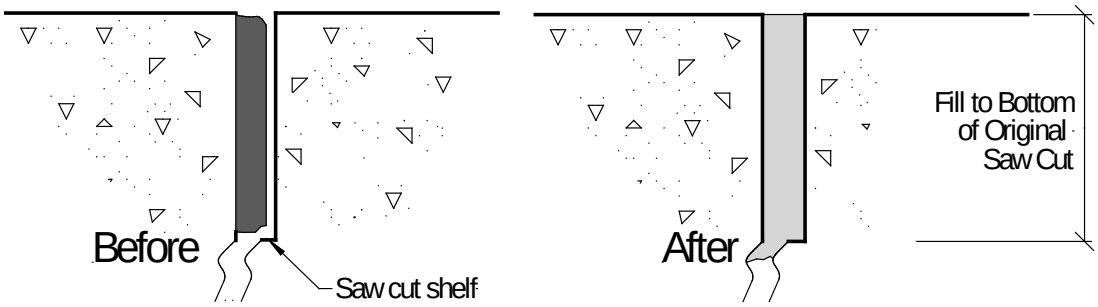
3.2 JOINT MILLING AND CAP FILLER REPLACEMENT



A. If existing joint filler is sound and resting on top of saw cut shelf, mill top 1/2" of material and refill with specified Polyurea joint filler.
1. Re-saw the joint to a minimum depth of 1/2” with a dry-cut, vacuum-equipped saw using a slightly oversized blade. The blade width should be sufficient to encapsulate the widest spall along a given contraction joint segment to produce a sharp corner on each side of the joint with a minimum of two passes through the joint.
2. Refill with polyurea joint filler material from the bottom up, taking care not to entrap large air bubbles per manufacturer’s recommendation. Slightly overfill and shave flush to the surface, prior to grinding process.

3. Ensure that after grinding, the joint is cut smooth and flush with the finish floor surface, without concave or intermittent, darkened profile.

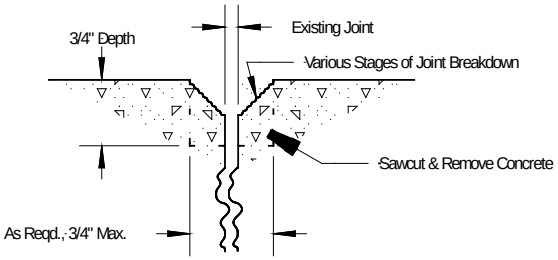
3.3 FULL DEPTH JOINT FILLER REPLACEMENT

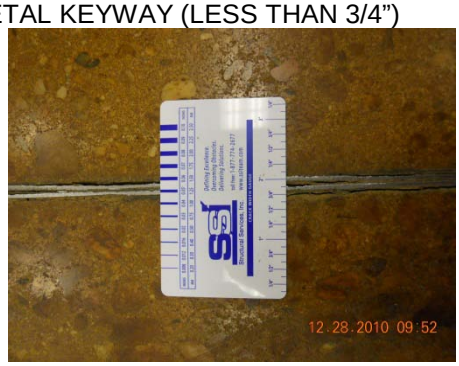


Note: if shelf width at base of saw cut is less than 1/4" on either side of joint, minimum required filler depth is 2" placed over compressibel backer rod or bagged silica sand.

A. If existing joint filler is loose, easily removed, or able to be forced downward with a hand tool, remove all filler material from joint and refill.
   1. Re-saw joint full depth with a dry-cut, vacuum-equipped saw using a slightly oversized blade. The blade width should be sufficient to encapsulate the widest spall along a given contraction joint segment to produce a sharp corner on each side of the joint with a minimum of two passes through the joint. Remove all filler material, debris, and laitance.
   2. Refill with polyurea joint filler material from the bottom up, taking care not to entrap large air bubbles per manufacturer's recommendation. Slightly overfill and shave flush to the surface prior to grinding process.
   3. Ensure that after grinding, the joint is cut smooth and flush with the finish floor surface, without concave or intermittent, darkened profile.

3.4 NARROW SPALLED JOINT REPAIR OR JOINT WITH METAL KEYWAY (LESS THAN 3/4")

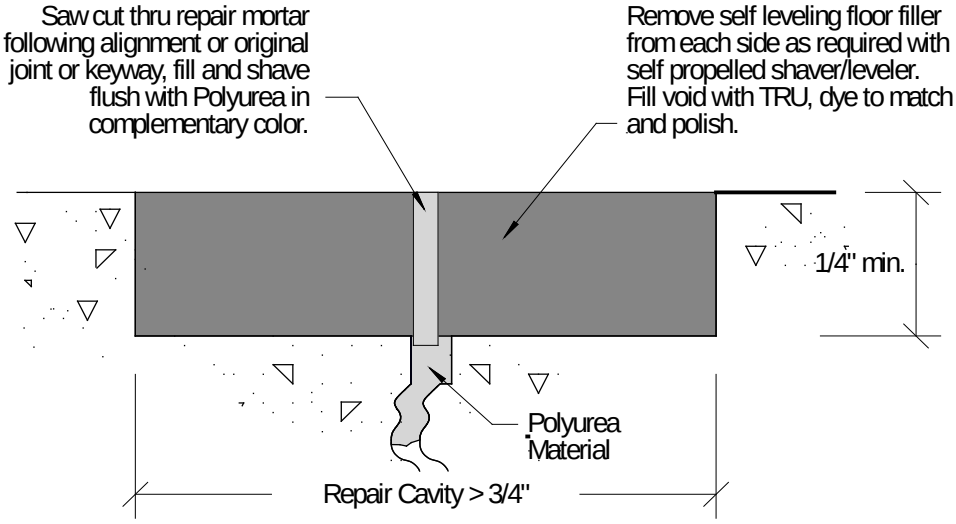




A. For joints that are spalled, are constructed with metal keys or have radius tooled edges not exceeding 3/4" in width at slab surface.
   1. Re-saw the joint edge to a minimum depth of 3/4" with a dry-cut, vacuum-equipped saw allowing removal of the widest spall (or top of radius) along a given joint segment to produce a sharp corner on each side of the joint with a minimum of two passes through joint.
   2. Clean joint of loose concrete, metal key fragments, joint filler, laitance, dirt, debris, backer rod, etc.
   3. Joints must be free of all visible moisture.
   4. Ensure filler penetrates the irregular aggregate interlock portion of the sawn contraction joint as shown below, re-establishing the aggregate interlock that may have been lost due to shrinkage, curling, and lack of reinforcement.
   5. Fill joint cavity with specified Polyurea joint filler per manufacturer's instructions, taking care not to entrap large air bubbles. Overfill joint slightly and shave flush to slab surface prior to grinding process.

3.5 WIDE SPALLED JOINT REPAIR (GREATER THAN 3/4")

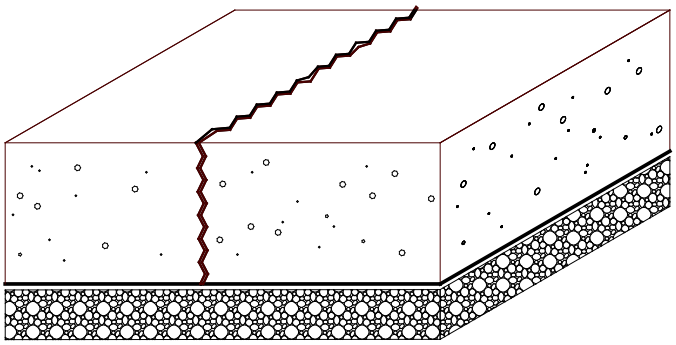
A. For



joints that are spalled, contain metal key or self leveling floor material that exceeds 3/4" in width at slab surface.

1. Re-saw the joint edge to a minimum depth of 1/4" with a dry-cut, vacuum-equipped shaver/leveler allowing removal of the widest spall or non-linear keyway along a given joint segment to produce a sharp corner on each side of the joint with a minimum of two passes through joint. Maintain consistent width of repair to within 1/2 inch in 10 feet.
2. Overfill repair cavity with overlay material per manufacturer's instructions, dye and grind flush to slab surface.
3. After repair has cured, and prior to any traffic on patched surface, re-saw original slab joint(s) ¾" in depth to honor joint and fill full depth with Polyurea joint filler per manufacturer's instructions.

3.6 CRACK REPAIR



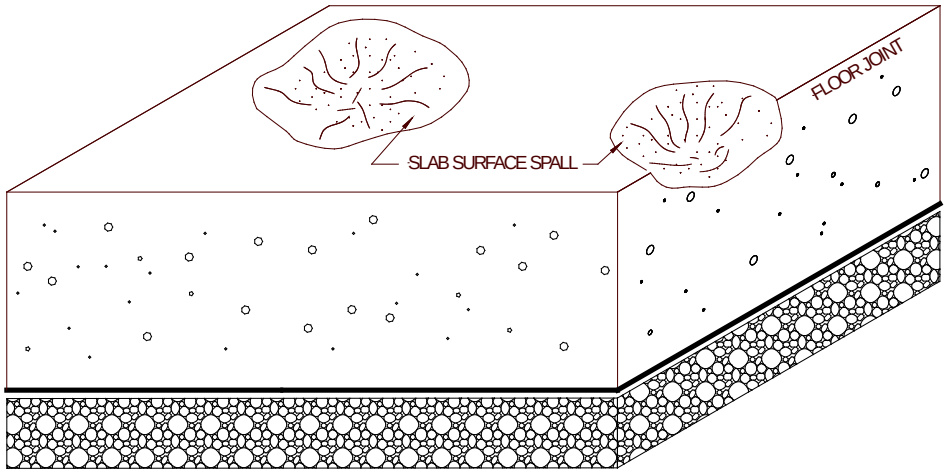
A. Crack width less than 1/32" without surface spalling.
   1. Do not repair.
   2. Grout coat may be used to fill thin hairline deficiencies.

B. Cracks from 1/32" to 1/4" in width.
   1. Clean crack cavity.
   2. Remove loose concrete, dirt and debris from crack with a wire brush or hand grinder with twisted wire wheel attachment, 1/2'" minimum depth, insuring crack sidewall is clean.
   3. Remove any loose segments, including islands formed by crack, with sharp tool.
   4. Use methods that will not widen existing crack.
   5. Vacuum crack to remove all dirt, debris and other laitance.
   6. Mask slab surface along crack as necessary to minimize overfill.
   7. Choose material color that closely matches the adjacent floor.
   8. Install low viscosity crack and spall repair material in accordance with manufacturer's instructions.
   9. Repeat until all voids are filled and material crowns slab surface.
      a. Do not flood area around crack.

b. Watch for bubble formation and out gassing.
c. Do not allow material to gel before adding additional material.

10. Shave or grind material flush to surface as stipulated by manufacturer.

3.7 SURFACE SPALLING REPAIR



A. For slab surface that is chipped and spalled, where the deficiency is 1/2" in length or width up to 3” in length or width, by 1/2" in depth.
1. Route edge of spall to provide 1/8” deep square edge or 30° edge (consult manufacturer’s data sheet for specific surface preparation instructions).
2. Use small hand grinder with maximum 5” diameter dry diamond blade and vacuum system attachment.
3. Do not overcut slots into existing slab surface.
4. Clean and prep spalled cavity.
5. Wire brush spalled surface to remove all dirt and laitance.
6. Mask slab at perimeter of spall with tape.
7. Install Low Viscosity Crack and Spall Repair material.
8. Polish over repair area with diamond disks to blend surface.
9. Feather filler material into the adjacent concrete floor surface.
10. With 2000 grit disk and firm pressure, add a few burn marks to mottle surface to blend with adjacent floor surface.
    a. NOTE: For inconsistent, varying spalled joints that comply with the measurements in this section, a form material may be needed to temporarily form and support the vertical face of spalled joint edge. Ensure that the repair material will not adhere to the form and the rigid repair material does not fuse the joint together.
11. For cleanouts, in-floor electric outlets and Walker Duct access plates, over-core around perimeter of existing embed by 1/2" in width and depth, then install Low Viscosity Crack and Spall Repair Material.

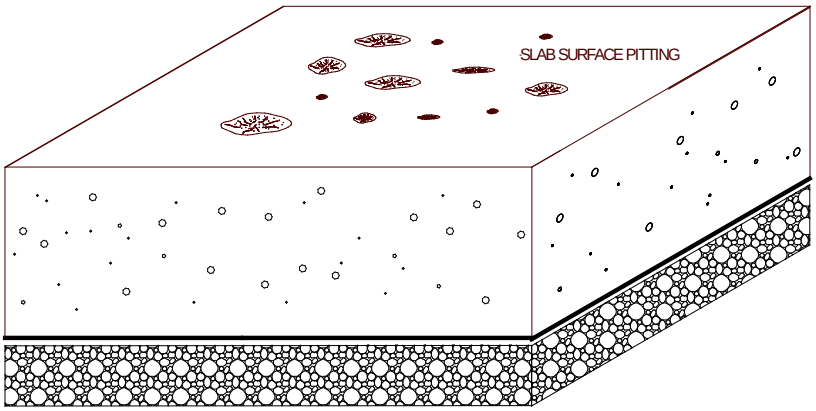
3.8 BOLT HOLE, CONDUIT REPAIR

A. For slab surfaces containing surface or sub-surface bolts, bolt-hole voids, conduit or subsurface conduit.
1. Recess steel bolt or conduit a minimum of 1/2” below finish floor by either punching or cutting.
    a. Check with General Contractor prior to cutting into active electrical or communication conduit.
2. For spall fractured edges less than 30 degrees, square edge to a minimum 1/8” depth with either a drill bit, chisel or edge grinder.
3. Clean cavity of all debris and laitance with drill activated, brass wire wheel. Vacuum hole to remove all dirt, debris and other laitance.
4. Dispense Low Viscosity Crack and Spall Repair at moderate pace using steady pressure. Dispense material into void, refilling as necessary to produce slight crown.
5. Grind material flush to slab surface per manufacturer’s instructions.

3.9 LARGE SURFACE REPAIR, UNDERLAYMENT REMOVAL AND REPLACEMENT

A. For slab surfaces containing wide-area irregular rough surfaces greater than 3” in width and length such as irregular coarse aggregate surfaces or surfaces with existing tile or carpet underlayment’s > 1/4" in thickness.
   1. Define edge perimeter with diamond masonry wheel or shaver/leveler to produce sharp edge, at least 1/8” deep.
   2. Roughen base surface using shaver/leveler to ICRI CSP 3 – 5 and vacuum clean.
   3. Wire brush to remove any small loose material and vacuum again.
   4. Mix and install overlay material in accordance with manufacturer’s instructions.
   5. Place repair material in floor surface defect, float level or leave slightly proud of existing floor.
   6. Grind, densify, dye and polish to match adjacent concrete.
   7. Re-establish original concrete slab joints by sawing completely through patch and re-filling with Polyurea joint filler prior to exposure to traffic.

3.10 SMALL SURFACE PITTING, PINHOLE REPAIR, GROUT COAT



A. For surfaces consisting of micro-deficiencies, pin holes, hairline cracks and other surface clutter that impedes the achievement of the specified overall gloss values
   1. Clean pitted sections with 90-degree angle grinder equipped with wire wheel to remove all dirt/laitance. Wheel should be run over defect in multiple directions to ensure proper cleaning.
   2. Vacuum prepared pitted sections.
   3. Install and disperse grout coat using GM 3000, StarSeal Fusion, or Diama-Fill in accordance with manufacturer’s directions.
   4. Ensure a thin, uniform layer of repair material covers the pitted areas. Refill any low spots as needed.
   5. Grind or polish flush with metal or resin-bond diamonds, ensuring repair material is flush with slab surface.
   6. Repeat repairs in areas as required if repair material pulls out of defects.
   7. Apply required applications of specified dye and polish smooth to meet specified overall gloss values.

3.11 PROTECTION

A. Protect surfaces of finished floor.

B. Prohibit traffic until floor repairs have received final approval by Owner.

SECTION 03357 - NEW INTEGRAL COLORED POLISHED CONCRETE FLOOR FINISH

PART 1 - GENERAL

1.1 SUMMARY

A. Installation of polished concrete floor system for new integral colored interior concrete floors by dry grinding, application of concrete densifier, and polishing with various size grit metal-bonded and resin-bonded diamonds to the scheduled reflective sheen..

1.2 SUBMITTALS

A. Comply with Section 01310 – SUBMITTALS.

B. Product Data:
1. Provide manufacturer's product data for polishing equipment, including grinding machine, grinding heads, grinding pads and dust extraction system.
2. Concrete liquid reactive surface densifying system including stain guard treatment

C. Samples: Submit two polished concrete finish samples, 3 x 3 inch in size, illustrating color and representative gloss level of polished concrete.

D. Installer's Certification:
1. Provide list of 5 projects performed with last three years of similar type, size and complexity. Submit project names, addresses, contacts and phone numbers for each project.
2. Applicator Qualifications: Submit letter of certification from manufacturers of all products and equipment specified herein, stating that the applicator is a certified applicator of the system and is familiar with proper procedures and installation methods as required by the manufacturer.

E. Maintenance Manual: Submit installer's maintenance manual, including maintenance and cleaning instructions for polished concrete floor system to owner upon completion of work.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Accessibility Requirements: Comply with applicable requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAGs) for Buildings and Facilities; Final Guidelines, revisions, and updates for static coefficient of friction for walkway surfaces.
2. Environmental Requirements: Comply with current Federal and local toxicity and air quality regulations and with Federal requirements on content of lead, mercury, and other heavy metals. Do not use solvents in floor polish products that contribute to air pollution or impact food quality.

B. Pre-installation Meeting:
1. Convene pre-installation meeting at the project site before start of installation of polished concrete floor system. Meeting to occur only after review and approval of required Sub-contractor submittals completion of test panel mock-up.
2. Require attendance of parties directly affecting work of this section, including:
   a. Contracting Officer
   b. Owner's Consultant
   c. General Contractor
   d. Polishing Subcontractor including Project Manager and Foreman
   e. Reactive Densifier manufacturer's technical representative
   f. Owner's Independent Testing Laboratory
3. Meeting agenda to include (but not limited to): Review of existing conditions, surface preparation, system installations, field quality control, protection, environmental requirements, coordination with other work, controls to limit damage from moisture and field quality control methods and reporting.

1.4 MOCK-UP

A. Provide polished concrete floor finish mock-up, 250 square feet, illustrating completed finish including all specified liquid surface treatments and specified gloss levels. Mock-up will include slab joints and slab edge treatments.

B. Locate mock-up where directed by AAFES Project Manager.

C. Accepted mock-up will serve as standard to judge quality and workmanship of completed polished concrete floor finish.

D. Accepted mock-up shall remain as part of finished product.

E. Mock-up and each Phase of work shall be approved by AAFES Project Manager, Architect or AAFES Concrete Consultant. Non-compliant work shall be corrected and approved before Contractor continues with work.

1.5 PROJECT CONDITIONS

A. Sequence application of concrete polishing after completion of other construction activities that would be damaging to completed polished finish.

B. Close areas to traffic during and after floor application for time period recommended in writing by manufacturer.

PART 2 - PRODUCTS

2.1 PRE-CERTIFIED INSTALLERS

A. American Concrete Concepts Inc. 877-775-0030
B. Avalon Corporation 425-643-5667
C. Bomanite of North Texas 800-492-2524
D. Budget Maintenance Concrete Services 610-323-7702
E. Diama-Shield 888-730-4075
F. Final Touch 614-751-0606
G. Jeffco Concrete Contractors 800-226-2668
H. K & J Concrete Polishing 865-567-5950
I. Kote It Inc 260-637-7051
J. Pacific Decorative Concrete 916-725-9269
K. Perfect Polish Inc. 877-917-4463
L. Stone Care of Texas 210-656-8019
M. Total Polish Solutions 865-633-5051
N. Wholesale Floors 602-248-7878

2.2 EQUIPMENT TO BE USED FOR INSTALLATION

A. Floor Grinder:
1. Model: Concrete Polishing Solutions “G-320”; HTC-America 800 (or equivalent).
2. Type: Multi-orbital, planetary-action, opposing-rotational, 3 or 4 diamond-headed floor grinders.
3. Weight: 850 pounds.
4. Grinding Pressure: 600 pounds.

B. Dust Extraction System and pre-separator for grinding/polishing:
Heavy-duty industrial HEPA filtration vacuum system, suitable for extracting and containing large quantities of fine concrete dust (minimum 350 CFM air flow) in conjunction with manufacturer recommended pre-separator:
1. HTC 86D
2. Pullman-Ermator T8600
3. SASE Bull 1250
4. Approved equal

C. Diamond Tooling for Coating Removal, Initial Grinding, and Preparing Floor for Polishing:
1. Metal Bonded Diamonds
a. Grit Size: 80 or 150.

D. Diamond Tooling for Polishing Concrete:
1. Resin Bonded, Phenolic Diamonds
a. Grit Size: Raptor L-1, Raptor L-2, MR 5(100), MR 6(200), SR30(400), SR40(800), SR50(1500), or equivalent.

E. Grinding / Polishing Pads for Edges
1. Grit Size: 60, 100, 120, 200, 400, 800, 1500 and 3000.

F. Hand Grinder with dust extraction attachment and pads.

G. High speed propane burnisher
   1. Minimum 27 inch head generating pad speeds of 1,500 RPM or higher.

H. Diamond Impregnated Janitorial Pads
   1. Twister Diamond Cleaning System Pads, by HTC
   2. Diamond Polishing Pads, by Norton
   3. SpinFlex Diamond Polishing Pads, by CPS
   4. 3M Scotch Bright Diamond Floor Pad System, by 3M
   5. VMC Diamond Maintenance Pads, by VMC
   6. Optima Pads, by VIC
   7. Consolideck Heat pad, by Prosoco

I. Applicator Pads and Equipment
   1. Professional Mighty Mop 077, by Quickie
   2. 24” Microfiber Wet Room Mop, by Rubbermaid
   3. Fas-Trak Chemical Application System, by Fas-Trak Industries
   4. Humm’V II, by Tuffy Systems, Inc.

2.3 MATERIALS

A. Penetrating Hardener/Densifier: Clear liquid reactive lithium-silicate based.
   1. Pentra-Sil (NL), by Convergent Concrete Technologies.
   2. Consolideck LS, by Prosoco.
   3. SS Harden X, by SealSource.
   4. Approved equal by other manufacturer specified herein.

B. Protective Surface Treatment (Stain Guard):
   1. Pentra-Guard (HP), by Convergent Concrete Technologies.
   2. Consolideck LS Guard, by Prosoco.
   3. SS Duraguard, by SealSource.
   4. Approved equal by other manufacturer specified herein.

E. Joint Filler
   1. RS 88 Polyurea in complementary darker color to match Integral Colored Polished Concrete, by Metzger McGuire

F. Crack and Spall Repair
   1. Rapid Refloor in complementary darker color, by Metzger McGuire
   2. 10 Minute Mender or Matchcrete in complementary color, by Roadware

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine integral floor to receive polished concrete floor system.

B. Notify the Contracting Officer of conditions that would adversely affect installation or subsequent use.

C. Do not begin surface preparation or installation until conditions are corrected and approved.

D. Verify the Following for New Integral Color Concrete in Mud Beds or Full Depth Installations
   1. Floor Finish: Wide channel floated, smooth, pan, combination blade and plastic blade finished floor from edge to edge, with no rough areas.
   2. Floor and Joints:
      a. Free of debris and excessive dirt, dust, clay, and mud.
      b. Dry.
   3. Concrete Curing: Minimum 7 days disposable wet curing blankets or removable curing compound applied. Concrete shall be cured for 14-days minimum before start of grinding process.
   4. Concrete Adjacent to Floor Penetrations: Troweled flat and level with surrounding concrete.

3.2 SURFACE PREPARATION

A. Protection: Protect surrounding areas and adjacent surfaces from the following:
   1. Minimal accumulation of dust from grinding and polishing.
   2. Contact with overspray of penetrating hardener / densifier.
   3. Contact with overspray of protective surface treatment (stain guard)
   4. Contact with overspray of water or solvent based dye treatment.
   5. Contact with joint filler, crack or spall repair materials

B. Clean Surfaces: Remove dirt, dust, debris, oil, grease, curing agents, bond breakers, paint, coatings, and other surface contaminants which could adversely affect installation of polished concrete floor system.

A. Refill new concrete joints in accordance with Section 07900.

G. Repair all slab defects and joints in accordance with Section 03 35 40

3.3 INSTALLATION

A. Install polished concrete floor system in accordance with installer's instructions at locations indicated on the Drawings.

B. Aggregate Exposure:
   1. Fine Aggregate: Mottled salt-and-pepper aggregate exposure.

C. Polished Concrete Floor System
   1. Open Slab Surface:
      a. Open-up concrete by grinding with 80-grit metal-bonded or Raptor Resin L-1 diamonds. Variations to the precise grinding, densifying, polishing, and stain guard application are anticipated, but must be discussed and approved in the pre-polish meeting.
      e. Progressive edge grinding will be necessary with ½" of all vertical abutments, including walls, cases, columns, posts and racking systems.
      f. Joint filler and spall repairs shall be flush with surface after grinding and polishing steps. Additional passes along curled joints may be necessary to remove joint filler chatter.
   2. Remove 80-grit metal-bonded diamond scratches by grinding with 150-grit metal-bonded diamonds.
   3. Apply lithium silicate densifier
      a. 500 square feet per gallon per manufacturer's recommendations and the concrete's acceptance of the product.
      b. Let densifier dry for approximately 30 – 60 minutes.
   4. Floor Polishing:
      a. Remove 150-grit metal-bonded diamond scratches by grinding with 100-grit resin-bonded diamonds.
      b. Remove 100-grit resin-bonded diamond scratches by grinding with 200-grit resin-bonded diamonds.
      c. Remove 200-grit resin-bonded diamond scratches by grinding with 400-grit resin-bonded diamonds.
      d. Remove 400-grit resin-bonded diamond scratches by grinding with 800-grit resin-bonded diamonds.
      e. Remove 800-grit resin-bonded diamond scratches by grinding with 1500-grit resin-bonded diamonds.
   5. Apply stain guard
      a. Apply in accordance with manufacturer's published instructions.
      b. Apply first coat at the rate of 2,000-2,500 sq. ft. per gallon, per manufacturer's recommendation (DO NOT OVER APPLY).
      c. Use applicator pad, pre-wetted with stain guard, to pull material out to create a thin film prior to drying.
      d. Remove product completely from areas of over application, as evidenced by surface streaking, and replace with unused stain guard.
      e. Apply second coat of stain guard at all high traffic areas identified on the drawings at the rate of 2,500 sq. ft. per gallon.

6. High speed burnish:
    a. After each application of stain guard is dry, burnish surface.
    b. Burnish at a slow movement pace using high speed machine with 800 grit diamond impregnated or hog's hair burnishing pads.
    c. Burnish with several passes. Make each progressive pass at 90 degrees from previous pass.
    d. Burnishing, pad type, and pace of forward movement shall combine to develop a minimum floor surface temperature of 91-degrees F directly below the burnishing pad as continuously measured by the operator during installation.

3.4 FIELD QUALITY CONTROL

A. Inspect completed polished concrete floor system with the Contracting Officer, Contractor, and Installer.

B. Review procedures with Contracting Officer to correct unacceptable areas of completed polished concrete floor system.

C. Specular Gloss/Reflectance, ASTM D 523:
    1. Perform polishing and burnishing work necessary to attain an average gloss reading of not less than 60 as measured using a Horiba IG-320 60 Degree Gloss Checker.
    2. Sweep, scrub and polish concrete surface to produce Specified Overall Gloss Value (SOGV) ≥ 50, Minimum Local Gloss Value (MLGV) ≥ 40.
    3. Gloss shall be considered as a quantitative value that expresses the degree of reflection when light hits the concrete floor surface. Gloss measurements will be taken independent of ambient lighting and will be taken within a sealed measurement window located beneath the test unit.

3.5 PROTECTION

A. Protect completed polished concrete floor system from damage until Substantial Completion.
    1. Do not allow vehicle and pedestrian traffic on unprotected floor.
    2. Do not allow construction materials, equipment, and tools on unprotected floor.
    3. Prohibit parking of vehicles on concrete slab.
    4. If construction equipment must be used for application, diaper components that might drip oil, hydraulic fluid, or other liquids.
    5. No tire embedments (rocks, nails, screws, etc.) that will scratch or pit slab surface.
    6. Prohibit pipe cutting using pipe cutting machinery on concrete slab.
    7. Prohibit temporary placement and storage of steel members on concrete slab.
    8. Prohibit acids and acidic detergents from contacting concrete surfaces.
    9. Cover concrete floors with drop cloths or use breathable drop cloths during painting. If paint is spilled on concrete floor, remove paint immediately.
    10. Protect slab surface from moisture for 72 hours to prevent re-emulsification of surface treatment prior to cure

B. Immediately remove mortar splatter, spilled liquids, oil, grease, paint, coatings, and other surface contaminants which could adversely affect completed polished concrete floor system.

C. Repair damaged areas of completed polished concrete floor system to satisfaction of Contracting Officer.

END OF SECTION

SECTION 04300 – MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Mortar and grout.
2. Masonry reinforcement, anchorage, flashing, and accessories.
3. Structural brick.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Recycled Content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Shop Drawing:
1. Provide shop drawings to illustrate special brick shapes, sizes, color, texture, and finish.

D. Product Data:
1. Mortar
2. Grout
3. Masonry reinforcement and anchorage, flashing, and accessories

E. Samples:
1. Colored mortar
2. Four samples of each brick to illustrate color, texture and extremes of color range.
3. See Article 1.03 for sample panel requirements.

1.3 MASONRY SAMPLE PANEL

A. After material samples are approved and prior to starting masonry work, a sample panel shall be constructed that represents the proposed materials, color range, texture, bond, mortar, and workmanship.

B. Construct a masonry sample panel sized four (4) feet long by six (6) feet high which includes all types of masonry units to be utilized in the work.

C. Locate masonry sample panel where directed by the Architect and AAFES Project Manager.

D. Sample panel may not remain as part of the Work.

E. Do not ship brick units from the manufacturer or start work until the Architect, AAFES Project Manager and the Installation's Authority having Jurisdiction have accepted the sample panel.

F. Sample panel shall remain on site throughout the construction period. Sample panel shall not be removed until approved for removal by the AAFES Project Manager.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units above ground on level platforms which allow air circulation under stacked units.

B. Handle units on pallets or flat bed barrows.

C. Do not permit free discharge from conveyors or transporting in mortar trays.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Masonry construction shall comply with Masonry Industry Council - Hot and Code Weather Masonry Construction.

B. The use of accelerators, antifreezes and calcium chlorides shall not be permitted for cold weather

construction.

C. Masonry sand shall be heated when the outside temperature is below freezing.

D. The use of frozen or partially frozen material shall not be permitted.

PART 2 - PRODUCTS

2.1 MORTAR

A. Manufacturers:
1. Cemex - Rich Color
2. Davis Colors - True Tone
3. Essroc Corporation - Brixment in Color
4. Approved Equal

B. Materials:
1. Masonry Cement - ASTM C91, Type N
2. Portland Cement - ASTM C150, Type I gray or white color, as required to produce required mortar color.
3. Masonry Sand - ASTM C144, standard masonry type.
4. Hydrated Lime - ASTM C207, Type S.
5. Water - Clean and potable.

C. Mortar Color:
1. Brick - See Exterior Finish Materials List on the drawings.

D. Admixtures:
1. Admixtures other than antifreeze compounds may be used in the mortar subject to prior approval by the Architect. The admixture shall not adversely affect mortar bond, color, or compressive strength of mortar designed without use of admixture. The admixture shall not contain calcium chloride, chloride salts, or any other chemical that will deleteriously affect metals embedded in mortar including coatings.

E. Mortar Mixes:
1. ASTM C270, Type S using the Proportion Specification.
2. Contractor, at his option, may use a masonry cement mix or a Portland cement and lime mix.

F. Mortar Mixing:
1. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
2. Maintain sand uniformly damp immediately before the mixing process.
3. Where permitted, add admixtures in accordance with the manufacturer's instructions. Provide uniformity of mix and coloration.
4. Do not use anti-freeze compounds to lower the freezing point of mortar.
5. If water is lost by evaporation, re-temper only within two (2) hours of mixing.
6. Mortar to be mixed only as required for immediate use and shall be used as soon as possible after mixing. Any mortar left standing for a period exceeding 60 minutes that cannot regain its original plasticity by a single re-tempering shall not be used under any circumstances.

2.2 GROUT

A. Components:
1. Portland Cement - ASTM C150, Type I, gray color
2. Hydrated Lime - ASTM C207, Type S
3. Grout Aggregate - ASTM C404, fine and course
4. Water - Clean and potable

B. Grout Mix:
1. Grout for Structural Masonry : 2000 psi strength at 28 days, 8-11 inch slump; mixed in accordance with ASTM C476 fine and coarse grout.

2.3 MASONRY REINFORCEMENT AND ANCHORAGE

A. Masonry Reinforcement:
1. Reinforcing steel for lintels, bond beams and vertical reinforcement shall be deformed bars

complying with ASTM A615, Grade 60. Shop fabricate reinforcement which is shown bent or hooked.

B. Horizontal Joint Reinforcement:
   1. Joint reinforcement shall be factory fabricated from cold drawn steel wire conforming to ASTM A82, having a tensile strength of 80,000 psi. Reinforcement shall consist of 9 gauge (.1483") deformed longitudinal wires with 9 gauge (.1483") cross wires butt-welded every 16" o.c. to form a truss pattern.
   2. Walls that are vertically reinforced shall have cross wires butt-welded every 16" o.c. to form a ladder pattern. Unit width shall be 1-1/2" less than the thickness of the masonry unit.
   3. Provide reinforcement in 10'-0" lengths with prefabricated corners and tees at intersecting walls of same design and finish as joint reinforcement.
   4. Reinforcing for exterior walls shall be Hot dip galvanizing shall be done after fabrication in accordance with ASTM A153 Class B2.
   5. Manufacturers:
      a. Dur-O-Wall
      b. Heckmann Building Products
      c. Hohmann & Barnard
      d. Masonry Reinforcing Corp. of America.
      e. Approved Equal

2.4 FLASHING

A. Flexible Membrane Flashing:
   1. Through-wall flashing shall be 40 mil self-adhesive, cold-applied sheet consisting of rubberized asphalt integrally bonded to an 8 mil high-density, cross-laminated polyethylene film. Flashing shall have a disposable silicone coated release sheet. Flashing shall comply with ASTM D 1970.
   2. Furnish prefabricated internal and external corners where required.
   3. Manufacturers:
      a. Hohmann & Barnard Inc., Textroflash.
      b. Dur-O-Barrier - Dur-O-Wall
      c. Perm-A-Barrier - Grace Construction Products
      d. TW Thru-Wall Flashing - Tamko Waterproofing
      e. Aqua Flash - Masonry Reinforcing Corp. of America
      f. Approved Equal

2.5 ACCESSORIES

A. Cell Vents:
   1. Cell vents shall be 3/8” x 2-1/4” x 3-3/8” cellular polypropylene. Color to match mortar.
   2. Manufacturers:
      a. D/A 1006 - Dur-o-Wall
      b. No. 85 - Heckman
      c. QV Quadro-Vent - Hohmann & Barnard, Inc.
      d. 3601 - Masonry Reinforcing Corp. of America
      e. Approved Equal

2.6 STRUCTURAL BRICK

A. All brick shall be color and texture as shown on the contract drawings.
   1. Manufacturers:
      a. Belden Brick
      b. Interstate Brick
      c. Approved Equal

B. Structural brick shall comply with ASTM C-652 latest edition, Grade SW, Type HBS or better. Average dimensions of the brick shall be 7-5/8 inches thick, 3-5/8 inches high and 15-5/8 inches long (nominal) and 7-5/8 inches thick, 7-5/8 inches high and 15-5/8 inches long. Minimum compressive strength shall be 9,000 psi. The maximum Saturation Coefficient shall be 0.78. The minimum IRA of the brick shall be 6 g / 30 sq. in. Maximum IRA shall be 30 g / 30 sq. in. Where IRA exceeds 30 g / 30 sq. in., pre-wetting brick is recommended.

C. Shapes; Where special shapes are shown on architectural drawings, manufacturer shall provide shop drawings for architect's approval prior to manufacturing shapes.

PART 3 - EXECUTION

3.1 GENERAL

A. Masonry cavity walls shall be constructed in accordance with Brick Institute of America Technical Note 21C.

3.2 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Verify items provided by other sections of work are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

D. Verify that special brick shapes are on site. Do not start installation of units until all special shapes are on site.

3.3 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.4 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness head joints to run vertical in line.

C. Structural Brick Units:
1. Bond: Running bond.
2. Coursing: Two (2) courses and two (2) mortar joints to equal 8 inches.
3. Mortar Joints: Tooled Concave.

3.5 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.

D. Remove excess mortar as work progresses.

E. Interlock intersections and external corners; except at stacked bond units.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, un-chipped edges. Prevent broken masonry unit corners or edges.

H. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.6 CELL VENTS

A. Install vents in veneer at 24 inches O.C. horizontally above through-wall flashing, above shelf angles and lintels, at bottom of walls and at top of walls as indicated.

3.7 CAVITY WALL

A. Maintain cavity air space as indicated on the drawings in accordance with the best practices of the industry.

B. Do not permit mortar to drop or accumulate into cavity air space or to plug weeps or cavity vents.

C. Install cavity drainage system at base of wall and at all lintels.

3.8 WALL REINFORCEMENT

A. Install horizontal joint reinforcement 16 O.C. (Maximum).

B. Place masonry joint reinforcement in first horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place joint reinforcement continuous in first joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

E. At corners use prefabricated “L” units in addition to masonry bonding.

F. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches O.C.

3.9 MASONRY FLASHINGS

A. Extend flashings horizontally at foundation walls, above lintels, at bottom of walls, and below window sills.

B. Turn flashing up a minimum of 8 inches and bed into mortar joint of masonry. Seal masonry flashings to sheathing over steel stud framed back-up.

C. Lap end joints a minimum of 6 inches and seal watertight.

D. Turn flashing, fold, and seal at corners, bends, and interruptions.

E. Provide end dams at heads, sills, lintels and flashing terminations.

3.10 LINTELS

A. Install loose steel lintels over openings.

B. Refer to structural drawings for lintel sizes.

C. Maintain minimum 8 inch bearing on each side of opening.

3.11 GROUTED COMPONENTS

A. Lay masonry units with cores vertically aligned, clear of mortar and unobstructed.

B. Place reinforcement bars as indicated on Drawings.

C. Splice reinforcement as required by code.

D. Place and consolidate grout fill without displacing reinforcing.

3.12 BUILT-IN WORK

A. As work progresses, install built-in items furnished by other Specification Sections.

B. Install built-in items plumb and level.

C. Do not build in organic materials subject to deterioration.

3.13 TOLERANCES

A. Maximum Variation from Unit to Adjacent Unit: 1/16 inch

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 3/8 inch in 20 ft maximum.

C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative maximum.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.

E. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.14 CUTTING AND FITTING

A. Cut and fit for pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.15 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

C. Dry brush masonry surface after mortar has set, at the end of each day's work.

D. Clean soiled surfaces with cleaning solution. Use non-metallic tools in cleaning operations.

3.16 PROTECTION OF FINISHED WORK

A. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

END OF SECTION

SECTION 04900 - MASONRY CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of the Section includes the following:
1. Cleaning of new masonry surfaces

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

B. Product Data:
1. Submit data on cleaning compounds and cleaning solutions.

C. Manufacturer's Installation Instructions:
1. Submit application procedures for products selected for use.

1.3 QUALITY CONTROL

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.4 MOCKUP

A. Clean a section of wall, 10’ x 10’ ft to determine extent of cleaning methods.

B. Locate where directed by Architect and AAFES Project Manager.

C. Acceptable panel illustrating results of cleaning will become standard for work of this section.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site in the manufacturer’s original unopened containers and packaging, bearing labels as to type and names of products and manufacturers.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Hot and Cold Weather Requirements: Comply with manufacturer’s written recommendations.

PART 2 - PRODUCTS

2.1 MASONRY CLEANING

A. Manufacturers:
1. ProSoCo Inc.
2. Approved Equal.

B. Masonry cleaner shall be appropriate for each type of masonry to be cleaned. Verify compatibility of cleaner with brick manufacturer and calcium silicate masonry unit supplier prior to application. Do not begin cleaning operations until cleaning product has been approved.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify surfaces to be cleaned are ready for work of this section.

3.2 PREPARATION

A. New face brick, mortar joints, etc., shall be properly prepared by masonry contractor prior to attempting final cleaning as specified under this Section.

B. Contractor doing this cleaning work shall thoroughly mask-off and protect all adjacent materials and shall be responsible for any damage caused to same by the cleaning material used.

C. Protect areas, landscaping, materials, and surfaces not receiving work of this section to protect from damage.

D. Protect calcium silicate masonry units from contact with other masonry cleaning agents in accordance with the manufacturer’s written instructions.

E. Allow 7 days for mortar to cure before final removal of stains and cleaning of masonry.

3.3 CLEANING

A. Masonry cleaner for each type of masonry to be cleaned, shall be prepared and applied in strict accordance with the manufacturer's recommendations.

B. Water for rinsing shall be clean, potable and free from organic material and deleterious amounts of dissolved acids, alkalies and salts. Unless otherwise recommended by manufacturer of cleaner, water rinse with pressure equipment providing at least 400 psi with a 40° fan spray tip.

C. When cleaning operation is considered complete by cleaning contractor, and cleaned surfaces have completely dried, call for an inspection of work. If, in the Architect’s opinion, additional cleaning is necessary, the contractor shall repeat the process until accepted by the Architect and AAFES Project Manager.

3.4 CLEAN-UP

A. Remove all masking materials after masonry has been cleaned and accepted by the Architect and AAFES Project Manager.

B. Remove all empty containers, packaging, etc. and leave site in a neat, clean condition.

END OF SECTION

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Structural steel framing members and support members.
2. Base plates.
3. Grouting under base plates.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local / regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
3. VOC Compliance - Submit documentation indicating VOC content of touch-up primer.

C. Shop Drawings: Submit shop drawings that indicate the following:
1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
2. Indicate connections.
3. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.
4. Submit two paper copies and one reproducible.

D. Welder's Certificates: Submit certificates to certify that the welders employed on the Work meet AWS qualifications within the previous twelve (12) months.

1.3 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC Code of Standard Practice.

B. Fabricator: Company specializing in performing the work of this section with a minimum of five (5) years documented experience.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor's option.

B. Structural Steel Members and Bolts: Refer to "Structural Notes" on drawings.

C. Structural Tubing: ASTM A500, Grade B.

D. Pipe: ASTM A53, Grade B.

E. Bolts, Nuts, and Washers: ASTM A325 bolts and ASTM A563 nuts.

F. Anchor Bolts: ASTM A307.

G. Welding Materials: AWS D1.1; type required for materials being welded.

H. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water

reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.

I. Shop Primer:
   1. Modified alkyd, rust-inhibitive primer.
      a. One coat - 2.0 to 4.0 mil DFT
      b. VOC - 347 g/l unthinned
   2. Equal to Tnemec Series 10, color gray.

J. Touch-Up Primer:
   1. Touch-up primer to be compatible with shop primer.
      a. One coat - 2.0 to 4.0 mil DFT
      b. VOC - less than 250 g/l

2.2 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP2 Hand Tool or SP3 Power Tool cleaning.

B. Shop prime structural steel members.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work. Do not begin work until all unsatisfactory conditions are corrected.

3.2 ERECTION

A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

B. Field weld components indicated on shop drawings.

C. Field connect members with threaded fasteners; torque to required resistance.

D. Do not field cut or alter structural members without approval by the Architect.

E. After erection, prime welds, abrasions, and surfaces not shop primed. Do not prime surfaces that will be in contact with concrete.

F. Provide asphaltic coating on all structural steel surfaces that will be in contact with concrete.

G. Grout under base plates.

3.3 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

3.4 TESTING

A. Testing shall be performed in accordance with Specification SECTION 01410 - TESTING SERVICES.

B. Testing Schedule:
   1. Unless noted otherwise, bolted connections shall comply with a snug tight condition which means that tightness exists when all plies in a joint are in firm contact. This may be attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud

wrench. Final tightening using “Turn-of-Nut Tightening” shall be in accordance with AISC “Specification for Structural Joints Using ASTM A325 or A490 Bolts”.

2. Field Welding: Inspect and test during erection of structural steel as follows:
   a. Certify Welders and conduct inspections and tests as required.
   b. Perform visual inspection of all welds.
3. If welds do not pass visual inspection, the Testing Agency shall perform one or more of the following tests to determine acceptability of welds. Testing Agency shall make a recommendation to the Architect prior to performance of any of these tests.
   a. Liquid Penetrant Inspection: ASTM E165.
   b. Magnetic Particle Inspection: ASTM E109; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
   c. Radiographic Inspection: ASTM E94 and ASTM E142: minimum quality level “202T”.
   d. Ultrasonic Inspection: ASTM E164.
4. Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor’s expense as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

END OF SECTION

SECTION 05210 - STEEL JOISTS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Open web steel joists, with bridging, attached seats and anchors.
2. Loose bearing plates and anchor bolts for site placement.
3. Framed roof openings greater than 18 inches.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with Section 01310.

B. Sustainability Product Data:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
3. VOC Compliance - Submit documentation indicating VOC content of primer.

C. Shop Drawings:
1. Indicate standard designations, configuration, sizes, spacing, locations of joists, bridging joist leg extensions.
2. Connections, attachments.
3. Provide engineering calculations and shop drawings for review, sealed by a professional engineer registered in Michigan State, prior to fabrication. See structural drawings for additional requirements.
4. Submit two paper copies and one reproducible.

D. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with SJI, Load Tables, and Weight Tables, including headers and other supplementary framing.

B. Fabricator: Company specializing in performing the work of this section with minimum 5 years documented experience and a member of the Steel Joist Institute.

C. Erector: Company specializing in performing the work of this section with minimum 5 years documented experience.

D. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State where the Project is located.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Transport, handle, store, and protect products and to SJI requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor’s option.

B. Open Web Joists Members: SJI Type K.

C. Anchor Bolts, Nuts and Washers: ASTM A307, galvanized to ASTM A153.

D. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A36/A36M.

E. Welding Materials: AWS D1.1; type required for materials being welded.

F. Shop Primer:
1. Modified alkyd, rust-inhibitive primer.
   a. One coat - 2.0 to 4.0 mil DFT
   b. VOC - 347 g/l unthinned
2. Equal to Tnemec Series 10, color gray.

G. Touch-Up Primer:
1. Touch-up primer to be compatible with shop primer.
   a. One coat - 2.0 to 4.0 mil DFT
   b. VOC - less than 250 g/l

2.2 FABRICATION

A. Provide bottom and top chord extensions as indicated.

B. Fabricate to achieve minimum end bearing of:
1. 2-1/2 inches on steel
2. 4 inches on masonry (K joists).

C. Frame special sized openings in joist web framing as detailed.

2.3 FINISH

A. Prepare joist component surfaces in accordance with SSPC SP 2 or 3.

B. Shop prime joists. Do not prime surfaces that will be fireproofed, field welded, and in contact with concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.2 ERECTION

A. Erect and bear joists on supports.

B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.

C. Coordinate placement of anchors in concrete masonry construction for securing bearing plates angles.

D. After joist alignment and installation of framing, field weld joist seat to bearing plates, angles or structural steel beams as detailed.

E. Position and field weld joist chord extensions and wall attachments as detailed.

F. Frame floor and roof openings greater than 12 inches with supplementary framing.

G. Do not permit erection of decking until joists are braced bridged, and secured or until completion of erection and installation of permanent bridging and bracing.

H. Do not field cut or alter structural members without approval of joist manufacturer.

I. After erection, prime welds, abrasions, and surfaces not shop primed except surfaces to be in contact with concrete.

3.3 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

SECTION 05310 - STEEL ROOF DECK

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Steel roof deck and accessories.
2. Formed steel, eave strips, and valley strips.
3. Framing for openings up to and including 18 in.
4. Bearing plates and angles.

B. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.

C. Steel Deck Institute:
1. SDI 29 - Design Manual for Composite Decks, Form Decks and Roof Decks.

1.2 SUBMITTALS

A. SECTION 01310 - SUBMITTALS: Submittal requirements.

B. Sustainability:
1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials: Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Shop Drawings
1. Indicate deck plan, support locations, Projections, openings and reinforcement, pertinent details, and accessories.
2. Submit two paper copies and one reproducible.

D. Product Data
1. Submit deck profile characteristics and dimensions, structural properties, and finishes.

E. Manufacturer’s Installation Instructions
1. Submit manufacturer's installation instructions.

F. Welders Certificates
1. Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Cut plastic wrap to encourage ventilation.

B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers:
1. United Steel Deck
2. Vulcraft Steel Deck
3. Wheeling Corrugating Co.
4. Approved Equal.

B. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor’s option.

C. Sheet Steel: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.

D. Bearing Plates: ASTM A36 steel

E. Welding Materials: AWS D1.1.

F. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color.

2.2 FABRICATION

A. Ribbed Metal Deck:
1. Sheet steel, painted, configured as follows:
a. Span Design: 3-span minimum
b. Minimum Metal Thickness Excluding Finish: 22 gage.
c. Minimum Section Properties (per foot width): S=0.235, I= 0.216.
d. Nominal Height: 1-1/2inch
e. Formed Sheet Width: 36 inch
f. Side Joints: interlocking
g. Flute Sides: plain vertical face

B. Related Deck Accessories: Metal closure strips, eave strips, valley strips, 22 gage thick galvanized sheet steel; of profile and size as indicated on drawings.

C. Fasteners: Galvanized hardened steel, self tapping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work. Do not begin work until all unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Manual.

B. Bear deck on steel supports with 1-1/2 inch minimum bearing. Align and level.

C. Fasten deck to steel support members as indicated in the structural drawings.

D. Weld in accordance with AWS D1.1.

E. Reinforce steel deck openings from 6 to 18 inches in size with L2 x 2 x ¼ inch steel angles. Place framing angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.

F. Install 6 inch minimum wide sheet steel cover plates, of same thickness as deck, where deck changes direction. Mechanically attach 12 inches oc maximum.

G. Place metal cant strips in position and mechanically attach.

H. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up prime paint. Blow holes in deck shall be repaired as follows: Holes up to 1/2" in diameter, fill with urethane or silicone sealant and cover with duct tape. Holes greater than 1/2" require sheet metal plate patches fastened to deck.

END OF SECTION

SECTION 05400 - COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Load bearing formed steel stud exterior wall, framing, bracing, bridging, and miscellaneous framing.
2. Entry roof framing.

B. Work Not Included
1. SECTION 09260 - GYPSUM BOARD SYSTEMS: Light weight, non-load bearing metal stud framing and exterior gypsum sheathing.

1.2 SYSTEM DESCRIPTION

A. Wall System:
1. Design to AISI - Cold-Formed Steel Design Manual.
2. Design to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclical day/night temperature ranges.
3. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.3 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials: Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Shop Drawings:
1. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related Work.
2. Describe method for securing studs to tracks and for welded framing connections.
3. Submit calculations for loadings and stresses of specially fabricated framing under Professional engineer's seal.

D. Product Data:
1. Provide data on standard framing members; describe materials and finish, product criteria, and limitations.

1.4 QUALITY ASSURANCE

A. Calculate structural properties of framing members in accordance with MFMA - Guidelines for the Use of Metal Framing requirements.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with a minimum of five (5) years experience.

C. Installer Qualifications: Company specializing in performing the work of this section with a minimum of five (5) years experience.

D. Design structural elements under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State where the Project is located.

E. Form, fabricate, install, and connect components in accordance with ML/SFA 540 - Lightweight Steel Framing Systems Manual.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers of load-bearing metal framing shall be:
1. Dale Industries
2. Dietrich Industries, Inc.
3. Unimast Inc.
4. Clark Steel Framing Systems
5. Approved Equal

2.2 FRAMING MATERIALS

A. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor's option.

B. Studs: ASTM C955, 16 gauge formed to channel shape, punched web, 6 inch depth, unless noted otherwise on the Drawings.

C. Track: Formed 14 gauge steel - channel shaped; same width as studs, tight fit; solid web.

D. Lintel: Formed 16 or 14 gauge steel - channel shaped, with unpunched web, size indicated on the Contract Documents.

E. Framing Materials: Roll from new sheet steel - re-rolled steel not acceptable.

2.3 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined by performance requirements specified.

B. Plates and Clips: Formed sheet steel, thickness determined by performance requirements specified.

C. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 zinc rich.

2.4 FASTENERS

A. Self-drilling, Self-tapping Screws, Bolts, Nuts, and Washers: Steel, hot dip galvanized to ASTM A123.

B. Anchorage Devices: Power actuated.

C. Welding: In conformance with AWS D1.1.

2.5 FABRICATION

A. Fabricate assemblies of formed sections of sizes and profiles required: fit, reinforce, and brace framing members to suit design requirements.

B. Fit and assemble in largest practical sections for delivery to site, ready for installation.

2.6 FINISHES

A. Studs: Galvanize to G60 Z180 coating class.

B. Tracks and Headers: Galvanize to G60 Z180 coating class.

C. Bracing, Furring, and Bridging: Same finish as framing members.

D. Plates and Clips: Same finish as framing members.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work. Do not begin work until all unsatisfactory conditions are corrected.

B. Verify that substrate surface components are ready to receive work.

C. Verify that rough-in utilities are in proper location.

3.2 ERECTION OF STUD WORK

A. Install components in accordance with manufacturer's instructions.

B. Place studs at 24 inches O.C. at interior walls and 16 inches O.C. at exterior walls unless noted otherwise; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using fastener method.

C. Coordinate stud location with the steel roof truss spacing, so that the steel roof trusses can be installed directly over a vertical wall stud.

D. Construct corners using a minimum of three (3) studs. Double stud wall openings, door jambs, and window jambs.

E. Erect load bearing studs utilizing one full length piece. Splicing of studs is not permitted.

F. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.

G. Install horizontal bridging between studs at 48 inches on center.

H. Coordinate placement of insulation in multiple stud spaces after erection.

I. Install intermediate studs above and below openings to align with wall stud spacing.

J. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.

K. Attach cross studs to studs for attachment of fixtures anchored to walls.

L. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

M. Touch-up field welds and damaged galvanized surfaces with primer.

N. Complete framing ready to receive sheathing.

O. Erector shall install permanent lateral bracing members as specified by the approved shop drawings.

3.3 ERECTION TOLERANCES

A. Maximum Variation from True Position: 1/8 inch

B. Maximum Variation of any Member from Plane: 1/8 inch

END OF SECTION

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Steel pipe bollards
2. Loose lintels
3. Fixed steel ladders
4. Downspout boots
5. Exterior stair nosings
6. Metal Gratings
7. Miscellaneous metal shapes, anchor bolts, nuts, washers, plates, etc. not supplied by the structural steel supplier.
8. Inserts, sleeves and concrete anchors.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with Section 01310.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
3. VOC Compliance - Submit documentation indicating VOC content of touch-up primer.

C. Shop Drawings:
1. Provide shop drawings that indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
2. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

D. Product Data:
1. Furnish product data for all manufactured items.

PART 2 - PRODUCTS

2.1 MATERIALS - STEEL

A. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor's option.

B. Steel Sections: ASTM A36.

C. Steel Tubing: ASTM A500, Grade B.

D. Plates: ASTM A283.

E. Pipe: ASTM A53, Grade B Schedule 40.

F. Bolts, Nuts, and Washers: ASTM A325 galvanized.

G. Welding Materials: AWS D1.1; type required for materials being welded.

H. Shop Primer:
1. Modified alkyd, rust-inhibitive primer.

a. One coat - 2.0 to 4.0 mil DFT
b. VOC - 347 g/l unthinned
2. Equal to Tnemec Series 10, color gray.

I. Touch-Up Primer:
1. Touch-up primer to be compatible with shop primer.
a. One coat - 2.0 to 4.0 mil DFT
b. VOC - less than 250 g/l

2.2 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to project site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FINISHES

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime paint all items not in contact with concrete with two coats of primer.

D. Provide asphaltic coating on all steel surfaces that will be in contact with concrete.

2.4 COMPONENTS

A. The following Schedule is a list of principal items only. Refer to the details on the Contract Documents for items not specifically scheduled in this section.
1. Miscellaneous metal shapes, anchor bolts, nuts, washers, plates, etc. not supplied by the structural steel supplier.
2. Inserts, sleeves and concrete anchors
3. Bollards - Steel pipe, concrete filled, crowned steel cap, as detailed; prime and paint finish.
4. Lintels - As detailed; galvanized finish.
5. Fixed Steel Ladders
a. Fabricate ladders for the locations as indicated on the drawings with dimensions, spacings, details and anchorages as indicated.
b. Unless otherwise shown, provide 1/2" x 2-1/2" continuous structural steel flat bar side rails with eased edges, spaced 18" apart.
c. Provide 3/4" diameter solid structural steel bar rungs, spaced 12" o.c. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.
d. Support each ladder at top and bottom and at intermediate points spaced not more than 5'-0" o.c. Use welded or bolted steel brackets, designed for adequate support and anchorage, and to hold the ladder clear of the wall surface with a minimum of 7" clearance from wall to centerline of rungs.
6. Downspout Boots
a. Manufacturer
(1). B4924 Series, B 25 pattern - Barrycraft
(2). DS Series - McKinley

(3). R-4926 Series - Neenah Foundry
(4). Approved Equal

7. Stair Nosing
   a. Nosing shall be a 4 inch wide cast metal nosing with anti-slip granules embedded in the walking surface. Furnish anchors for cast-in-place concrete treads.
   b. Manufacturer
      (1). Style 801 - American Safety Tread
      (2). Style B-1 - Barry Pattern and Foundry Company
      (3). Type 101 - Wooster Products Inc.
      (4). Approved Equal
8. Metal Gratings
   a. Grating Type: NAAMM Metal Bar Grating Manual, Welded W19-4.
   b. Bearing Bar: 1 x 3/16 inch size, spaced 1-3/16 inches on center.
   c. Cross Bar: 1/4 x 1/4 inch size, spaced 4 inches on center.
   d. Edge Banding: Same material as bearing bars at edges.
   e. Prepare surfaces to be primed in accordance with SSPC SP 2.
   f. Galvanizing: ASTM A123 to 1.8 oz/sq ft weight.
9. Handrails And Guardrails
   a. Provide handrails and railing systems capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved.
      (1). Guardrail, top rail - 200 lb. concentrated load, 50 lb. uniform load applied at any point and in any direction along the top rail member.
      (2). Handrail, top rail - 200 lb. concentrated load, 50 lb. uniform load applied at any point and in any direction along the top rail member.
      (3). Infill area - 200 lb. concentrated load applied on a 1 - sq. ft. area at any point.
   b. Fabrication
      (1). Fabricate to dimensions shown, with smooth bends and welded joints using pipe of diameter and material indicated. Secure posts and rail ends to building construction as required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive the work of this section.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components as indicated on the approved shop drawings.

D. Perform field welding in accordance with AWS D1.1.

E. Obtain approval from the Contracting Officer prior to site cutting or making adjustments not scheduled or detailed in the approved shop drawings.

F. After erection, prime welds, abrasions, and surfaces not shop primed except surfaces to be in contact with concrete.

G. Provide asphaltic coating on all structural steel surfaces that will be in contact with concrete.

H. Grating Installation
1. Place frames in correct position, plumb and level.
2. Mechanically cut galvanized finish surfaces. Do not flame cut.
3. Set perimeter closure flush with top of grating and surrounding construction. Anchor to walls with expansion bolts 24 inch o.c.
4. Secure to prevent movement.

3.4 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Structural framing
2. Wall, floor and roof sheathing.
3. Decking
4. Miscellaneous framing and sheathing.
5. Telephone and electrical panel back boards.
6. Wood Blocking in walls and ceilings.
7. Wood furring and grounds.
8. Concealed wood blocking for support of washroom accessories, fire extinguisher cabinets, plaques, shelving, casework, visual display boards, lockers, telephones and miscellaneous items.
9. Preservative treatment of wood.

1.2 SUBMITTALS

A. General:
1. Submittals shall in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
2. VOC Compliance - Submit documentation indicating VOC content of adhesives, see SECTION 01352 LEED REQUIREMENTS for VOC limits.

C. Product Data:
1. Provide technical data on wood sheathing, wood preservative materials, and application instructions.

D. Manufacturer's Certificate: Certify that Products conform to specified requirements.

1.3 DELIVERY, STORAGE, AND PROTECTION

A. Transport, handle, deliver, store, and protect products in accordance with the provisions of SECTION 01600 - MATERIAL AND EQUIPMENT.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

A. Non-structural Light and Miscellaneous Framing: #2 Southern Yellow Pine or other available wood, well seasoned, dimension lumber size classification, 19 percent maximum moisture content.

2.2 PANEL MATERIAL

A. Wall Sheathing
1. APA rated sheathing, exterior exposure
2. Thickness: As indicated
3. Width: 4’-0” panels
4. Edges: Square and straight

B. Floor Sheathing
1. APA structural rated sheathing
2. Thickness: As indicated
3. Width: 4’-0” panels
4. Edges: Tongue and groove

C. Roof Sheathing
1. APA structural rated sheathing, exterior exposure
2. Thickness: As indicated

3. Width: 4’-0” panels
4. Edges: Tongue and groove

D. Miscellaneous Sheathing (telephone and electrical backboards)
1. APA B-D Group 2, interior
2. Thickness: 5/8”
3. Width: 4’-0” panels
4. Edges: Square and straight

2.3 WOOD DECKING

A. Wood decking:
1. Size: 2 x 6 nominal
2. Length: 12’-0” maximum
3. Species: Southern yellow pine, select decking
4. Moisture Content: 15% KD
5. Surface Texture: S2S - CM
6. Edges - Tongue and groove

2.4 ACCESSORIES

A. Fasteners and Anchors:
1. Fasteners - Hot dipped galvanized steel for high humidity and treated wood locations, Unfinished steel at all other locations.

B. Adhesives
1. Construction adhesives shall comply with applicable regulations regarding toxic and hazardous materials, see SECTION 01352 LEED REQUIREMENTS for VOC limits.

2.5 PRESERVATIVE TREATMENT

A. All lumber and plywood used for exterior work shall be preservative treated against decay and insects.

B. Preservative treatment: Waterborne, alkaline copper quaternary (ACQ) or copper azole (CA-B).

C. Pressure preservative treatment shall comply with AWPA Standard C2 for lumber and C9 for plywood.

D. Pressure treatment shall meet the following retention rates:
1. Above Ground - 0.25 lb./CF minimum
2. Ground contact - 0.40 lb./CF minimum

E. Wood shall be kiln dried after treatment to the following moisture content:
1. Lumber - 19 percent
2. Plywood - 18 percent

F. Products:
1. Wolmanized Natural Select Wood – Arch Treatment Technologies
2. Preserve - Chemical Specialties Inc.
3. Dura-guard - Hoover Treated Wood
4. Approved Equal

G. End Cut Preservative: Furnish material that is compatible with preservative treatment and approved for use by the preservative treatment manufacturer.

2.6 FIRE RETARDANT WOOD TREATMENT

A. Lumber and plywood used for framing and sheathing where indicated on the drawings, shall be pressure impregnated with an approved fire retardant.

B. All fire retardant treated wood shall be pressure treated in accordance with AWPA C20 (lumber) and C27 (plywood).

C. After treatment, all lumber shall be kiln dried to a moisture content of 19% or less before use and all plywood shall be dried to a moisture content of 15% or less before use.

D. All fire retardant treated wood shall have a UL FR-S rating and a flamespread rating of 25 or less with no significant progressive combustion when tested for 30 minutes duration in accordance with ASTM E84.

E. Fire performance and strength properties of the fire retardant treated wood shall be recognized by issuance of a National Evaluation Services Report. Fire retardant lumber design values must be valid for temperature exposures up to 150° F and 170° respectively.

F. Product:
   1. Dricon - Arch Treatment Technologies
   2. Flame Proof D-Blaze - Chemical Specialties
   3. Pyro-Guard - Hoover Treated Wood Products
   4. Approved Equal

PART 3 - EXECUTION

3.1 FRAMING

A. Set structural members level and plumb, in correct position.

B. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Place horizontal members, crown side up.

D. Construct framing and curb members full length without splices.

E. Coordinate the installation of roof sheathing with the installation of steel trusses.

3.2 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment in accordance with the manufacturer's instructions.

3.3 SHEATHING MATERIALS

A. Install telephone and electrical panel backboards with plywood sheathing material where required.

B. Field paint telephone and electrical panel backboards to match adjacent surfaces.

END OF SECTION

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Finish lumber material.
2. Finish panel material.
3. Adjustable closet and utility shelves.
4. Slatwall.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainable Product Data:
1. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
2. VOC Compliance - Submit documentation indicating VOC content of adhesives.
3. Letter of Certification for Sustainable Forestry:
a. Forest Stewardship Council (FSC) - Provide letter of certification signed by lumber supplier. Indicate compliance with FSC "Principles for Natural Forest Management" and identify certifying organization.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, and jointing details.

D. Samples: Plastic laminate samples.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Woodwork Quality Standards, Custom Grade.

B. Fabricator: Company specializing in fabricating the products specified in this section with a minimum of five (5) years experience.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Transport, deliver, handle, store, and protect products in accordance with SECTION 01600 - MATERIAL AND EQUIPMENT.

B. All products are to be stored flat, in a cool dry place. Protect work from moisture damage. Do not stack panels directly on the floor.

1.5 PROJECT CONDITIONS

A. Coordinate the work of this section with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

A. Hardwood Lumber: Graded in accordance with AWI Custom; poplar species, maximum moisture content of 8 percent; paint grade.

B. Hardwood Lumber: Graded in accordance with AWI for Grade of Work specified; Red Oak species, plain sawn, moisture content of 6-8% with grain plain sawn grain of quality suitable for transparent finish.

C. Hardwood lumber: Graded in accordance with AWI for Grade of Work specified; Maple species, plain sawn, moisture content of 6-8% with grain plain sawn grain of quality suitable for transparent finish

2.2 PANEL MATERIALS

A. Wood Particleboard: 45-48# medium density particle board.

B. Hardwood Plywood: Graded in accordance with AWI for Grade of Work specified; birch veneer face species, plain sliced.

C. Plywood for exposed shelving: Baltic birch Plywood, size as indicated on the drawings.

2.3 ADJUSTABLE CLOSET AND UTILITY SHELVES

A. Wood Shelves: 3/4" Baltic birch veneer plywood with solid wood edges on three sides, glued and nailed. Edges to match face species.

B. Wood shelves shall be fabricated to comply with AWI Section 600. Fabricate to AWI Custom Quality Standards.

C. Hardware: As manufactured by Knape & Vogt or approved equal.
1. Standards: #87 ANO
2. Brackets: #187LL ANO
3. Shelf Rests: No. 210, 211 and 212 where required.

2.4 SLAT WALL SYSTEM

A. Slat wall system shall be as manufactured by:
1. J.D. Concepts Corporation
2. Approved equal.

B. Surface burning characteristics in accordance with ASTM E84.

C. Provide and install, as indicated on the drawings, 4'-0" x 8'-0" x 3/4" slat wall paneling with plastic laminate finish (See Finish Schedule for plastic laminate color) over 5/8" gypsum board. Slot spacing shall be 3" on center in the 8'-0" direction so the joints are stacked.

D. Core: The core material shall be ¾" thick of medium density fiberboard (MDF), having a 48 pound density with an internal bond strength of 110 pounds per square inch, a linear expansion of 30% with a moisture content of 6-8%. The core squareness shall be held to 1/16" tolerance when measured across the diagonals of the board. Screw holding capabilities for the face of the material shall be 350 pounds and 275 pounds for the edges.

E. Face: High pressure Laminate color and pattern as indicated on Finish material list in contract drawings.

F. Inserts: Extruded aluminum inserts, alloy type 6063-T5 or better, with a clear anodized finish. Inserts shall be installed into panel slots at factory.

G. Provide wood blocking for added support as required.

H. Secure slat wall with countersunk, flathead screws with finish to match metal insert finish. Countersunk fasteners to be flush with aluminum inserts.

I. Moldings: Provide moldings capable of concealing inside and outside corners. All edges are to be covered with appropriate edge molding pieces.

2.5 FASTENERS

A. Fasteners: Of size and type to suit application; finish in concealed locations and finish in exposed locations.

B. Concealed Joint Fasteners: Threaded steel.

2.6 WOOD TREATMENT

A. Provide identification on pressure treated material.

B. Re-dry kiln dry wood after pressure treatment to maximum 8 percent moisture content.

2.7 FABRICATION

A. Fabricate to AWI Custom standards.

B. Verify that field measurements are as indicated on shop drawings.

C. Shop prepare and identify components for grain matching during sire erection.

D. Shop assemble work for delivery to site, permitting passage through building openings.

E. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.8 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.

D. Finish work in accordance with AWI - Section 1500 System for opaque finish.

E. Stain, seal, and varnish surfaces exposed to view surfaces. Brush apply only.

F. Seal internal surfaces and semi-concealed surfaces. Brush apply only.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails or screws countersunk, joints and cracks filled flush and smooth with the adjoining surface.

B. Verify adequacy of backing and support framing.

C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 INSTALLATION

A. Install work in accordance with AWI Custom quality standard.

B. Install work in accordance with slat wall manufacturer’s installation instructions.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

E. Install trim with nails, screws, or wall adhesive by gun application.

F. Install hardware in accordance with manufacturer's instructions.

3.3 ERECTION TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 06400 - CUSTOM CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Custom fabricated casework.
2. Countertops.
3. Cabinet hardware.

1.2 SUBMITTALS

A. General
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials: Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
3. VOC Compliance - Submit documentation indicating VOC content of adhesives.

C. Shop Drawings:
1. Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.

D. Product Data:
1. Provide manufacturer's product data for hardware accessories.

E. Samples:
1. Submit plastic laminate samples.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with AWI Custom quality.

B. Perform cabinet construction in accordance with AWI Custom quality.

C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with a minimum of five (5) years experience.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Transport, deliver, handle, store, and protect in accordance with manufacturer's recommendations.

B. Protect units from moisture damage. Store materials at ambient room temperature and maintain relative humidity per manufacturer's instructions.

1.5 SUSTAINABILITY

A. All composite wood products and agrifiber products shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins in accordance with LEED EQ credit 4.4.

PART 2 - PRODUCTS

2.1 WOOD MATERIALS

A. Softwood Lumber: PS 20; graded in accordance with AWI Custom; average moisture content of 8 percent;

B. Hardwood Lumber: NHLA; graded in accordance with AWI Custom; average moisture content of 8 percent; species and grade as follows:
1. Internal Construction: Species: Poplar

2.2 PANEL MATERIALS

A. Softwood Plywood: PS 1; graded in accordance with AWI, core materials of veneer, Premium

B. Hardwood Plywood: PS 51; graded in accordance with AWI, core materials of veneer, type of glue recommended for application.

C. Wood Particleboard: PS 1; ANSI A208.1; graded in accordance with AWI standard, composed of wood chips, medium density, made with high waterproof resin binders; of grade to suit application.

D. Cabinets to be Flush Overlay type Cabinets, AWI Custom Grade.

E. Grade label: Furnish each shop-assembled unit of casework with Certified Compliance Grade Label, and furnish written certification covering loose materials, indicated grade specified.

F. Wood trim and countertop. AWI Section 300, Custom grade.

2.3 MANUFACTURERS - PLASTIC LAMINATE

A. Manufacturers:
1. Formica Corporation.
2. Nevamar Corporation.
3. Ralph Wilson Plastics Co. (Wilsonart)
4. Piointe Decorative Laminates

2.4 LAMINATE MATERIALS

A. Plastic Laminate: NEMA LD 3, PF 42 Post Forming; GP - 50 Countertops and Horizontal Surfaces; GP 28 vertical surfaces and edges. Color as indicated on the Contract Documents.

B. Laminate Backing Sheet: LD-3 BK20 backing grade, undecorated plastic laminate.

C. Surface burning characteristics in accordance with ASTM E84.

2.5 ACCESSORIES

A. Adhesive: FS MMM-A-130 contact adhesive. Fabricator to follow adhesive manufacturer's recommendations.

B. Countertop Edge: As indicated on the Contract Documents.

C. Fasteners: Size and type to suit application.

D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; finish in concealed locations and finish in exposed locations.

E. Concealed Joint Fasteners: Threaded steel.

F. Grommets: Plastic material for cut-outs. Color to match countertop. Coordinate locations of grommets with location of cash register and other equipment. Coordinate with Architect.

2.6 HARDWARE

A. Hardware: BHMA A156.9, Types Grade 1. Finish: US26D (BHMA 625/651) unless noted otherwise.

B. Shelf Brackets: Knape and Vogt 255 and 256, Garcy U73 and Y73 for flush mounting or equal. Natural aluminum finish.

C. Drawer and Base Cabinet Door Pulls: H'A'FELE chrome plated matte finish – 3" wire pull handle #116.39.437 or approved equal.

D. Wall Cabinet Door Pull: H'A'FELE chrome plated matte finish – 3" wire pull handle #116.39.437 or approved equal.

E. Cabinet Locks Knape and Vogt 986 or equal. (Coordinate cabinets to be locked with Contracting Officer.)

F. Catches: Hager No. 1437, Stanley No. 46, or equal.

G. Drawer Slides: Knape and Vogt 1305 or equal. Provide stops to prevent drawers from accidental removal.

H. Hinges: Hager No. 1043, Stanley No.331 for overlay doors, or equal.

I. Lift top hinges: Stanley 331-1/4, Hager CD 1311, size as required for top thickness, or equal.

2.7 FABRICATION

A. Fabricate custom cabinets in accordance with AWI Custom Quality.

B. Verify that field measurements are as indicated on shop drawings

C. Shop prepare and identify components for grain matching during site erection.

D. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

E. Fit shelves, doors, and exposed edges with matching plastic laminate edging. Use one piece for full length only.

F. Cap exposed plastic laminate finish edges with material of same finish and pattern.

G. Door and Drawer Fronts: 3/4 inch thick; flush overlay style.

H. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

I. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises.

J. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

K. Provide cutouts for inserts, appliances, outlet boxes, and fixtures and fittings.

L. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

M. Install hardware in accordance with manufacturer's instructions.

2.8 FACTORY SITE FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.

D. Finish work in accordance with AWI - Section 1500. TR-2 or TR-4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to starting work, verify that existing conditions are ready to receive the work of this section.

B. Verify adequacy of backing and support framing.

C. Verify location and sizes of utility rough-ins associated with work of this section.

3.2 INSTALLATION

A. Install work in accordance with AWI Custom quality standard.

B. Set and secure casework in place; rigid, plumb, and level.

C. Use fixture attachments in concealed locations for wall mounted components.

D. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.

E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose. Apply clear sealant in accordance with SECTION 07900 - JOINT SEALERS at the joint between the casework and the wall.

F. Secure cabinet and counter bases to floor using appropriate angles and anchorages.

G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to

match surrounding wood; finish flush with surrounding surfaces.

3.3 ADJUSTING

A. Adjust installed work and test installed work for rigidity and ability to support loads.

B. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

A. Clean inside and outside of casework. Clean and remove debris from counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 06620 - PLASTIC FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Solid surface material window stools, restroom and transaction counters.

1.2 DESIGN REQUIREMENTS

A. Design Load: 100 lb/sq ft with deflection limited to L/360.

B. Design items with sufficient strength for handling and placement stresses.

1.3 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
3. VOC Compliance - Submit documentation indicating VOC content of adhesives.

C. Shop Drawings:
1. Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.

D. Product Data:
1. Submit manufacturer's product data describing product.

E. Samples:
1. Submit 2 inch x 2 inch samples illustrating material, color, texture, and finish.

F. Maintenance Data:
1. Submit maintenance data that indicates the manufacturer's approved cleaning materials and procedures and substances that are harmful to the component materials. Include manufacturer's instructions for stain removal and surface and gloss restoration.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this section with a minimum of three (3) years documented experience.

1.5 PROJECT CONDITIONS

A. Verify that field measurements are as indicated on the approved shop drawings prior to fabrication.

B. Coordinate the work of this section with plumbing rough-in, blocking and installation of associated and adjacent components.

1.6 SEQUENCING

A. Sequence Work to permit installation of adjacent affected construction.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Solid surfacing material shall be a solid, non-porous surfacing material consisting of natural minerals and high-performance acrylic.

B. Manufacturers:
1. LG Hi-Macs
2. DuPont Corian.

3. Approved Equal.

C. Surface burning characteristics as determined by ASTM E84:
1. Flame spread index: 25 or less.
2. Smoke developed index: 450 or less.

D. Adhesives
1. Construction adhesives shall comply with applicable regulations regarding toxic and hazardous materials, South Coast Air Quality Management District Rule 1168.
2. VOC limit: 70g/l (minus water)
3. Joint adhesive to be manufacturer's standard one- or two- part adhesive kit.

2.2 FABRICATION

A. Fabricate components to achieve shape and configuration as shown on the Contract Documents. See drawings for material thickness and edge detail.

B. Provide factory cut outs for plumbing fittings and accessories as indicated on Contract Documents.

C. Provide product in the largest pieces available.

D. Radius corners and edges. Repair or reject defective and inaccurate work.

2.3 FINISH

A. Color: See Finish Materials List on Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions are ready to receive the work of this section before the start of installation.

B. Verify that joint preparation and affected dimensions are acceptable.

3.2 PREPARATION

A. Provide anchoring for installation.

3.3 INSTALLATION

A. Install components in accordance with the approved shop drawings and the manufacturer's instructions.

B. Align work plumb and level, scribed to adjacent finishes.

C. Rigidly anchor to substrate to prevent misalignment.

D. Install countertops with no more than 1/8" sag, bow or other variation from a straight line.

E. Form field joints using manufacturer's recommended adhesive. Exposed joints and seams shall not be allowed.

3.4 CLEANING

A. Clean and polish surfaces in accordance with the manufacturer's instructions.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS.

END OF SECTION

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Board insulation at perimeter foundation wall.
2. Cavity wall insulation
3. Fiberglass wall insulation
4. Perimeter wall sill gasket
5. Air barrier

B. Work Not Included:
1. SECTION 07535 - SINGLE-PLY MEMBRANE ROOF; roof insulation

C. National Fire Protection Association:
1. NFPA 255 - Test of Surface Burning Characteristics of Building Materials.

D. Underwriters Laboratory:
1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Product Data:
1. Provide data on product characteristics, performance criteria, and limitations.

PART 2 - PRODUCTS

2.1 SUSTAINABILITY REQUIREMENTS

A. Rigid insulation board shall be chlorofluorocarbon (CFC) free.

B. Fiberglass materials shall contain a minimum of 30% recycled glass in the form of pre- and post-consumer cullet.

C. Fiberglass insulation shall meet or exceed the following allowable emission levels as established by The Greenguard Institute:
1. Total VOC's -.50 mg / m^3
2. Formaldehyde -.05 ppm
3. Total aldehides -.1 ppm

2.2 PERIMETER INSULATION

A. Foundation perimeter insulation shall be an extruded polystyrene board meeting the requirements of ASTM C578-87a, Type IV, with the following characteristics:
1. Board Density - 1.6 pcf
2. Board Size - 48" x 96"
3. Board Thickness - 2"
4. Board Edge - Square
5. Compressive Strength - 25 psi
6. Thermal Resistance - 5.0 per inch

B. Products:
1. Styrofoam - Dow Chemical Co.
2. Foamular - Owens Corning
3. Approved Equal

C. Adhesives:
   1. Type recommended by insulation manufacturer for application.

D. Accessories:
   1. Tape - Bright aluminum Polyethylene Polyester self-adhering type, mesh reinforced, 2 inch wide.

2.3 CAVITY WALL INSULATION

A. Cavity wall insulation shall be an extruded polystyrene board meeting the requirements of ASTM C578-87a, Type X, with the following characteristics:
   1. Board Density - 1.35 pcf
   2. Board Size - 16" x 96"
   3. Board Thickness - 1"
   4. Board Edge - Square
   5. Compressive Strength - 15 psi
   6. Thermal Resistance - 5.0 per inch
   7. Water Vapor Transmission - 0.4 - 1.1 perm
   8. Water Absorption - 0.1 %

B. Cavity wall insulation shall be:
   1. Styrofoam Cavitymate - Dow Chemical Co.
   2. Foamular 150 - Owens Corning
   3. Approved Equal

C. Adhesive shall be as recommended by the manufacturer.

2.4 FIBERGLASS INSULATION MATERIALS

A. Batt insulation shall be glass fiber thermal insulation with a reinforced foil and kraft facing. Insulation shall conform to ASTM C665, Type III, Class A.

B. Wall insulation shall have the following characteristics:
   1. Thickness - 3-1/2"
   2. R-Value - R-13
   3. Perm Rating - .02 min - 1.0 max.
   4. Flame Spread - 25
   5. Smoke Developed - 50

C. Fiberglass wall insulation shall be:
   1. Certapro Thermal FSK- 25 Faced Batts - Certainteed
   2. FSK-25 - Guardian Fiberglass
   3. FSK-25 Faced Batts - Johns Manville Insulations
   4. FSK-25 Foil Faced Batts - Knauf Fiber Glass
   5. Flame Spread 25 - Owens Corning
   6. Approved Equal

D. Seal joints and seams of facing with self-adhesive vapor-barrier tape.

2.5 PERIMETER WALL SILL GASKET

A. Flexible polyethylene foam gasketing strip. Width to match width of metal stud track.

B. Manufacturer:
   1. Styrofoam Sill Seal – Dow Chemical Company
   2. FoamSealR – Owens-Corning
   3. Approved Equal

2.6 AIR INFILTRATION BARRIER

A. Air infiltration barrier shall be a tear-resistant, non-woven, non-perforated, olefin building wrap (polyethylene or polypropylene) meeting or exceeding the following requirements:
   1. Air Penetration - <0.06 cfm / ft^3 ASTM E 283
   2. Water Vapor Transmission Rate - 200 g/m^3 max ASTM E 96
   3. Water Vapor Permeance - 28 perms max ASTM E 96

B. Product:
   1. Styrofoam Weathermate – Dow Chemical
   2. Tyvek Commercial Wrap – DuPont
   3. Pink Housewrap – Owens Corning
   4. Approved Equal

C. Accessories: Joint Tape
   1. Joint tape shall be as recommended by the air barrier manufacturer.

D. Fasteners: 1-5/8 inch rust-resistant screws with 2 inch diameter plastic cap.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate, and adjacent materials, are dry and ready to receive insulation and adhesive.

B. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials or substances that may impede adhesive bond.

3.2 INSTALLATION - FOUNDATION PERIMETER

A. Preparation: Adhere a 8" inch wide strip of polyethylene sheet over concrete construction joints with double beads of adhesive each side of joint.
   1. Tape seal joints.
   2. Extend sheet full height of joint.

B. Install boards on foundation wall perimeter, horizontally.
   1. Apply adhesive in three continuous beads per board length to full bed 1/8 inch thick.
   2. Place boards in a method to maximize contact bedding.
   3. Stagger end joints.
   4. Butt edges and ends tight to adjacent board and to protrusions.

C. Cut and fit insulation tight to protrusions or interruptions to the insulation plane.

D. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation or outside of the range acceptable in accordance with the product manufacturer’s installation instructions.

3.3 INSTALLATION - CAVITY WALL INSULATION

A. Verify that masonry joints are struck flush and other conditions are satisfactory for proper installation.

B. Remove mortar projections that interfere with placement of insulation boards.

C. Apply 2 inch diameter daubs of adhesive spaced approximately 12 inches on center both ways on inside face of insulation board.

D. Butter all edges of insulation board with adhesive to provide continuous vapor barrier.

E. Fit insulation between wall ties and other obstructions with joints staggered and edges butted tightly.

3.4 INSTALLATION – FIBERGLASS INSULATION

A. Install insulation in accordance with the manufacturer's installation instructions.

B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of the insulation.

E. Seal joints and seams of facing with self-adhesive vapor-barrier tape.

3.5 INSTALLATION - PERIMETER SILL GASKET

A. Install perimeter sill gasket in accordance with the manufacturer’s written recommendations.

3.6 INSTALLATION – AIR INFILTRATION BARRIER

A. Install air infiltration barrier in accordance with the manufacturer's instructions.

B. Secure air infiltration barrier tight to exterior sheathing materials with screws and washers into steel studs a maximum of 16 inch O.C. every 16 inch on the vertical.

C. At corners extend the air infiltration barrier 12" beyond the corner. Wrap and secure around the corner.

D. Horizontal Joints: Upper air infiltration barrier must overlap lower air infiltration barrier by 6". At base of wall, air infiltration barrier to overlap wall flashing and be caulked and sealed.

E. At the top of wall, air infiltration barrier must wrap over the top of the wall and be secured with screws and washers and sealed and caulked.

F. All vertical joints to overlap 12". Fold over lap half way and secure to substrate.

G. All horizontal and vertical joints to be taped with approved tape.

H. At all rough openings wrap air infiltration barrier into the opening on all sides for the thickness of the wall and secure and seal.

I. All fissures or tears of the air infiltration barrier membrane to be repaired with the approved tape.

J. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

K. Air infiltration barrier material must be covered within four (4) months of installation.

3.7 PROTECTION OF FINISHED WORK

A. Do not permit work to be damaged prior to covering work of this section.

END OF SECTION

SECTION 07424 - COMPOSITE WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes metal-faced composite wall panels.

1.2 DESIGN REQUIREMENTS

A. Delegated Design: Design metal-faced composite wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Provide metal-faced composite wall panel assemblies capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:
   1. Wind Loads: Determine loads based on the following minimum design wind pressures:
      a. Uniform pressure of 20 lbf/sq. ft., acting inward or outward.
   2. Deflection Limits: Metal-faced composite wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/175 of the span at the perimeter and 1/60 of the span anywhere in the panel of the span.

1.3 SUBMITTALS

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

B. Shop Drawings: Show fabrication and installation layouts of metal-faced composite wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish among factory-, shop-, and field-assembled work.

C. Samples: For each type of exposed finish required.

D. Delegated-Design Submittal: For metal-faced composite wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation.

E. Coordination Drawings: Exterior elevations, drawn to scale, on which the following items are shown and coordinated with each other.

F. Product test reports.

G. Maintenance data.

H. Samples of special warranties.

1.4 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Where indicated, provide metal-faced composite wall panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal-faced composite wall panel assemblies that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

B. Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal-faced composite wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
   1. Surface: Smooth, flat finish.
   2. Exposed Coil-Coated Finishes:
      a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
      b. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
   3. Exposed Anodized Finishes:
      a. Clear Anodic Finish: AAMA 611, [AA-M12C22A31, Class II, 0.010 mm] or thicker.
      b. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
   4. 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: ASTM C 920.

2.2 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. Subgirts: Manufacturer's standard C- or Z-shaped sections 0.064-inch (1.63-mm) nominal thickness.

C. Zee Clips: 0.079-inch (2.01-mm) nominal thickness.

D. Base or Sill Angles: 0.079-inch (2.01-mm) nominal thickness.

E. Hat-Shaped, Rigid Furring Channels:
   1. Nominal Thickness: As required to meet performance requirements].
   2. Depth: 1-1/2 inches.

F. Cold-Rolled Furring Channels: Minimum 1/2-inch- (13-mm-) wide flange.
   1. Nominal Thickness: As required to meet performance requirements.
   2. Depth: 3/4 inch.
   3. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with nominal thickness of 0.040 inch (1.02 mm).
   4. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062 inch diameter wire, or double strand of 0.048-inch diameter wire.

2.3 MISCELLANEOUS MATERIALS

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M).

B. 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-faced composite wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

2.4 METAL-FACED COMPOSITE WALL PANELS

A. General: Provide factory-formed and -assembled, metal-faced composite wall panels fabricated from two metal facings bonded, using no glues or adhesives, to solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment system components and accessories required for weathertight system.
   1. Fire-Retardant Core: Noncombustible, with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
      a. Flame-Spread Index: 25 or less.
      b. Smoke-Developed Index: 450 or less.

2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Alcan Composites USA Inc.; Alucobond, Alucobond Plus.
   b. Alcoa Inc.; Reynobond PE FR.
   c. ALPOLIC, Division of Mitsubishi Chemical America, Inc.; ALPOLIC ALPOLIC/fr.
   d. CENTRIA Architectural Systems; Formabond Wall System.
   e. Citadel Architectural Products, Inc., Envelope 2000 (RS) (RR).
   f. Copper Sales, Inc.; UNA-FAB Series 1000 Series 1500.
   g. Protean Construction Products, Inc.; ACM 100.

B. Aluminum-Faced Composite Wall Panels: Formed with 0.020-inch- (0.50-mm-) thick, anodized aluminum sheet facings.
   1. Panel Thickness: 0.157 inch (4 mm).
   2. Core: Standard.
   3. Exterior Finish: 3-coat fluoropolymer.
      a. Color: Match Architect's samples.

C. Attachment System Components: Formed from material compatible with panel facing.
   1. Include manufacturer's standard perimeter extrusions with integral weather stripping, panel stiffeners, panel clips, and anchor channels.

2.5 ACCESSORIES

A. Wall Panel Accessories: Provide components required for a complete metal-faced composite wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal-faced composite wall panels unless otherwise indicated.

B. Flashing and Trim: Formed from 0.018-inch- (0.46-mm-) minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal-faced composite wall panels.

2.6 FABRICATION

A. General: Fabricate and finish metal-faced composite wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal-faced composite wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

C. Metal-Faced Composite Wall Panels: Factory form panels in a continuous process with no glues or adhesives between dissimilar materials. Trim and square edges of sheets with no displacement of face sheets or protrusion of core material.
   1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
   2. Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.
   3. Fabricate panels with panel stiffeners, as required to comply with deflection limits, attached to back of panels with structural silicone sealant or bond tape.
   4. Dimensional Tolerances:
      a. Panel Bow: 0.8 percent maximum of panel length or width.
      b. Squareness: 0.25 inch (5 mm) maximum.

D. Sheet Metal Accessories: Fabricate 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.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorage according to ASTM C 754 and metal-faced composite wall panel manufacturer's written instructions.

3.2 METAL-FACED COMPOSITE WALL PANEL INSTALLATION

A. Attachment System Installation, General: Install attachment system required to support metal-faced composite wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
   1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
   2. Do not begin installation until weather barrier and flashings that will be concealed by composite panels are installed.

B. Clip Installation: Attach panel clips to supports at each metal-faced composite wall panel joint at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-returned flanges of wall panels to panel clips with manufacturer's standard fasteners.
   1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Division 07 Section "Joint Sealants."

C. Track-Support Installation: Provide manufacturer's standard horizontal and vertical tracks that provide support and complete secondary drainage system, draining to the exterior at horizontal joints. Install support system at locations, spacings, and with fasteners recommended by manufacturer. Attach panels to wall by interlocking tracks with perimeter extrusions attached to wall panels. Fully engage integral gaskets and leave horizontal and vertical joints with open reveal.
   1. Attach routed-and-returned flanges of wall panels to perimeter extrusions with manufacturer's standard fasteners.
   2. Attach flush wall panels to perimeter extrusions by engaging panel edges and by attaching with manufacturer's standard structural silicone adhesive.
   3. Install wall panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.
   4. Do not apply sealants to joints unless otherwise indicated on Drawings.

D. Subgirt-and-Spline Installation: Provide manufacturer's standard subgirts and splines that provide support and complete secondary drainage system, draining to the exterior at horizontal joints. Install support system at locations, spacings, and with fasteners recommended by manufacturer. Attach wall panels by interlocking perimeter extrusions attached to routed-and-returned flanges of wall panels with subgirts and splines. Fully engage integral subgirt-and-spline gaskets and leave horizontal and vertical joints with open reveal.
   1. Install wall panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.
   2. Do not apply sealants to joints unless otherwise indicated on Drawings.

E. Rainscreen-Principle Installation: Provide manufacturer's standard pressure-equalized, rainscreen-principle system with vertical channel that provides support and complete secondary drainage system, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by manufacturer. Attach wall panels by engaging horizontal support pins into notches in vertical channels and into flanges of wall panels. Leave horizontal and vertical joints with open reveal.
   1. Install wall panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.
   2. Do not apply sealants to joints unless otherwise indicated on Drawings.

3.3 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-faced composite wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.4 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal-faced composite wall panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), nonaccumulative, on level, plumb, and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.5 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal-faced composite wall panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal-faced composite wall panel installation, clean finished surfaces as recommended by panel manufacturer. Maintain in a clean condition during construction.

B. After metal-faced composite wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

END OF SECTION

SECTION 07535 - SINGLE-PLY ROOFING - MECHANICALLY ATTACHED

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Work of this section shall include the following:
   1. Tapered Insulation
   2. Mechanically attached single-ply membrane roofing
   3. Base flashings, and counterflashings.

1.2 SUBMITTALS

A. General:
   1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability Product:
   1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
   3. Solar Reflectance Index - Submit documentation of roof membrane solar reflectance index.
   4. VOC Compliance - Submit documentation indicating VOC content of sealants.

C. Shop Drawings:
   1. Show roof size and configuration; tapered insulation layout, location, type and details of roof penetrations; perimeter details and sequence of installation.

D. Product Data:
   1. Submit product data for sheet membrane, flashing membrane, fasteners, sealants, walkway pads and insulation.

E. Samples:
   1. Submit samples of roof membrane and insulation for Contracting Officer's review.

F. Certificate:
   1. The roofing system membrane manufacturer's acceptance or approval of the roofing contractor.
   2. The roofing contractor's experience record:
      a. Past experience applying proposed system (5 year minimum)
      b. Past experience of roof system installations of similar size and complexity in the last year.
      c. List of clients and architects, names and phone numbers.
   3. Letter from the roof system membrane manufacturer and counter-signed by the roofing contractor that:
      a. The materials proposed are compatible with each other and with the proposed substrate, and,
      b. The specification proposed is suitable for the proposed conditions
      c. The contractor has adequate experience and technical ability to successfully complete the work.
   4. Maintenance Program:
      a. Roof manufacturer shall provide for the Owner a detailed preventative maintenance program describing general care, maintenance, and periodic inspections of the roof.

G. Warranty:
   1. Submit manufacturer's warranty.

1.3 PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand positive and negative wind loads, including increased loads at building corners.
   1. Design Wind Load - Based on basic wind speed of 90 mph, exposure B.

B. Fire Rating: UL 790: Class A Fire Hazard Classification.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

1.5 QUALIFICATIONS

A. Applicator: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Store products in weather protected environment, clear of ground and moisture. Protect foam insulation from direct sunlight exposure.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not apply roofing membrane during ambient temperatures below -15 degrees F or above 115 degrees F without proper weather protection.

B. Do not apply roofing membrane to damp or frozen deck surface.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.8 COORDINATION

A. Coordinate Work with installation of associated roof penetrations and metal flashings, as Work of this section proceeds.

1.9 WARRANTY

A. Roofing Warranty
1. Upon completion of the work and acceptance by the roofing manufacturer's technical representative, the roofing contractor shall furnish the roofing manufacturer's written and signed standard system warranty certifying the performance and consistency of the products for a period of fifteen (15) years from the date of building acceptance and that the installation is in accordance with the manufacturer's requirements. The warranty shall be a 15-year full system non-prorated warranty and shall include an 80 mph wind warranty.
2. This warranty shall cover defective materials, including flashings, membrane and related components provided by the roofing manufacturer, and workmanship. The manufacturer shall be responsible for the material for the entire length of the warranty and the labor after the first year. The roofing contractor shall be responsible for workmanship and labor for the first year of the warranty period.
3. The warranty shall cover the cost of repairs and/or replacement of defective membrane. Warranty shall be based on replacement cost and not original cost. Warranty liability shall not be determined on a pro-rated basis.
4. The roofing manufacturer shall inspect the roof one (1) year after building acceptance and shall report any material or workmanship deficiencies.

PART 2 - PRODUCTS

2.1 ROOFING SYSTEM

A. Membrane: mechanically attached, minimum .040 inch (40 mil) thick polyester mat reinforced, polymer-modified PVC thermoplastic.

B. Manufacturers:
1. Duro-Last Membrane - Duro-Last Inc.
2. SR-50 UltraGard - Johns Manville.
3. EGSR Ever Guard PVC - GAF Materials Corp.
4. S 327 Membrane - Sarnafil.
5. Approved Equal.

C. Color: White

D. Mechanical attachment: In seam with bar or disc as recommended by the manufacturer.

E. Disc Washers and Screws: As required by the manufacturer.

F. Seams: Hot-air welded

G. Flexible Flashings: Same material as membrane.

H. Separator Sheet: Manufacturer's recommended if required.

I. Accessories:
   1. Sealants - As recommended by membrane manufacturer. Membrane sealants shall have a VOC limit of 450 g/l less water.
   2. Penetration Flashing - Prefabricated single-piece units fabricated from roofing membrane
   3. Walkpads - Manufacturer's standard. Color to contract roof membrane color.

2.2 INSULATION

A. Insulation: ASTM C1013, faced rigid cellular polyisocyanurate roof insulation, with the following characteristics:
   1. Board Compressive Strength - 20 lb/sq in.
   2. Board Size - 48 x 48 inch
   3. Board Thickness - 1-1/2 inches per board. Total thickness 3 inches
   4. Furnish tapered units where shown on the drawings to achieve the slope indicated. Minimum board thickness, ½ inch
   5. Board Edges - Square
   6. Thermal Conductivity - Aged R value of 5.56 per inch
   7. Rigid insulation shall contain a minimum of 9% recovered/recycled material.

B. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor's option.

C. Insulation Fasteners: Appropriate for purpose intended and approved by system manufacturer; length required for thickness of material with metal washers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify surfaces and site conditions are ready to receive work and that deck is supported and secure.

B. All plywood surfaces must be smooth and free of all foreign material.

C. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, and wood perimeter nailing strips are in place.

3.2 INSTALLATION

A. Insulation Application:
   1. Mechanically fasten insulation to deck. Fasteners to penetrate minimum of 1 inch into wood deck.
   2. Mechanically fasten boards in accordance with manufacturer's recommendations.
   3. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
   4. Apply no more insulation than can be covered with membrane in same day.

B. Membrane Application:
   1. Apply membrane and mechanical attachment devices in accordance with manufacturer's specifications.
   2. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
   3. Overlap edges and ends and seal by heat welding. Seal permanently waterproof.
   4. Shingle joints on sloped substrate in direction of drainage.
   5. Extend membrane up cant strips minimum of 6 inches onto vertical surfaces.

6. Seal membrane around roof penetrations.

C. Flashings And Accessories:
1. Fully adhere flexible flashings to seal membrane to vertical elements in accordance with manufacturer's specifications.
2. Coordinate installation of roof drains and related flashings.
3. Seal flashings and flanges of items penetrating membrane.
4. Install walkway pads around roof top unit. Space pad joints to permit drainage.
5. Install additional layer of roof membrane around kitchen exhaust vents.

3.3 FIELD QUALITY CONTROL

A. Representative of the roofing manufacturer shall inspect the roof prior to the issuance of the warranty to assure that the roof was installed in accordance with the manufacturer's specifications.

3.4 CLEANING

A. In areas where finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

B. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Protect building surfaces against damage from roofing work.

B. Where traffic must continue over finished roof membrane, protect surfaces.

END OF SECTION

SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes:
1. Wall coping systems.
2. Reglet flashing and counterflashing systems.
3. Gutters and downspouts.

1.2 SUBMITTALS

A. General
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability Product Data:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Shop Drawings - Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

D. Samples - Submit two 6 inch x 6 inch samples illustrating material color and finish.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual standard details and requirements.

1.4 QUALIFICATIONS

A. Fabricator and Installer - Company specializing in sheet metal flashing work with a minimum of five (5) years experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products in accordance with the provisions of specification section 01600 - material and equipment.

B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials which may cause discoloration or staining.

1.6 COORDINATION

A. Coordinate with the work of other Sections for installing flashing reglets and coping.

PART 2 - PRODUCTS

2.1 SHEET MATERIALS

A. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor's option.

B. Aluminum Sheet: ASTM B209, 5005 alloy, H34 temper; .040 inch.

C. Pre-Finished Steel Sheet: ASTM A792, 24 ga. (.022 inch base metal)

2.2 METAL COPING - FABRICATED

A. Form sections shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as sheet, to interlock with sheet.

C. Fabricate starter strips of same material as sheet, continuous, to interlock with sheet.

D. Form pieces in longest practical lengths.

E. Hem exposed edges on underside 1/2 inch; miter and seam corners.

F. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

G. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.3 REGLET AND COUNTER FLASHING SYSTEM

A. Reglet and counterflashing system shall be fabricated to the profiles indicated on the Drawings. Reglets shall be fabricated for masonry, stucco and surface mounted applications where indicated on the drawings. At the contractor's option, reglet and counterflashing system may be shop fabricated to the profiles indicated.

B. Reglet and flashing in areas not exposed to view shall be made of .040" Aluminum, mill finish. In areas exposed to view, reglet and counterflashing shall be finished to match adjacent finishes.

C. Reglet shall have a formed end lap; flashing shall have a 6" lap. Reglet to be installed level and true.

D. Furnish accessories as required for a complete job. Accessories shall include, but necessarily limited to the following items.
   1. Interior corners.
   2. Exterior corners.
   3. Foam end closures.

E. Reglet and counterflashing shall be one of the following:
   1. Fry Reglet
   2. MM Systems
   3. W.P. Hickman Co.
   4. Approved Equal

2.4 GUTTERS AND DOWNSPOUTS

A. Fabricate gutters to profile and size indicated on the drawings.

B. Fabricate downspouts to rectangular profile; size as indicated on the drawings.

2.5 ACCESSORIES

A. Fasteners: Same material and finish as sheet metal, with soft neoprene washers.

B. Slip Sheet: Rosin sized building paper.

C. Sealant: See SECTION 07900 - JOINT SEALERS.

D. Roof Cement: ASTM D4586, Type I.

2.6 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as sheet, minimum 12 inches wide, interlockable with sheet.

C. Form pieces in longest possible lengths.

D. Hem exposed edges on underside ½ inch; miter and seam corners.

E. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.

2.7 FINISH

A. Finish shall be a spray applied, two coat fluropolymer coating utilizing 70% Kynar 500 resin. Finish shall comply with the performance criteria of ASCA 96.

B. Finish shall be a 2 coat, factory applied, baked on finish, .75 to .80 mil minimum DFT color coat over a 0.2 to 0.3 mil primer coat.

C. Back of metal shall be finished with manufacturer's standard protective backing paint to a minimum dry film thickness of 1.0 mil.

D. Colors shall be as indicated in the Exterior Finish Schedule on the drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify pipes, sleeves, ducts, or vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

3.3 INSTALLATION - MANUFACTURED COPING

A. Install manufactured coping in accordance with manufacturer's written instructions.

3.4 INSTALLATION - SHEET METAL COMPONENTS

A. Conform to drawing details included in the SMACNA manual.

B. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Seal metal joints watertight.

END OF SECTION

SECTION 07900 - JOINT SEALERS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes:
1. Sealants and joint backing.
2. Precompressed foam sealers.
3. Hollow gaskets.

1.2 SUBMITTALS

A. General
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability Product Data:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
3. VOC Compliance - Submit documentation indicating VOC content of sealants.

C. Samples: Submit manufacturer's standard color samples illustrating sealant color range for selection.

D. Manufacturer's Installation Instructions: Indicate special procedures, surface preparation, and perimeter conditions requiring special attention.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the work of this section with minimum five (5) years documented experience approved by manufacturer.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.5 COORDINATION

A. Coordinate the work with all sections referencing this section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Joint sealants shall be as manufactured by one of the following:
1. Pecora Corporation
2. Sika Corporation
3. Sonneborn Division of Degussa Building Systems
4. Tremco Inc.
5. Approved Equal

2.2 SEALANTS

A. Architectural sealants shall have a VOC limit of 250 g/l less water.

B. Type A - General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25, Uses M, G, and A; multi component.
1. Standard and premium colors to matching adjacent finished surfaces.

C. Type B - Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, non-drying, non-skinning, non-curing.

D. Type C - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, single component, paintable.

1. Standard and premium colors matching adjacent finished surfaces.

E. Type D - Bathtub/Tile Sealant: Silicone; ASTM C920, Uses M and A; single component, mildew resistant.
   1. Color to be clear or white.

F. Type E - Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single component.
   1. Standard and premium colors matching adjacent finished surfaces.

G. Type F - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single component.
   1. Standard and premium colors matching adjacent finished surfaces.

2.3 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D1565, open cell PVC oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces and joint openings are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. Remove loose materials and foreign matter which might impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfiguration.

3.3 INSTALLATION

A. Perform installation in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.

3.4 CLEANING

A. Clean adjacent soiled surfaces.

3.5 PROTECTION OF FINISHED WORK

A. Protect sealants until cured.

3.6 SCHEDULE

A. Sealant Type A:
   1. Exterior wall expansion and control joints.
   2. Joints between concrete, masonry and other materials.
   3. Joints between metal frames and adjacent materials.
   4. Under door thresholds

5. Other exterior joints for which no other sealant is indicated.

B. Sealant Type B:
1. Concealed sealant bead in sheet metal work.

C. Sealant Type C:
1. Interior wall and ceiling control joints.
2. Joints between door and window frames and wall surfaces.
3. Other interior joints for which no other type of sealant is indicated.

D. Sealant Type D:
1. Joints between plumbing fixtures and floor and wall surfaces.
2. Between countertops and walls.
3. Interior corner joints at all ceramic tile.

E. Sealant Type E:
1. Control and expansion joints in floors.

F. Sealant Type F:
1. Joints in sidewalks and concrete vehicular paving.

END OF SECTION

SECTION 08120 - METAL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
   1. Rated and non-rated steel frames.

1.2 SUBMITTALS

A. General:
   1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
   1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Product Data: Indicate frame configuration and finishes.

D. Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacings, location of cut-outs for hardware, and finish.

E. Manufacturer's Installation Instructions: Indicate special installation instructions.

F. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

A. Conform to requirements of SDI-100.

B. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five (5) years experience.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Transport, handle, store, and protect products under provisions of SECTION 01600 - MATERIAL AND EQUIPMENT.

B. Accept frames on site in manufacturer's packaging. Inspect for damage.

1.5 PROJECT CONDITIONS

A. Coordinate the work with frame opening construction, door, and hardware installation.

B. Sequence installation to ensure connections are achieved in an orderly and expeditious manner.

PART 2 - PRODUCTS

2.1 GENERAL

A. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor’s option.

2.2 MANUFACTURERS

A. Metal frames shall be manufactured by:
   1. Amweld
   2. Steelcraft
   3. Ceco Door Products.
   4. Curries
   5. Kewanee
   6. Republic
   7. Pioneer
   8. Approved Equal

2.3 FRAMES

A. Exterior Frames:
   1. Grade III, 14 gauge thick material, base metal thickness.

B. Interior Frames:
   1. Grade III, 16 gauge thick material, base metal thickness.

2.4 ACCESSORIES

A. Bituminous Coating: Fibered asphalt emulsion (exterior jambs only).

B. Primer: Zinc chromate type (garage door jambs to be galvanized).

C. Silencers: Gray rubber.

D. Weatherstripping: Specified in SECTION 08710 - DOOR HARDWARE.

E. Drip Cap: Exterior frames to be furnished integral drip cap.

2.5 FABRICATION

A. Attach metal fire rated label to each fire rated frame.

B. Provide slip on type door jambs at all wood partitions.

C. Provide welded type door frames at all masonry openings.

D. Fabricate frames with hardware reinforcement plates welded in place.
   1. Provide mortar guard boxes.
   2. Hinges - 7 gauge x 10½”
   3. Closer - 12 gauge
   4. Strike - 12 gauge
   5. Other hardware - 14 gauge

E. Prepare frames for silencers. Provide three single silencers for single doors on strike side and two per head for double doors.

2.6 FINISH

A. Steel Sheet: Galvanized to ASTM A525 A60.

B. Primer: Baked-on factory prime coat.

C. Finish: Field paint, refer to Specification SECTION 09900 - PAINTING.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install frames in accordance with SDI-100 and NFPA 80.

B. Coordinate with existing wall construction for anchor placement.

C. Coordinate installation of glass and glazing specified in SECTION 08800 - GLAZING.

D. Coordinate installation of frames with installation of doors specified in SECTION 08130 - METAL DOORS, SECTION 08210 - FLUSH WOOD DOORS, and installation of hardware specified in SECTION 08710 - DOOR HARDWARE.

END OF SECTION

SECTION 08130 - METAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes:
1. Rated and non-rated steel doors.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Shop Drawings:
1. Indicate door elevations, internal reinforcement, closure method, and finishes. Identify cutouts for glazing and louvers.

D. Product Data:
1. Indicate door configurations, location of cut-outs for hardware reinforcement.

E. Manufacturer's Installation Instructions:
1. Provide manufacturer’s installation instructions and indicate special installation instructions.

F. Manufacturer's Certificate:
1. Certify that Products meet or exceed specified requirements. Certify that rated doors meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

A. Manufacturer’s Qualifications: Company specializing in the manufacturer of the products specified with a minimum of five years experience.

B. Conform to requirements of SDI-100.

C. Doors and frames shall be factory cut.

D. All necessary holes shall be drilled and tapped from templates to receive hinges, lock strikes and door silencers. Templates for this purpose shall be furnished by the hardware contractor to the frame manufacturer.

E. All opening protective assemblies shall be labeled by an approved agency at the place of manufacture. **Field labeling is not permitted**.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Transport, handle, store, and protect products in accordance with manufacturer’s recommendations.

B. Accept doors and frames on site in manufacturer's packaging. Inspect for damage.

1.5 PROJECT CONDITIONS

A. Coordinate the work with door opening construction, door frame, and door hardware installation.

B. Coordinate bottom of doors and existing floor surface to allow for a maximum of 5/8 inch undercut.

C. Sequence installation to insure wire connections are achieved in an orderly and expeditious manner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Doors shall be manufactured by:

1. Hollow metal doors shall be manufactured by:
2. Amweld, Inc.
3. Steelcraft, Inc.
4. Ceco Door Products.
5. Curries
6. Kewanee
7. Pioneer Industries
8. Republic.
9. Approved Equal

2.2 DOORS

A. Exterior Doors (thermally insulated): 1-3/4" thick, SDI-100 Grade III, Model 1.

B. Interior Doors: 1-3/4" thick, SDI-100, Grade III, Model 1.

2.3 DOOR CONSTRUCTION

A. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor's option.

B. Construction: Full Flush Design.

C. Face: Steel sheet 16 and 20 gauge.
1. 16 gauge (32" wide doors).
2. 20 gauge (over 32" wide doors).

D. End Closure: Channel, 0.047 inches thick, flush.

E. Reinforced hinge pockets.

F. Core: Vertical steel stiffeners, 18 gauge.

G. Thermal Insulated Door: total insulation R value of 2.7 measured in accordance with ASTM C236.

H. Exterior doors shall be fabricated from galvanized steel.

2.4 FABRICATION

A. Fabricate doors with hardware reinforcement welded in place.

2.5 FINISH

A. Steel Sheet: Galvanized to ASTM A525 A60.

B. Primer: Baked-on factory prime coat.

C. Finish: Field Paint, Refer to Specification SECTION 09900 - PAINTING.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that opening sizes and tolerances are acceptable.

3.2 INSTALLATION

A. Install doors in accordance with SDI-100 and NFPA 80.

B. Install doors in accordance with the manufacturer's recommendations to insure a plumb fit with secure anchorage.

C. Coordinate installation of doors with installation of frames specified in SECTION 08120 - METAL FRAMES and hardware specified in SECTION 08710 - DOOR HARDWARE.

D. Paint metal doors prior to installation of hardware.

E. Coordinate installation of doors with installation of glass under SECTION 08800 - GLAZING.

3.3 ADJUSTING

A. Adjust door operation under provisions of SECTION 01700 - PROJECT CLOSEOUT.

B. Adjust door for smooth and balanced door movement.

3.4 CLEANING

A. Remove debris from adjacent surfaces generated by the work of this section.

B. Clean and remove debris from metal doors and frames.

C. Clean windows installed in metal doors in accordance with the manufacturer's recommendations.

END OF SECTION

SECTION 08210 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes:
1. Flush wood doors; rated and non-rated.

1.2 SUBMITTALS

A. SECTION 01310 - SUBMITTALS: Procedures for submittals.

B. Sustainable Product Data:
1. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
2. VOC Compliance - Submit documentation indicating VOC content of adhesives.
3. Letter of Certification for Sustainable Forestry - Forest Stewardship Council (FSC). Provide letter of certification signed by lumber supplier. Indicate compliance with FSC "Principles for Natural Forest Management" and identify certifying organization.

C. Product Data: Indicate door core materials and construction; veneer species, type and characteristics. Inner blocking locations shall be indicated for each door.

D. Samples: Submit two samples of door veneer, 6” x 6” in size illustrating wood grain.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with AWI Quality Standard Section 1300, Premium Grade.

B. Finish doors in accordance with AWI Quality Standard Section 1500.

C. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years experience.

D. Construction and materials required to be per the SmartWood Certification Program, administered by the Rain Forest Alliance and accredited by the Forest Stewardship Council.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Transport, handle, store, and protect products in accordance with manufacturer’s recommendations.

B. Doors shall be individually wrapped in plastic at the factory for protection in transit and storage. Each door shall be marked with identifying numbers as specified.

1.5 WARRANTY

A. Provide warranty to the following term:
1. Interior Doors - Manufacturer’s “Life of Installation” warranty.

B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

C. If any door is found defective, provide for replacement, including refinishing and rehanging at no cost to AAFES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Wood doors shall be manufactured by:
1. Algoma
2. Eggers
3. Graham
4. Marshfield Door Systems, Inc.
5. Mohawk Flush Doors, Inc.
6. VT Industries

7. Approved Equal

2.2 DOOR TYPES

A. Flush Interior Doors: 1-3/4 inches thick; solid core construction as indicated.

2.3 DOOR CONSTRUCTION

A. Non-labeled doors:
1. Non-labeled wood doors shall meet or exceed AWI Quality Standard PC-5 ME [or SLC-5 ME].
2. Core shall be 28-32 pcf density particleboard, certified by Scientific Certification Systems (SCS). **DOES NOT QUALIFY FOR CERTIFIED WOOD CREDIT. **
3. [Core shall be FSC certified butt-jointed staved lumber. **QUALIFIES FOR CERTIFIED WOOD CREDIT **]

B. Labeled Doors:
1. Labeled doors shall meet or exceed AWI Quality Standards FD 3/4 or FD1.
2. All labeled doors (3/4 Hr. rating or greater) shall have a mineral core.

2.4 ACCESSORIES

A. Glazing Stops:
1. Non-labeled Doors: Glazing stops shall be selected from manufacturer's standard profiles machined from solid stock matching the species of the face veneer. Glazing shall be flush with the face of the door.
2. Labeled doors: Glazing stops shall have a UL labeled wood bead (1/3 hr. rating) or a UL labeled wood veneered steel glazing stop.

2.5 FLUSH DOOR FACING

A. Veneer Facing (Flush Interior Doors): AWI Premium "AA" Grade, plain sliced white oak with slip matched grain, for transparent finish.
1. Refer to Finish Materials List for stain color.

B. Plastic Laminate Facing: NEMA LD-3, General Purpose Type 50. See Finish Schedule.

2.6 ADHESIVE

A. Adhesives:
1. Adhesives shall comply with applicable regulations regarding toxic and hazardous materials, South Coast Air Quality Management District Rule 1168.
2. VOC limit: 80g/l (minus water)

B. Facing Adhesive: Type I - waterproof.

C. Core Adhesive: Type II – water-resistant.

2.7 FABRICATION

A. Fabricate doors in accordance with AWI Quality Standards requirements.

B. Provide inner blocking at lock edge exit device locations, and top of door for closer for hardware reinforcement. Verify blocking with hardware supplier prior to ordering doors.

C. Vertical Exposed Edge of Stiles: Of same species as veneer facing. Hardwood for transparent finish.

D. Fit door edge trim to edge of stiles after applying veneer facing.

E. Bond edge banding to cores.

F. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware. Provide solid blocking for through bolted hardware.

G. Factory fit doors for frame opening dimensions identified on shop drawings.

H. Provide edge clearances in accordance with AWI 1600.

2.8 FACTORY FINISHING

A. All factory finishing shall be in conformance with AWI Quality Standards – Section 01500, Premium Grade.

B. All wood doors shall be finished at the factory using the manufacturer's standard catalyzed polyurethane system conforming to AWI Finish System TR-6, premium grade. Top coat finish shall be clear with satin sheen. See finish materials list for door stain color.

C. Any field touch-up shall be done using touch-up material supplied by the pre-finisher that blend in color and sheen and is compatible with the finish system specified.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that opening sizes and tolerances are acceptable.

B. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 INSTALLATION

A. Install doors in accordance with AWI Quality Standards requirements.

B. Trim non-rated door width by cutting equally on both jamb edges.

C. Trim door height by cutting bottom edges to a maximum of 3/4 inch.

D. Factory machine cut for hardware. Hardware supplier to provide templates.

E. Coordinate installation of doors with installation of frames specified in SECTION 08120 - METAL FRAMES and hardware specified in SECTION 08710 - DOOR HARDWARE.

F. Install door louvers plumb and level.

3.3 INSTALLATION TOLERANCES

A. Conform to AWI requirements for fit and clearance tolerances.

B. Conform to AWI Section 1300 requirements for maximum diagonal distortion.

3.4 ADJUSTING

A. Adjust door for smooth and balanced door movement.

B. Adjust closer for full closure.

END OF SECTION

SECTION 08310 - ACCESS DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes:
1. Rated and non-rated access doors and panels with frames.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Shop Drawings:
1. Indicate exact position of all access door units.

D. Product Data:
1. Submit literature indicating sizes, types, finishes, hardware, schedule locates, and details of adjoining Work.

E. Manufacturer's Installation Instructions:
1. Indicate installation requirements, and rough-in dimensions.

1.3 COORDINATION

A. Coordinate Work with work requiring controls, valves, traps, dampers, cleanouts, and similar items requiring operation being located behind finished surfaces.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND PANELS

A. Access Door Type 1: Non-Fire Rated Flush Panel
1. Manufacturer:
a. JL Industries – Model WB
b. Larsen’s Manufacturing Company – Model L-DWC
c. Karp Associates – Model KDW
d. Milcor Inc. – Style DW
e. Nystrom – NW Series
f. Approved Equal
2. Fabrication:
a. Frame - 16 gauge cold-rolled steel with drywall bead flange.
b. Door Panel - 14 gauge cold-rolled steel
c. Hinge - Concealed pin type
d. Latch - Flush screwdriver cam
e. Finish - Phosphate dipped gray prime.

B. Access Door Type 2: Non-Rated Recessed Panel
1. Manufacturer:
a. JL Industries – Model CT
b. Larsen’s Manufacturing Company – Model L-DWR
c. Karp Associates – Model RDW
d. Nystrom – RW Series
e. Approved Equal
2. Fabrication:
a. Frame -16 gauge cold-rolled steel with drywall bead flange.
b. Door Panel - 16 gauge cold-rolled steel recessed to receive 5/8 inch drywall.
c. Hinge - Concealed pivot rod

d. Latch - Flush screwdriver cam
e. Finish - Phosphate dipped gray prime.

C. Access Door Type 3: Fire Rated Flush Panel
1. Manufacturer:
a. JL Industries – Model FDWB
b. Larsen's Manufacturing Company – Model L-FRAP
c. Karp Associates – Model KRP-350FR
d. Nystrom – IW Series
e. Approved Equal
2. Fabrication:
a. Frame -16 gauge cold-rolled steel with drywall bead flange.
b. Door Panel - 2-inch mineral fiber insulated sandwich panel fabricated from 20 gauge cold-rolled steel. Fire rating shall be appropriate for the rating of the wall where the panel is located.
c. Hinge - Automatic closing spring hinge
d. Latch - Flush screwdriver cam
e. Finish - Phosphate dipped gray prime.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify rough openings for access doors and panels are correctly sized and located.

3.2 INSTALLATION

A. Secure frames rigidly in place, plumb, and level in opening, with plane of door and panel face aligned with adjacent finished surfaces.
1. Set concealed frame type units flush with adjacent finished surfaces.

B. Position unit to provide convenient access to concealed work requiring access.

END OF SECTION

SECTION 08330 - OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section shall include the following:
   1. Coiling security grille
   2. Anchorages, attachments and shims

1.2 SUBMITTALS

A. General:

B. Submittals shall be in accordance with SECTION 01310.

C. Sustainability:
   1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

D. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

E. Product Data: Submit general construction, component connections and details, and electrical equipment.

F. Samples: Submit two grille members, 12” x 12” in size illustrating shape, color and finish texture.

G. Manufacturer's Installation Instructions: Submit installation sequence and procedures, adjustment and alignment procedures.

H. Maintenance Data: Include recommended cleaning methods, cleaning materials, operating and maintenance procedures.

I. Warranty: Copy of manufacturer’s standard warranty.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Indicate lubrication requirements and frequency, and periodic adjustments required.

1.4 QUALITY ASSURANCE

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

PART 2 - PRODUCTS

2.1 OVERHEAD COILING GRILLES

A. Manufacturers:
   1. Visionaire - Cornell Iron Works, Inc.
   2. Model 670 – Overhead Door Corporation
   3. DuraGrille – Raynor Garage Doors
   4. Approved Equal

B. Product Description: Coiling metal grilles and operating hardware; push-up operation.

2.2 COMPONENTS

A. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor’s option.

B. Curtain and Bottom Bar:
   1. Material: Aluminum conforming to ASTM B221.
   2. Pattern: Straight

3. Horizontal Rods: Solid rod, 5/16 inch diameter, aluminum alloy, spaced 2 inches on center
4. Vertical Chain: 3/4 inch links spaced at 6 inches on center.
5. Bottom Bar: 2 x 3-1/2 inch extruded aluminum tubular section.
6. Finish: Clear anodized as indicated on the door schedule. [coordinate finish and color]

C. Guides:
1. Heavy-duty extruded aluminum sections with snap-on cover to conceal fasteners and polypropylene pile runners on both sides of the curtain.
2. Finish: Clear anodized to match curtain. [coordinate finish and color]

D. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to assure smooth operation of grille from any position; with adjustable spring tension.

E. Hood Enclosure:
1. Furnish hood in locations where unit will be exposed. All concealed locations do not require the use of a hood.
2. Square shape, .040 aluminum with reinforced top and bottom edges. Provide intermediate support brackets as required.
3. Finish: Dark bronze anodized to match curtain. [coordinate finish and color]

F. Hardware:
1. Cylinders: Mortise cylinder with interchangeable core furnished under Section 08710 - Door Hardware.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

3.2 INSTALLATION

A. Door manufacturer to provide end support columns.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to end support columns only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Install perimeter trim and closures.

3.3 ADJUSTING

A. Adjust grille, hardware and operating assemblies for smooth and noiseless operation.

3.4 CLEANING

A. Clean grille and components.

B. Remove labels and visible markings.

END OF SECTION

SECTION 08380 - DOUBLE ACTION DOOR

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
   1. Double action door.

1.2 SUBMITTALS

A. General:
   1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
   1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   2. Local / Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Samples: Submit plastic laminate manufacturer's standard sample pieces of high pressure plastic laminate. Color as indicated in Finish Materials List on the Contract Documents.

D. Shop Drawings: Indicate details and dimensions of fabrication and installation.

E. Manufacturer's Literature: Descriptive literature and installation instructions.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver product in manufacturer's original unopened packages with labels legible and intact.

B. Identify manufacturer, brand name, and model, size, finish, location of installation.

C. Store double action door and accessories in unopened packages in protected dry area to prevent damage from environmental and construction operations.

D. Handle double action doors with care to prevent damage.

PART 2 - PRODUCTS

2.1 SOLID CORE DOUBLE ACTION PARTITION DOOR

A. Manufacturer:
   1. Eliason Corporation, Model SCP8.
   2. Chase Industries, Model 3002.
   3. Approved Equal.

B. Doors:
   1. Body: 3/4 inch solid core with 0.032 inch high pressure laminate both sides. (Custom Color as indicated in the Finish Materials list on the Contract Documents).
   2. Base Plates: 18 gauge stainless steel both sides, 18" high.
   3. Edge Trim and Hinge Cover: 18 gauge stainless steel.
   4. Vision Window: Clear acrylic, 9" x 14" set in black rubber molding with rounded corners.
   5. Hinges: Metal, easy swing designed as integral part of double action door.
   6. Jamb Guards: Fabricated from 1/4" hot dipped galvanized 9" high.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify that openings are prepared with headers level, jambs plumb, floor level, without projections, and are correctly dimensioned to receive double action door.

B. Begin installation of double action door only when conditions are satisfactory.

3.2 INSTALLATION

A. Install double action door complete with accessories in accordance with Shop Drawings and manufacturer's instructions.

3.3 ADJUST AND CLEAN

A. Repair or replace damage to double action door to match manufacturer's original finish.

B. Adjust double action door to provide smooth operation without binding.

C. Leave doors, vision window and work area clean and free of debris.

END OF SECTION

SECTION 08410 - ALUMINUM FRAMING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Aluminum storefront framing.
2. Aluminum Curtainwall framing.
3. Aluminum storefront doors and frames.
4. Vision glass and glass infill panels.
5. Door hardware for aluminum storefront doors.

1.2 SYSTEM DESCRIPTION

A. Interior and exterior aluminum entrances and storefront system includes tubular aluminum sections with supplementary internal support framing, shop fabricated, factory finished, vision glass, glass related flashings, anchorage and attachment devices.

1.3 PERFORMANCE REQUIREMENTS

A. System Design: Design and size components in accordance with the mitigation requirements listed in UFC 4-010-01, Section B-1, Standard 10, Windows, Skylights and Glazed Doors.
1. Static Design Load 1 PSI applied to the surface of the glazing and frame
2. Deflection - Limit mullion deflection to 1/60 of unsupported member lengths.

B. System Assembly: Accommodate without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.

C. Air Infiltration: Limit air leakage through assembly to 0.06 cfm/min/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E283.

D. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and inner sheet of infill panel and heel bead of glazing compound.

E. Water Leakage: None, when measured in accordance with ASTM E331 with a test pressure difference of 6.24 lbf/sq ft.

F. Expansion / Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components and anchorage.

G. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

1.4 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details and finishes.

D. Design Data: Provide framing member structural and physical characteristics, calculations, dimensional limitations.

E. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

F. Submit two samples 6x6 inches in size illustrating finished aluminum surface, glass units, glazing materials.

G. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

H. Warranty: Submit manufacturer warranty and ensure forms have been completed in AAFES' name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with AAMA SFM-1 and AAMA - Metal Curtain Wall, Window, Storefront and Entrance - Guide Specifications Manual.

B. Conform to requirements of ANSI A117.1.

C. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems with minimum five (5) years experience.

D. Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the location where the Project is located.

1.6 DELIVERY, STORAGE, AND PROTECTION

A. Transport, handle, store, and protect products in accordance with the provisions of specification SECTION 01600 – MATERIAL AND EQUIPMENT.

B. Protect finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Materials And Equipment: Environmental conditions affecting products on site.

1.8 WARRANTY

A. Correct defective Work within a five (5) year period after Substantial Completion.

B. Warranty: Include coverage for complete system for failure to meet specified requirements.

C. Provide five (5) year manufacturer warranty for glazed units.

PART 2 - PRODUCTS

2.1 EXTERIOR FRAMING SYSTEM *** UFC Rated ***

A. Exterior framing system shall be an exterior pressure plate glazed curtain wall system, nominal 2-1/2 inch wide profile, with thermal break isolator. System depth shall be as indicated on the drawings. Framing system shall accommodate 1 inch glazing. System shall be furnished complete with all sub-sills, anchors and related flashing.

B. Details based on Kawneer Company 1600 System 1 Curtainwall System. Approved equal products are manufactured by the following:
   1. System 5600 - EFCO Corporation
   2. CW-250 - Vistawall Architectural Products
   3. Approved Equal

2.2 EXTERIOR DOORS

A. Thermal Isolated Doors: Thermally isolated frame, nominal 2-1/4 inches thick, 4-1/16 inch wide top rail, 4-1/16 inch wide vertical stiles, 7-1/16 inch wide bottom rail; with square glazing stops. Wall thickness shall be nominal .125 inch. Wall thickness for glazing stops shall be nominal .050 inch. Frame shall be designed to accommodate 1 inch insulated glass.

B. Details based on Kawneer Company Insulclad Thermal Entrance. Approved equal products are manufactured by the following:
   1. Series D 302 Medium Stile Door - EFCO Corporation
   2. Thermal Medium Stile Door - Vistawall Architectural Products
   3. Approved Equal

C. *** UFC Rated Doors *** Heavy Wall Entrance Doors: 2 inches thick, 3-1/2 inch wide top rail and vertical stiles, 6 1/2 inch bottom rail; with square glazing stops. Wall thickness to be .1875 inch. Wall thickness for glazing stops shall be nominal .050 inch. Frame shall be designed to accommodate 1/4 inch glass.

D. Heavy wall doors shall be:
   1. 350 Heavy Wall Entrance Door - Kawneer Company
   2. Ruged Medium Stile entrances - Vistawall Architectural Products
   3. Approved Equal

2.3 INTERIOR FRAMING SYSTEM

A. Interior framing system shall be a nominal 1-3/4 x 4½ inch nominal dimension; center glazed profile using 1/4 inch glass.

B. Details based on Kawneer Company Trifab VG 450.

C. Approved equal products are manufactured by the following:
   1. System 401 - EFCO Corporation
   2. FG-1000 - Vistawall Architectural Products
   3. Approved Equal

2.4 INTERIOR DOORS

A. Doors: 1-3/4 inches thick, 3-1/2 inch wide top rail, 3-1/2 inch wide vertical stiles, 6-1/2 inch wide bottom rail; with square glazing stops. Wall thickness shall be nominal .125 inch. Wall thickness for glazing stops shall be nominal .050 inch. Frame shall be designed to accommodate 1/4 inch glass.

B. Doors shall be:
   1. 300 Series Medium Stile Door - EFCO Corporation
   2. 350 Medium Stile Door - Kawneer Company
   3. 375 Medium Stile Door - Vistawall Architectural Products
   4. Approved Equal

2.5 MATERIALS

A. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor's option.

B. Extruded Aluminum: ASTM B221.

C. Sheet Aluminum: ASTM B209.

D. Fasteners: Stainless steel.

2.6 COMPONENTS

A. Flashings: Manufacturer's standard aluminum finish to match mullion sections where exposed to view.

B. Sill Flashings: Break metal aluminum. Color to match aluminum framing.

C. Accessories: Finish to match framing.
   1. Fillers
   2. Sill Starters
   3. Head Receptors.

2.7 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: As specified in specification Section 08800 - Glazing of Types described below:
   1. Glass in Exterior Lights - Insulated clear tempered and laminated.
   2. Glass in Interior Lights - Clear tempered.
   3. Glass in Exterior Door - Insulated clear tempered and laminated.
   4. Glass in Interior Door - Clear tempered.

B. Glazing Materials: As specified in SECTION 08800 - GLAZING.

2.8 SEALANT MATERIALS

A. Sealant and Backing Materials:
   1. Perimeter Sealant - As specified in SECTION 07900 - JOINT SEALERS.

2.9 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments to conceal from view.

E. Prepare components with internal reinforcement for door hardware and door operator hinge hardware.

F. Reinforce framing members for imposed loads.

2.10 FINISHES

A. Exposed Aluminum Surfaces: AA-M12-C22-A44 anodic coating finish, Architectural Class I as follows:
   1. Exterior Surfaces - Dark Bronze
   2. Interior Surfaces – Dark Bronze

B. Concealed Steel Items: Galvanized in accordance with ASTM A123/A123M to thickness Grade 85, 2.0 oz/sq ft.

C. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

D. Doors shall receive a clear top coat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.2 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions and AAMA - Metal Curtain Wall, Window, Storefront and Entrance - Guide Specifications Manual.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Coordinate attachment and seal of perimeter air and vapor barrier materials.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Set thresholds in bed of mastic and secure.

J. Install hardware using templates provided. Refer to SECTION 08710 - DOOR HARDWARE for installation requirements.

K. Install glass in accordance with SECTION 08800 - GLAZING, to glazing method required to achieve

performance criteria.

L. Install perimeter sealant to method required to achieve performance criteria and installation criteria in accordance with SECTION 07900 - JOINT SEALERS.

3.3 ERECTION TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 ADJUSTING

A. Adjust operating hardware for smooth operation.

3.5 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by method acceptable to sealant manufacturer.

3.6 PROTECTION OF FINISHED WORK

A. Protect finished Work from damage.

END OF SECTION

SECTION 08425 - AUTOMATIC SLIDING ENTRANCE DOORS - BLAST RESISTANT

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 types of automatic entrances:
1. Exterior bi-parting, sliding automatic entrances with electrical connections.
2. Sliding automatic entrances shall be blast resistant.
3. Glazing of door units.

1.3 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

B. Safety Device: Device that prevents a door from opening or closing, as appropriate.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide automatic entrance door assemblies capable of withstanding structural loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Thermal Movements: Provide automatic entrances 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 joint sealants, 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. Operating Range: Minus 30 deg F (Minus 34 deg C) to 130 deg F (54 deg C).

D. Opening-Force Requirements for Egress Doors: Not more than 50 lbf (222 N) required to manually set door in motion if power fails, and not more than 15 lbf (67 N) required to open door to minimum required width.

E. Closing-Force Requirements: Not more than 30 lbf (133 N) required to prevent door from closing.

F. Sliding automatic entrances specified with automatic locking shall be designed to function as follows:
1. Entrances shall be normally closed and locked by automatic locking system with exterior motion activation system disabled. Interior motion activation system to remain enabled; free egress.
2. Upon signal from exterior secure activation device, sliding automatic entrances will unlock and open enabling motion activation system. Entrance will be held open as long as an object or pedestrian remains in the activation or safety zones.
3. Once all activation and safety zones have cleared the entrance will close and re-lock, returning to normal state.

G. Structural properties of components:
1. Deflection limitations:
a. The deflection of any framing member in a direction normal to the plane of the wall when subjected to the specified design loads shall not exceed l/175 of its clear span or 3/4 inch (19 mm) whichever is less.
b. For cantilevers, the span shall be taken as two times the distance between anchor centerline and end of cantilever.
c. The deflection shall not exceed 50% of the nominal joint width at sealant joints occurring between framing members and relatively stiff building elements, or less if

required by sealant manufacturer.

d. Upon reversal of load direction at magnitudes up to and including 1.5 times design pressures, slippage at fastened and/or clamped connections shall not exceed 1/8 inch (3 mm).

e. Glass deflection at full design load shall not exceed 1/100 of its span, or 3/4 inch (19 mm) whichever is less.

f. Metal panel deflection shall not exceed 1/90 of its span or 3/4 inch (19 mm) whichever is less. The span shall be taken as the lesser of the distances between the horizontal or vertical support members.

2. Structural design criteria and testing requirements.

a. The work shall be designed to withstand the design loads and pressures specified herein. Compliance shall be demonstrated by calculatons performed in accordance with accepted engineering practice.

b. The work shall be designed to conform to ASTM E 330. Inward and outward acting test pressures shall be equal to 1.5 times the inward and outward acting design pressures to demonstrate a safety factor of 1.5 design pressures. Satisfactory performance at these loads shall mean no glass breakage, no permanent damage to fasteners or anchors, hardware, parts or actuating mechanisms; no malfunction of windows; no permanent deformation of main framing members in excess of 0.2% of their clear span.

H. Air Infiltration: The work shall be designed to conform to ASTM E 283. Differential static pressure shall be 6.24 psf (299 Pa). Any chamber leakage shall be accurately determined, not estimated. Air leakage of the fixed wall area shall not exceed 0.06 cfm (1.7 l/m) per 1 sf (929 scm) of exterior surface.

I. The glazed framing system and its anchorage shall be designed to withstand normal recognized testing criteria to accept seismic movement without structural failure or glass breakage.

J. Blast Rating

1. The complete system, framing, glazing and panels is designed to comply with UFC 4-010-01. DoD minimum anti-terrorism standards.

2. Proof of certification will be by structural engineering calculations for each job specific requirements. The structural engineering calculations shall confirm the structural capacity of the proposed opening to support the blast loads impacting the entrance system and related components. If calculations determine the need for additional structural support, supplemental support shall be provide under separate relevant sections. Contractor must submit all certificates for review and approval of blast resistant compliance to BCE ,HQ,:AFEES and A/E prior to delivery and installation.

1.5 SUBMITTALS

A. General:

1. Submittals shall be in accordance with SECTION 01 33 00 - SUBMITTAL PROCEDURES.

B. Shop Drawings: Indicate layout and dimensions; head, jamb, and sill conditions; elevations; components, anchorage, recesses, materials, and finishes, electrical characteristics and connection requirements.

1. Identify installation tolerances required, assembly conditions, routing of service lines and conduit, and locations of operating components and boxes.

C. Engineering Calculations: When required by the architect, submit engineering calculations and supporting product data as required to confirm compliance with 1.05 Performance Requirements. Calculations shall be prepared in accordance with common, accepted engineering practice and shall conform to appropriate design rules of the referenced standards and building ordinances. All documents are to bear the seal of a licensed engineer. Calculations shall include:

1. Material specifications and properties.
2. The derivation of member properties.
3. Analyses of stress and deflections for all structural elements, connections and anchorages.
4. Dimensioned drawings of extrusion shapes where required to support calculations
5. Safety Factors

D. Color Samples for selection of factory-applied color finishes.

E. Closeout Submittals:
   1. Owner’s Manual.
   2. 2. Warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained for installation and maintenance of units required for this Project.

B. Manufacturer Qualifications: A qualified manufacturer with a company certificate issued by AAADM.

C. Certifications: Automatic sliding door systems shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards (refer to1.5 F above for submitted requirements.)
   1. ANSI/BHMA A156.10.
   2. NFPA 101.
   3. UL 325
   4. UFC 4-010-1.

D. Source Limitations: Obtain automatic entrance door assemblies through one source from a single manufacturer.

E. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of automatic entrance door assemblies and are based on the specific system indicated.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

G. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrances serving as a required means of egress.

1.7 PROJECT CONDITIONS

A. Field Measurements: General Contractor shall verify openings to receive automatic entrance door assemblies by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.

C. Other trades: General Contractor shall advise of any inadequate conditions or equipment.

1.8 COORDINATION

A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic entrances to comply with indicated requirements.

B. Building Structure: Review and confirm structural capacity of entrance substrate as required for proper frame anchoring.

C. Electrical System Roughing-in and Final Electrical Connections: Coordinate layout and installation of automatic entrance door assemblies with connections to power supplies, remote activation devices, and security access control system.

D. System Integration: Integrate sliding automatic entrances with other systems as required for a complete working installation.
   1. Provide electrical interface control capability for operation of sliding automatic entrances by secure activation system on doors with electric locking.

1.9 WARRANTY

A. Automatic Entrances shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.

B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.

C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

PART 2 - PRODUCTS

2.1 AUTOMATIC ENTRANCES

A. Manufacturer: Stanley Access Technologies; Dura-Shield™ Blast High Security Series sliding automatic entrances.

B. Substitutions: See Division 0, Section 00404 - Substitution Procedures.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Headers: 6063-T6.
2. Framing, stiles and rails: 6105-T5
3. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
4. Sheet and Plate: ASTM B 209.

B. Sealants and Joint Fillers: Performed under Division 7 Section "Joint Sealants".

2.3 AUTOMATIC ENTRANCE DOOR ASSEMBLIES

A. General: Provide manufacturer's standard automatic entrance door assemblies including doors, sidelights, framing, headers, carrier assemblies, roller tracks, door operators, activation and safety devices, and accessories required for a complete installation.

B. Sliding Automatic Entrances:
1. Bi-Parting Entrances:
a. Configuration: Two sliding leaves and two full sidelights.
b. Traffic Pattern: Two-way.
c. Emergency Breakaway Capability: None; Uninterruptible Power Supply.
d. Mounting: Between jambs.

2.4 COMPONENTS

A. Framing Members: Manufacturer's standard extruded aluminum reinforced as required to support imposed loads.
1. Nominal Size: 2 1/2 inch by 6 inch (63.5 mm by 152.4 mm).

B. Stile and Rail Doors and Sidelights: Manufacturer's standard 2 3/8 inch (60.3 mm) thick glazed doors with extruded-aluminum tubular stile and rail members. Incorporate concealed tie-rods that span full length of top and bottom rails or mechanically fasten corners with reinforcing brackets that are welded.
1. Glazing Stops and Gaskets: Extruded-security aluminum stops and gaskets.
2. Stile Design: 2 3/4 inch (70 mm) to 5 inch (127 mm) nominal width.
3. Top Rail Design: 2 3/4 inch (70 mm) nominal height
4. Bottom Rail Design: 2 3/4 inch (70 mm) to 8 1/2 inch (216 mm) nominal height.
5. Muntin Bars: Horizontal tubular rail member for each door; 1 5/8 inch (41 mm) nominal height.

C. Glazing: Provide insulated and laminated glazing units for sliding automatic entrances in composed of the following elements: (nominal 1 ¼**"** thickness)
1. 1/4 inch (6 mm) clear tempered Low E glass, PPG Sungate 500.
2. Laminate glazing units, 1/8 inch (3 mm) inner and outer panes, clear, heat strengthened with 0.060 inch (1.5 mm) clear PVB interlayer.
3. 1/2 inch (13 mm) air space.
4. Glazing units to comply with requirements of UFC-4-010-1.

D. Headers: Fabricated from extruded aluminum and extending full width of automatic entrance door units to conceal door operators, carrier assemblies, and roller tracks. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.
1. Mounting: Surface applied to structural framing system.

2. Capacity: Capable of supporting doors up to 400 lb (182 kg) per leaf over spans up to 14 feet (4.3 m) without intermediate supports.

E. Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment of at least 1/8 inch; consisting of urethane with precision steel lubricated ball-bearing wheels, operating on a continuous roller track. Support doors from carrier assembly by 2 inch diameter anti-riser wheels with factory adjusted cantilever and pivot assembly. Minimum four ball-bearing roller wheels and two anti-rise rollers for each active leaf.
1. Minimum Load Wheel Diameter: 2 1/2 inch (64 mm).

F. Thresholds: Manufacturer's standard thresholds as indicated below:
1. Standard extrusion track under sidelights.
2. All thresholds to conform to details and requirements for code compliance.

G. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

H. Signage: Provide signage in accordance with ANSI/BHMA A156.10.

2.5 DOOR OPERATORS

A. General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, operation under normal traffic load for type of occupancy indicated.

B. Electromechanical Operators: Two (2) self-contained overhead units, 1/4 horsepower minimum, permanent-magnet DC motors with gear reduction drives, microprocessor controller; and encoder.
1. Operation: Power opening and power closing.
2. Features:
a. Adjustable opening and closing speeds.
b. Adjustable back-check and latching.
c. Adjustable braking.
d. Adjustable hold-open time between 0 and 30 seconds.
e. Obstruction recycle.
f. On/Off switch to control electric power to operator.
g. Energy conservation switch that reduces door-opening width.
h. Variable rate open/closed speed control.
i. Closed loop speed control with active braking and acceleration.
j. Variable obstruction recycle time delay.
k. Self adjusting stop position.
l. Self adjusting closing compression force.
m. Optional Switch to open/Switch to close operation.
3. Mounting: Concealed.
4. Drive System: Synchronous belt type.

C. Electrical service to door operators shall be connected to existing services as disconnected from removed sliding doors (under this section).

2.6 ELECTRICAL CONTROLS (ALL ELECTRICAL CONNECTIONS TO BE PROVIDED UNDER THIS SECTION)

A. Electrical Control System: Electrical control system shall include a microprocessor controller and position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed. Systems utilizing external magnets and magnetic switches are not acceptable. A single controller shall be capable of controlling up to two (2) operators per entrance system.

B. Life Cycle Data Counter: The electrical control system shall incorporate a non-re-settable counter to track door operation cycles.

C. Controller Protection: The microprocessor controller shall incorporate the following features to ensure trouble free operation:
1. Automatic Reset Upon Power Up.
2. Main Fuse Protection.
3. Electronic Surge Protection.

4. Internal Power Supply Protection.
5. Resetable sensor supply fuse protection.
6. Motor Protection, over-current protection.

D. Soft Start/Stop: A “soft-start” “soft-stop” motor driving circuit shall be provided for smooth normal opening and recycling.

E. Obstruction Recycle: Provide system to recycle the sliding panels when an obstruction is encountered during the closing cycle. If an obstruction is detected, the system shall search for that object on the next closing cycle by reducing door closing speed prior to the previously encountered obstruction location, and will continue to close in check speed until doors are fully closed, at which time the doors will reset to normal speed. If obstruction is encountered again, the door will come to a full stop. The doors shall remain stopped until obstruction is removed and operate signal is given, resetting the door to normal operation.

F. Programmable Controller: Microprocessor controller shall be programmable and shall be designed for connection to a local configuration tool. Local configuration tool shall be software driven and shall be utilized via Palm® handheld interface. The following parameters may be adjusted via the configuration tool.
1. Operating speeds and forces as required to meet ANSI/BHMA A156.10.
2. Adjustable and variable features as specified in 2.05, B., 2.
3. Reduced opening position.
4. Fail Safe/Secure control.
5. Firmware update.
6. Trouble Shooting
   a. I/O Status.
   b. Electrical component monitoring including parameter summary.
7. Software for local configuration tool shall be available as a free download from the sliding automatic entrance manufacturer’s internet site.

2.7 ACTIVATION AND SAFETY DEVICES

A. Motion Sensors: Motion sensors shall be mounted on each side of door header to detect pedestrians in the activating zone, and to provide a signal to open doors in accordance with ANSI/BHMA A156.10. Units shall be programmable for bi-directional or uni-directional operation and shall incorporate K-band microwave frequency to detect all motion in both directions.

B. Presence Sensors: Presence sensors shall be provided to sense people or objects in the threshold safety zone in accordance with ANSI/BHMA A156.10. Units shall be self-contained, fully adjustable, and shall function accordingly with motion sensors provided. The sensor shall be enabled simultaneously with the door-opening signal and shall emit an elliptical shaped infrared presence zone, centered on the doorway threshold line. Presence sensors shall be capable of selectively retuning to adjust for objects which may enter the safety zone; tuning out, or disregarding, the presence of small nuisance objects and not tuning out large objects regardless of the time the object is present in the safety zone. The door shall close only after all sensors detect a clear surveillance field.

C. Photoelectric Beams: In addition to the threshold sensor include a minimum of two (2) doorway holding beams. Photoelectric beams shall be pulsed infrared type, including sender receiver assemblies for recessed mounting.

2.8 HARDWARE

A. General: Provide units in sizes and types recommended by automatic entrance door and hardware manufacturers for entrances and uses indicated.

B. Deadlocks: Manufacturer's standard deadbolt operated by exterior cylinder and interior thumb turn; with minimum 1 inch (25 mm) long throw bolt; ANSI/BHMA A156.5, Grade 1.
1. Cylinders: To match existing, keyed to existing keying system.
2. Hook Latch: Laminated-steel hook, mortise type, BHMA A156.5, Grade 1.

C. Uninterruptible Power Supply (UPS): Provide UPS on designated sliding automatic entrances in accordance with the following:
1. UPS shall be a fully integrated unit designed to fit within the door header and shall be UL listed for operation with the automatic door system provided herein.

2. Upon main power interruption to the door:
   a. The UPS shall supply power to the operator, controls, activation, and safety systems of the sliding automatic entrance door.
   b. The UPS shall provide up to 1.5 hours of normal operation.
3. UPS unit shall include a low battery shut down feature to safely open or close the door prior to complete battery discharge.
4. UPS unit shall include an audible battery replacement alarm to indicate that the battery will no longer accept a charge and replacement is required.

D. Control Switch: Provide manufacturer’s standard rotary switch mounted on the interior jamb to allow for full control of the automatic entrance door. Rotary switch shall be keyed on entrances with automatic locking. Controls to include, but are not limited to:
   1. Power On/Off
   2. One-way traffic
   3. Reduced Opening
   4. Open/Closed/Automatic

E. Sliding Weather Stripping: Manufacturer's standard replaceable components complying with AAMA 701; made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

F. Weather Sweeps: Manufacturer's standard adjustable nylon brush sweep mounted to underside of door bottom.

2.9 FABRICATION

A. General: Factory fabricates automatic entrance door assembly components to designs, sizes, and thickness indicated and to comply with indicated standards.
   1. Form aluminum shapes before finishing.
   2. Use concealed fasteners to greatest extent possible.

B. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.

C. b. Reinforce members as required to receive fastener threads.

D. B. Framing: Provide automatic entrances as prefabricated assemblies.
   1. Fabricate tubular and channel frame assemblies with manufacturer's standard mechanical or welded joints. Provide sub-frames and reinforcement as required for a complete system to support required loads.
   2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
   3. Form profiles that are sharp, straight, and free of defects or deformations.
   4. Prepare components to receive concealed fasteners and anchor and connection devices.
   5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.

E. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.

F. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.

G. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated.

H. Hardware: Factory install hardware to the greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site.

2.10 ALUMINUM FINISHES

A. General: Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.

B. Class II, Anodic Finish: AA-M10C22A31 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, bronze coating to match existing,0.40 mils minimum complying with AAMA 611-98, and the following:
   1. AAMA 607.1

2. Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrances. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. A. General: Do not install damaged components. Fit frame joints to produce joints free of burrs and distortion. Rigidly secure non-movement joints.

B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
   1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
   2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.

C. Door Operators: Connect door operators to existing electrical power service (presently serving the removed sliding doors).

D. Glazing: Glaze sliding automatic entrance door panels in accordance with, published recommendations of glass product manufacturer, and sliding automatic entrance manufacturer's instructions.

E. Sealants: Comply with requirements specified in Division7 Section "Joint Sealants" to provide weather tight installation.

3.3 FIELD QUALITY CONTROL

A. Testing Services: Factory Trained Installer shall test and inspect each automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

3.4 ADJUSTING

A. Adjust door operators, controls, and hardware for smooth and safe operation, for weather-tight closure, and complying with requirements in ANSI/BHMA A156.10.

3.5 CLEANING AND PROTECTION

A. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish. Comply with requirements in Division 8 Section "Glazing", for cleaning and maintaining glass.

END OF SECTION

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work of this Section includes the following:
1. Hardware for wood doors, hollow metal doors, specialty doors and gates.
2. Removable key cylinders for doors where hardware is supplied by others.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local / Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Shop Drawings:
1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, electrical characteristics and connection requirements.
2. Submit manufacturer's parts lists, templates, and local suppliers.
3. Samples will be incorporated into the Work. Samples will be returned to supplier.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

E. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

F. Material List:
1. Before any finish hardware is ordered or purchased for this project, submit through the Contractor to the AAFES Project Manager, four copies of the complete list of all finish hardware proposed to be furnished for this work, giving manufacturer’s name and catalog number for each item and cut of item identified.
2. The schedule of materials to be supplied shall have a clear cross reference identifying door location, room number, direction of door swing, door and frame material and hardware items to be installed.
3. This shall in no way be constructed as permitting substitutions other than listed in paragraph 2.12.
4. Make all submittals, and resubmittals if necessary.
5. After approval of schedule, delivery hardware templates and/or physical hardware, as required, to door and frame manufacturers.

G. Manufacturer’s Recommendations: Prior to installation, deliver to all installing personnel, complete recommendations from the manufacturers regarding installation methods.

H. Deliver to the Contracting Officer one copy each of all installation and adjustment instructions for his permanent maintenance files.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with the following requirements:
1. AWI.
2. BHMA A156 series.
3. DHI - A115 series.
4. DHI - WDHS.3.
5. NFPA 80.
6. NFPA 101.
7. NFPA 252.
8. UL 10B.
9. UL 305.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

C. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with five years experience. Approved by manufacturers.

D. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) to assist in the work of this section, check the installation of all finish hardware and make recommendations for adjustments and/or replacements before confirming completeness of the installation.

1.4 PRODUCT HANDLING

A. Packaging:
1. Furnish all finish hardware with each unit clearly marked or numbered in accordance with the Hardware Schedule.
2. Pack each item complete with all necessary pieces and fasteners.
3. Properly wrap and cushion each item to prevent damage during delivery and storage.

B. Delivery:
1. Deliver all finish hardware to the General Contractor in a timely manner to ensure orderly progress of the total work.
2. The General Contractor shall receive, take charge of, and distribute hardware at the building. He shall provide and arrange temporary shelving for the storage of all hardware.
3. The person to whom hardware is delivered will be responsible for the care, preservation, and protection of same until acceptance of the building.

1.5 REGULATORY REQUIREMENTS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND PROTECTION

A. SECTION 01600 - MATERIAL AND EQUIPMENT: Transport, handle, store, and protect products.

B. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

C. Stockpile all items sufficiently in advance to ensure their availability and make all necessary deliveries in a timely manner to ensure orderly progress of the total work. Hardware supplier shall correlate hardware delivery requirements with the General Contractor immediately upon receipt of the Contractor’s purchase order.

1.7 PROJECT CONDITIONS

A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

C. Coordinate Owner's keying requirements during the course of the Work.

1.8 WARRANTY

A. Provide ten (10) year manufacturer warranty for door closers and not less than one year warranty for all locks, exit devices, and electrical devices.

B. Warranty: Submit manufacturer warranty and ensure forms have been completed in AAFES's name and registered with manufacturer.

1.9 MAINTENANCE PRODUCTS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

C. Provide maintenance manual for each type of hardware supplied for use by facility maintenance

personnel.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Hardware shall be furnished by one of the following manufacturers:
1. Hinges: Bommer, Hagar, Lawrence, McKinney, and Stanley.
2. Pivots: Hagar, McKinney, and Stanley.
*** Coordinate lock type and manufacturer with installation standards ***
3. Latchsets and Locksets (Bored and Mortise): Best, Arrow, and Falcon (as approved by facility manager).
4. Key Cylinders : Best
5. Padlocks: Best, Arrow, and Falcon (as approved by facility manager).
6. Electric Locks: Security Door Controls, Locknetics, Dynalock, and Von Duprin.
7. Exit Devices: Von Duprin, Monarch, Precision, Sargent, Yale, Corbin-Russwin.
8. Alarmed Exit Devices: Von Duprin, Sargent, Yale
9. Delayed Exit Devices: Von Duprin, Sargent
10. Closers: LCN.
11. Overhead Holders: Glynn-Johnson, Rixson, Door Controls International, Architectural Builders Hardware, Corbin-Russwin and Sargent.
12. Floor and Wall Door Stops: Glynn-Johnson, Ives., Rockwood, and Hagar.
13. Push/Pulls: Rockwood, Baldwin, Ives, and Hagar.
14. Manual and Automatic Bolts: Glynn-Johnson, Ives, Rockwood, and Door Controls International.
15. Gasketing: National Guard, Pemko Zero, and Durable.
16. Sliding Door Hardware: Stanley, Grant, and Lawrence.
17. Bi-Folding Door Hardware: Stanley, Grant, and Lawrence.
18. Protection Plates: Rockwood, Baldwin, Ives, and Hagar.
19. Substitutions: Not permitted.

B. References to specific proprietary products are sued to establish minimum standards of utility and quality. Unless otherwise approved, only the specified products will be approved. Design is based on the materials specified.

2.2 FASTENERS

A. General
1. Furnish all hardware with all necessary screws, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
2. Furnish fastenings, where necessary, with expansion shields, toggle bolts, sex bolts, and other approved anchors according to the material to which the hardware is to be applied and the recommendations of the hardware manufacturer.

B. Design: All fastenings shall harmonize with the hardware as to material and finish.

2.3 FINISHES

A. Finishes: ANSI A156.18; furnish following finishes except where otherwise indicated in Schedule at end of section.
1. Hinges:
a. BHMA 630 and 626, satin finish.
2. Typical Exterior Exposed and High Use Interior Door Hardware:
a. BHMA 630, satin finished stainless steel.
b. BHMA 626, satin chromium plated brass or bronze.
3. Typical Interior Door Hardware:
a. BHMA 626, satin chromium plated brass or bronze.
b. BHMA 630, satin finished stainless steel.
4. Typical Interior Restroom Door Hardware:
a. BHMA 626, satin chromium plated brass or bronze.
b. BHMA 630, satin finished stainless steel.
5. Closers: Finish appearance to match door hardware on same face of door.
a. BHMA 628, satin aluminum, clear anodized.

6. Thresholds:
   a. Mill Finish.
7. Other Items: Furnish manufacturer's standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish.

2.4 HINGES

A. Unless otherwise specified, provide 5-knuckle, button tip, full mortise template type butts with non-rising loose pins and plain or ball bearings as follows:
   1. Exterior Door Hinges: Stainless steel. Provide extra heavy ANSI A5111 type door hinges with non-removable pins.
   2. Interior Door Hinges: Cold rolled steel. ANSI Type A8112, polished and plated to match specified finish. ANSI Type A8133 may be supplied where listed for doors expected to have low frequency operation.
   3. Where required to clear trim or permit doors to swing 180 degrees, furnish hinges of sufficient throw.
   4. All doors with door closers to have ball bearing hinges as indicated.
   5. All doors wider than 3'-0" to have 4 ball bearing extra heavy hinges (.190") 5" x 4½". Doors wider than 4'-0" to have 4 ball bearing hinges 6" x 4½".
   6. Supply three hinges for all doors to 7'-6" high and one additional hinge for each additional 2'-6" or fraction thereof.

2.5 LOCKS AND LATCHES

*** Select either mortise or cylindrical lock ***

A. Mortise Type:
   1. All locksets and latchsets shall be full Mortise Type 1000, Grade 1, in accordance with BHMA/ANSI A156.13.
   2. Lockset Escutcheons shall be cold forged bronze .050" thick, approximately 7½" x 2¼", and shall be thru bolted with no visible screws on the entry side of the door.
   3. Lever handles shall be approximately 5" long with 3" projection and with unattached end returning to approximately ½" from face of door. Outside levers shall be pinned to the spindle.

B. Bored Type:
   1. Bored locksets and latchsets shall be heavy duty Type 4000, Grade 1 Cylindrical locks and latches in accordance with ANSI A156.2.
   2. Lever handles shall be approximately 5" long with 3" projection and with unattached end returning to approximately ½" from the face of the door and shall have anti-rotation through bolts.
   3. Roses shall be approximately 3½" diameter.

C. General:
   1. All locksets shall have a interchangeable cores with a minimum of seven pins.
   2. All locks shall be provided with construction cores. No substitutions will be allowed. Construction cores shall be provided by the Contractor.
   3. Upon completion of construction, the General Contractor, in company with the Contracting Officer, shall remove construction cores and install operational cores. Construction cores and keys will become property of Contractor.
   4. Hardware supplier shall be responsible for providing cylinders with cams of proper configuration and tail pieces as required.

2.6 EXIT DEVICES

A. Exit Devices shall be either a touch bar or push bar type conforming to ANSI A156.3 grade 1, and shall meet performance standards established by Underwriters Laboratories for accident hazard and/or fire labeled situations as indicated.

B. Alarmed exit devices shall be self-contained alarm system powered by a 9-volt battery. Alarm kit shall be furnished with a key over-ride. Furnish signage stating "EMERGENCY EXIT ONLY. ALARM WILL SOUND"

C. Exit device shall be furnished without key cylinder.

2.7 DELAYED EXIT DEVICES

A. Exit Devices shall be either a touch bar or push bar type conforming to ANSI A156.3 grade 1 for design and function and ANSI A156.24 for electronic operation, and shall meet performance standards established by Underwriters Laboratories for accident hazard and/or fire labeled situations as indicated.

B. Delayed exit device shall have the following features:
   1. Remote power supply - 24 VAC
   2. Electrical power transfer from frame to device.
   3. Secure mode with alarm and conditional release. Device shall be factory set to hold door for 15 seconds before permitting egress.
   4. Alarm shall be continuous until alarm is reset from key over-ride located within device.

C. Doors furnished with delayed exit devices shall unlock upon activation of the automatic fire suppression system or upon loss of power to the device.

D. Furnish signage stating “EMERGENCY EXIT ONLY. PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 SECONDS”

2.8 SECURITY DEAD LOCKS

A. Auxiliary security dead locks shall be heavy duty type with pivoted saw-resistant dead bolt having 1.41" projection. Locks shall be supplied with strikes as indicated herein.

B. Dead lock shall be designed for use with an interchangeable core. Lock shall be furnished without core.

2.9 CYLINDERS

A. Furnish cylinders with interchangeable cores with a minimum of seven pins.

B. Hardware supplier shall be responsible for providing cylinders with cams of proper configuration and tail pieces as required.

2.10 KEYING

A. All lock cores to be master keyed in one or more sets and keyed individually. Provide three (3) change keys per lock, three masterkeys for each masterkey group. All keying shall be set to AAFES Grand Masterkey System, which is a component of the Facility Key System. All keying must be coordinated through the AAFES General Manager. Confirm number of masterkey sets and keyed alike sets in conformance with the AAFES General Manager.

B. Locks shall be keyed in sets or subsets as scheduled. Cylinder locks shall be furnished with the manufacturer’s standard construction key system.

C. Keys for cylinder locks shall be stamped with change number, and the inscription “U.S. Property - Do Not Duplicate” keys shall be supplied as follows:

D. Deliver keys with identifying tags to local facility AAFES General Manager by security shipment direct from hardware supplier.

2.11 DOOR CLOSERS

A. Closers: ANSI A156.4, modern type with cover, surface mounted closers; full rack and pinion type with steel spring and non-freezing hydraulic fluid.
   1. Adjustability - Furnish controls for regulating closing, latching, speeds, and back checking.
   2. Arms - Type to suit individual condition; parallel-arm closers at reverse bevel doors and where doors swing full 180 degrees. Furnish arms with spring stops where indicated in hardware schedule.
   3. Location - Mount closers on inside of exterior doors, room side of interior doors typical; mount on pull side of other doors.
   4. Operating Pressure: Maximum operating pressure as follows.
      a. Interior Doors - Maximum 5 pounds.
      b. Exterior Doors - Maximum 10 pound.
      c. Fire Rated Doors - As required for fire rating, maximum 15 pounds.

2.12 KICK PLATES, MOP PLATES, ARMOR PLATES

A. High pressure laminate kick plates and mop plates .125" x designated height x full width of door minus 1-1/2" on push side, and ½" less than door width on pull side of door. Provide mop plates and kick plates for all doors above hard surface floors.

2.13 DOOR STOPS AND HOLDERS

A. Place door stops at least 2/3 of the distance from hinge edge to lock edge of the door and in such a position that they permit maximum door swing but do not present hazard or obstruction. Wall mounted door bumpers will not be acceptable, except where doors will not contact floor mounted door stops. Provide door stops where noted. Where carpeting occurs, provide appropriate elevators as Glynn Johnson #FB14R. Install no door stops before finished floor covering is in place.

B. Overhead spring cushion type door stops shall be surface mounted, channel - slide arm type and shall be correlated with door closers to provide unobstructed operation of both door stop arms and door closer arms. Furnish heavy duty stops for exterior doors and medium duty for interior doors unless noted otherwise in the hardware schedule.

2.14 EXIT DOOR SIGNS

A. Exit doors which are provided with dead locks for after hour security shall be provided with signs engraved with 1" letters to read. “This door to remain unlocked when the building is occupied”. In accordance with NFPA 101 Life Safety Code paragraph 5-2, 1.5, exception 2.

2.15 OTHER MATERIALS

A. All other materials, not specifically described, but required for a complete and proper finish hardware installation, shall be as selected by the Contractor subject to approval by the Contracting Officer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings. Instructed by the manufacturer.

B. Verify that electric power is available to power operated devices and is of the correct characteristics.

3.2 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions.

B. Use templates provided by hardware item manufacturer.
   1. Mounting heights for hardware from finished floor to center line of hardware item:
   2. Locksets - 40-5/16"
   3. Push - 45"
   4. Pulls - 42"
   5. Dead Locks - 48"
   6. Exit Devices - 40-5/16"

3.3 FIELD QUALITY CONTROL

A. Architectural Hardware Consultant will inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.4 ADJUSTING

A. Adjust hardware for smooth operation.

3.5 PROTECTION OF FINISHED WORK

A. Do not permit adjacent work to damage hardware or finish.

3.6 INSPECTION OF INSTALLATION

A. Upon completion of the installation, and as a condition of its acceptance, deliver a report signed by the

AHC stating that his inspection was made, that all adjustments recommended by him have been completed, and that all finish hardware furnished under this section has been installed and is in optimum working condition.

3.7 HARDWARE SCHEDULE

A. Furnish items in the amount indicated on the drawings or required for a complete and operable facility.

B. Hardware sets listed on the drawings are intended to be complete and functional. However, it is the responsibility of the hardware supplier to furnish materials as required and in accordance with manufacturer's recommendations for best operation and to notify the Contracting Officer of any recommended changes with no reduction in quality.

C. Products listed include quantity, manufacturer name, product description, manufacturer product number US finish, BHMA/ANSI finish, and BHMA/ANSI Product number where available.

END OF SECTION

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
   1. Insulated glass units.
   2. Single pane glass units.
   3. Glazing accessories.

1.2 SUBMITTALS

A. General:
   1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
   1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

D. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

E. Certificates: Certify that Products meet or exceed specified requirements.

F. Manufacturer's Certificate: Certify that sealed insulated glass, meets or exceeds specified requirements.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five (5) years experience approved by manufacturer.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Material And Equipment: Environmental conditions affecting products on site.

B. Do not install glazing when ambient temperature is less than 50 degrees F.

C. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds

1.5 WARRANTY

A. Provide a ten (10) year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 - PRODUCTS

2.1 FLAT GLASS MATERIALS

A. 1/4" clear plate glass shall conform to ASTM C1036-90 Type I, Class 1, Quality q^3.

B. 1/4" clear tempered glass shall conform to ASTM C1048-85 Kind FT, Condition A, Type I, Class 1, Quality q^3.

C. Nominal 9/32” thick laminated glass shall conform to ASTM C1172-91, Kind LA and shall consist of two (2) 1/8” lites of flat annealed glass with a .030” layer of polyvinyl butyl polymer between the lites. Glass shall be clear.

D. 20 minute fire rated safety glass shall be 1/4” clear glass conforming to ASTM E-152 and CPSC 16 CFR 1201-77, Category II.

1. Fire rated safety glass shall be:
   a. SuperLite I - SAFTI First
   b. Fireglass 20 - Technical Glass Products
   c. Pyroswiss - Vetrotech USA
   d. Approved Equal

E. 45 minute fire rated safety glass shall be 3/16” clear glass conforming to ASTM E-152 and CPSC 16 CFR 1201-77, Category II.
   1. Fire rated safety glass shall be:
      a. SuperLite I-XL - SAFTI First
      b. Pyroshield - Technical Glass Products
      c. Keralite FR-F - Vetrotech USA
      d. Approved Equal

2.2 INSULATING GLASS UNITS

A. Insulated glass shall be fabricated from one pane of 9/32” laminated glass and onetwo panes of ¼” tempered glass separated by a 1/2" air space. Laminated glass shall be on the interior side of the unit. See glass schedule for designations.

B. Insulating glass units shall be furnished with a low-emissivity (Low-E) coating pyrolitically applied to the #3 glass surface of the unit.

C. Insulated glass units shall have a butyl primary sealing system with a silicone secondary sealing system.

D. Glass shall meet the requirements of paragraph 2.01, Flat Glass Material.

2.3 GLAZING ACCESSORIES

A. Setting Blocks: ASTM C864 Neoprene 80 to 90 Shore A durometer hardness, length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: ASTM C864 Neoprene 40 to 50 Shore A durometer hardness, minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face, chemically suitable with sealant.

C. See section 08410 for glazing accessories required for aluminum entrances and storefronts.

D. Glazing accessories for fire rated safety glazing shall be as recommended by the manufacturer for the fire rating specified.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealant in accordance with manufacturer's instructions.

3.3 INSTALLATION

A. General:
   1. All field and factory glazing is to be performed in strict accordance with manufacturer's recommendations and with the Flat Glass Marketing Association "Glazing Manual" - current edition.

B. Compatibility:

1. The chemical compatibility of all glazing materials and framing sealants with each other and with like materials used in glass fabrication must be established by this Contractor prior to the start of installation. See Section 07900 for joint sealants specified for General Building use.

3.4 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.5 PROTECTION OF FINISHED WORK

A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

B. Replace damaged glass.

3.6 GLASS SCHEDULE

A. Glass Type G-1: 1/4” tempered glass, clear - 1/2” air space - 9/32” laminated1/4” clear tempered glass, clear. Laminated glass to be installed on the interior side of the unit.

B. Glass Type G-2: 9/32” laminated glass (exterior entry doors)

C. Glass Type G-32: 1/4” tempered glass (interior doors)

D. Glass Type G-4: 1/4” fire rated safety glazing - 20 minute

E. Glass Type G-5: 1/4” fire rated safety glazing - 45 minute

END OF SECTION

SECTION 09260 - GYPSUM BOARD SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Gypsum board and joint treatment.
2. Gypsum tile backer board
3. Cementitious backer board
4. Exterior gypsum sheathing.
5. Metal stud wall framing.
6. Acoustic insulation.
7. Accessories.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content – Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
3. VOC Compliance - Submit documentation indicating VOC content of adhesives.

C. Product Data: Provide data on metal framing, gypsum sheathing, gypsum board, acoustic insulation, joint tape, and cementious backer board.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C840.

B. All products tested in accordance with ASTM E90 & ASTM E119.

C. Applicator Qualifications: Company specializing in performing the work of this section with minimum five (5) years experience, approved by manufacturer.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to job site in manufacturer's original, undamaged packaging.

B. Store and handle materials to protect against contact with damp and wet surfaces, exposure to weather, breakage and damage to edges.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Gypsum board products shall be manufactured by:
1. Georgia Pacific Corporation
2. United States Gypsum Company
3. National Gypsum Company
4. Approved Equal

2.2 FRAMING MATERIALS

A. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor's option.

B. Studs and Tracks: ASTM C645; and GA-600; galvanized sheet steel, 1 5/8 inch, 2 ½ inch, 3-5/8 inch, 6 inch and 8 inch size unless otherwise noted on drawings. All studs shall be 20 ga. (0.0359")

C. Flexible track:
1. Individual formed track sections connected with a .750" x .023" sliding strap. Width as

indicated on the drawings.

2. Manufacturers:
   a. Contour Track - Dietrich Metal Framing
   b. Flex-C Track - Flex-Ability Concepts
   c. Approved Equal

D. Fasteners: ASTM C1002 or ASTM C954.

E. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

2.3 GYPSUM BOARD MATERIALS

A. Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent pre-consumer recycled content at contractor's option.

B. Fire Resistant Gypsum Board: ASTM C1396/C1396M; Type "X" 5/8 inch thick, maximum available length; ends squared, tapered edges.

C. Moisture Resistant Gypsum Board: ASTM C1396/C1396M; 5/8 inch thick, maximum available length in place; ends square cut, tapered edges.

D. Exterior Gypsum Soffit Board: ASTM C1396/C1396M: 5/8 inch thick, maximum available length; ends squared, tapered edges.

E. Exterior Gypsum Sheathing Board: Silicone-treated gypsum core sheathing, 5/8 inch thick, with glass mats both sides. Sheathing shall conform to ASTM C1177/C1177M. Core shall be Type "X".
   1. Dens-Glas Gold – Georgia Pacific
   2. Fiberock Aqua-Tough Exterior Sheathing, US Gypsum Corp.
   3. Approved Equal

F. Exterior Gypsum Parapet Board: Silicone-treated gypsum core sheathing, 5/8 inch thick, with glass mats both sides. Sheathing shall conform to ASTM C1177/C1177M. Core shall be Type "X".
   1. Dens-Deck Prime – Georgia Pacific
   2. Approved Equal

G. Gypsum Tile Backer Board: Silicone-treated gypsum core sheathing, 5/8 inch thick, with glass mat facing both sides. Tile side of board shall be faced with a heat-cured, copolymer water and vapor retardant coating. Sheathing shall conform to ASTM C1178/C1178M. Core shall be Type "X".
   1. Dens-Shield Tile Backer – Georgia Pacific
   2. Approved Equal.

2.4 ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced, 3½ inch and 6 inch unless otherwise noted on drawings.
   1. Manufacturers.
      a. Certain Teed Corporation.
      b. Johns Manville Corporation.
      c. Owens Corning Corporation.

B. Corner Beads: Galvanized steel angle, 1-1/4" x 1-1/4" x .014" thick.

C. Edge Trim: L or J shaped galvanized steel, .014" thick. All edge trim shall be concealed after finishing.

D. Control Joint: galvanized steel, 1-3/4" x 7/16" x .014" with 3/32" grounds.

E. Joint Materials: ASTM C475; reinforcing tape, joint compound, adhesive, and water. Use exterior grade products for exterior applications.

F. Adhesives:
   1. Drywall and panel adhesives shall comply with applicable regulations regarding toxic and hazardous materials, see SECTION 01352 LEED REQUIREMENTS for VOC limits.

G. Fasteners:
   1. ASTM C954, Type S12, Screws - for attaching to heavy gauge metal studs.
   2. ASTM C1002, Type S Screws - for attaching to light gauge metal studs.
   3. ASTM C1002, Type G screws - for attaching gypsum board to gypsum board.

H. Exterior Gypsum Sheathing Accessories:
   1. Furnish manufacturer's recommended self-adhering fiberglass sheathing tape, 10 by 10 fiberglass mesh by minimum 2 inches wide.

I. Blocking:
   1. Wood Blocking - See Specification Section 06100 – Rough Carpentry
   2. Sheet Metal Blocking - 18 gauge (minimum), width as required for application.

J. Security Mesh:
   1. Security mesh shall be expanded metal mesh with the following characteristics:
      a. Thickness: 0.120 inch, carbon steel
      b. Opening: .923 inch x 2.12 inch
   2. Manufacturer:
      a. ASM .75-9F - Alabama Metal Industries Corporation (AMICO)
      b. Approved Equal

PART 3 - EXECUTION

3.1 METAL STUD INSTALLATION

A. Install studs in accordance with ASTM C754 manufacturer's instructions.

B. Metal Stud Spacing: 24 inches on center (maximum) unless otherwise noted.

C. Extend stud framing to underside of roof truss framing. Attach ceiling runner securely to ceiling framing in accordance with manufacturer's instructions or as indicated on drawings.

D. Extend all stud framing through the ceiling to the structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.

E. Install horizontal bridging between studs at 48 inches on center.

F. Door Opening Framing: Install double 20 gauge studs at door frame jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.

G. Blocking: Bolt or screw blocking to studs. Install blocking for support of plumbing fixtures, lockers, wall cabinets, wood frame opening, washroom accessories, slat wall, and visual display boards.

3.2 CEILING FRAMING INSTALLATION

A. Install in accordance with ASTM C754 and manufacturer's instructions.

B. Coordinate location of hangers with other work.

C. Install ceiling framing independent of walls, columns, and above ceiling work.

D. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.

E. Laterally brace entire suspension system.

3.3 ACOUSTIC ACCESSORIES INSTALLATION

A. Place acoustic insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.

B. Install acoustic sealant within partitions in accordance with manufacturer's instructions.

3.4 INSTALLATION - EXTERIOR GYPSUM SHEATHING

A. Exterior gypsum sheathing shall be installed in accordance with the manufacturer’s written instructions, ASTM C1280, Standard Specification for Application of Gypsum Sheathing Board, Gypsum Association GA-253-93, Recommended Specifications for the Application of Gypsum Sheathing and good practices of the trade.

B. Contractor shall schedule and coordinate the work as required to minimize exposure of gypsum sheathing to the weather to less than 30 calendar days. Gypsum sheathing shall be protected in

accordance with the manufacturer's recommendations if the exposure time will be extended beyond 30 days.

C. Sheathing shall be attached to the metal framing as recommended by the sheathing manufacturer.

D. Gypsum sheathing shall be installed so that no joint will align with an edge of the opening. Joints shall be staggered.

E. All openings and penetrations through the sheathing shall be properly flashed and sealed by this installer to protect cut edges of sheathing.
   1. All joints shall be covered with sheathing tape.

3.5 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with ASTM C840 and GA216.

B. Erect single layer gypsum board in most economical direction with ends and edges occurring over firm bearing.

C. Use screws when fastening gypsum board to metal furring or framing.

D. Treat cut edges and holes in moisture resistant gypsum board, exterior gypsum soffit board and gypsum sheathing with sealant.

E. Install gypsum tile backer board over metal studs in accordance with manufacturer's instructions. Gypsum tile backer board shall be installed behind all ceramic wall tile at wet walls only.

F. Laminated Gypsum Board:
   1. Surface of substrate to be prepared in accordance with manufacturer's recommendations. Remove all loose paint and other material that would not permit the gypsum board to be fully adhered to the existing substrate.
   2. Adhere gypsum board to existing block walls where indicated on the drawings.

G. Place corner beads at all external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

H. Provide expansion joints every 30 feet as recommended by manufacturer. Coordinate locations with Contracting Officer prior to installation.

3.6 JOINT TREATMENT

A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

B. Feather coats on to adjoining surfaces so that camber is maximum 1/32 inch.

C. Tape, fill and finish joints and corners of cementitious backing board.

3.7 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 in any direction.

END OF SECTION

SECTION 09300 - TILE

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Ceramic wall and floor tile and base.
2. Porcelain pavers and porcelain paver base.
3. Quarry tile and Quarry tile base.
4. Mosaic floor tile & mosaic floor tile base.
5. Grout.
6. Expansion Joints in tile
7. Grout release
8. Cleavage Membrane.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
3. VOC Compliance - Submit documentation indicating VOC content of adhesives.

C. Product Data: Provide instructions for using grouts and adhesives, and product data for transition strips, expansion joints, exterior corners, coved base pieces and cleavage membrane.

D. Samples: Provide full size samples of tile each labeled with Manufacturer name, product number and color.

E. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.3 QUALITY ASSURANCE

A. Maintain one copy of TCA Handbook and ANSI A108 Series/A118 Series on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum five (5) years documented experience approved by manufacturer.

D. Blending:
1. Require blending of tile at the job site.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Transport, handle, store, and protect products.

B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not install adhesives in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials or as recommended by the manufacturer.

C. Maintain relative humidity of 60% or less during installation of setting materials.

1.6 EXTRA MATERIALS

A. Provide 3% of each type, color, and size of the tile specified. Clearly label each package.

B. Turn over to AAFES at project close-out.

PART 2 - PRODUCTS

2.1 TILE MATERIALS

A. Manufacturers: All like products by the same manufacturer. All tile shall be from the same dye lot.
   1. See Finish Materials List on Contract Drawings.
   2. All ceramic tile used for floor surfaces shall have a minimum coefficient of friction of .6 in accordance with ADA Accessibility Guidelines (ASTM C1028).
   3. All tile shall be in accordance with ANSI A137.1.

2.2 PRODUCTS

A. Ceramic Tile: ANSI A137.1, conforming to the following:
   1. See Finish Materials List on Contract Drawings. All ceramic tile shall be from the same dye lot.

B. Ceramic Tile Base:
   1. See Finish Materials List on Contract Drawings. All ceramic tile base shall be from the same dye lot.

C. Porcelain Paver:
   1. See Finish Materials List on the Contract Drawings. All porcelain pavers shall be from the same dye lot.

D. Porcelain Paver Base:
   1. See Finish Materials List on the Contract Drawings. All porcelain paver base shall be from the same dye lot.

E. Quarry Tile:
   1. See Finish Materials List on the Contract Drawings. All quarry tile shall be from the same dye lot.

F. Quarry Tile Base:
   1. See Finish Materials List on the Contract Drawings. All quarry tile base shall be from the same dye lot.

G. Mosaic Floor Tile:
   1. See Finish Materials List on the Contract Drawings. All mosaic floor tile shall be from the same dye lot.

H. Mosaic Floor Tile Base:
   1. See Finish Materials List on the Contract Drawings. All mosaic floor tile base shall be from the same dye lot.

2.3 MORTAR MATERIALS

A. Manufacturers:
   1. Custom Building Products
   2. TEC
   3. Mapei
   4. Laticrete, Inc.

B. Mortar Bed Materials: Portland cement, sand, latex additive, and water.

C. Mortar Bond Coat Materials:
   1. Latex-Portland Cement type: ANSI A118.4.

2.4 GROUT MATERIALS

A. Manufacturers:
   1. Laticrete: See List of Finish Materials on the Contract Drawings. All products from the same manufacturer and from the same dye lot.
   2. Other acceptable manufacturers:
      a. Custom Building Products
      b. Tec
      c. Bonsal

d. Color must match grout color specified on Finish Materials List or be approved by the Contracting Officer.

B. Sanded (1500 Series) and unsanded (1600 Series) Grout with Laticrete 1776 Grout Admix Plus, color as indicated on drawings.

2.5 ACCESSORY MATERIALS

A. Edging strips as manufactured by Blanke or Schulter Systems, Inc. Schiene-A, Color: Aluminum, shall be installed at edges of ceramic tile floor where it abuts resilient flooring or concrete. Top of strips shall be flush with top of floor tile. Floor filler shall be installed against the resilient side of the strip to within 1/16" of the top and feathered down to the concrete floor surface. Minimum width of tapered floor filler shall be 24 inches. See Specification Section 09650 - Resilient Flooring, Paragraph 2.03 Accessories for reducer strip to concrete. Edging strips are also to be installed where changes in wall tile occur. See drawings for locations.

B. Adhesives:
1. Ceramic tile adhesives shall comply with applicable regulations regarding toxic and hazardous materials, South Coast Air Quality Management District Rule 1168.
2. VOC limit: 65g/l (minus water)

2.6 EXPANSION JOINTS IN TILE

A. Provide expansion joints as indicated on Contract Drawings. See Floor Finish Plan for details.
1. One part silicone at joints between floor and walls, and at perimeter of metal door frames.
2. All expansion, control, construction, & cold joints in the structure should continue through the tile work. Joint through tile work directly over structural joints must never be narrower than the structural joint.
3. Color to match grout as approved by the Contracting Officer.

2.7 CLEAVAGE MEMBRANE

A. Laticrete “Blue 92 Anti-Fracture Membrane” TCA extra heavy rating per ASTM C627.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Remove dirt, dust, soap scum, coatings, oil, wax, concrete curing compounds, etc. prior to the start of installation. The means and methods used to prepare the surface shall be in accordance with the setting material manufacturer’s written recommendations. Acid shall not be used to prepare the surface.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

3.3 INSTALLATION - GENERAL

A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.10, manufacturer's instructions, and TCA Handbook recommendations.

B. Install expansion joints every 20’-0” - 25”-0” in each direction in accordance with TCA handbook for tile installation. See drawings for locations.

C. Install crack-suppression membrane to comply with manufacturer’s written instructions and in accordance with TCA handbook to produce membrane of uniform thickness bonded securely to substrate.

D. Lay tile to pattern indicated on Floor Finish Drawing and Interior Elevations.

E. Place edge strips at locations indicated where dissimilar materials meet.

F. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor, base and wall joints where applicable.

G. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

H. Form internal angles square and external angles bullnosed.

I. All inside corners to be caulked - See SECTION 07900 - JOINT SEALERS. Use sealants complying with ASTM C920. Caulk to match adjacent grout.

J. Install tile accessories rigidly in prepared openings.

K. Sound tile after setting. Replace hollow sounding units.

L. Allow tile to set for a minimum of 48 hours prior to grouting.

M. Grout tile joints using the minimum grout joint width.

N. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.4 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCA Handbook Method, F125, Latex Portland Cement bond with grout and cleavage membrane.

3.5 INSTALLATION - WALL TILE

A. Over water-resistant gypsum backer board, gypsum tile backer board at wet walls only, install in accordance with TCA Handbook Method W247-05, using epoxy grout as indicated on drawings.

3.6 CLEANING

A. Clean work under provisions of SECTION 01720 - CLEANING.

B. Clean tile and grout surfaces per manufacturer's instructions.

3.7 PROTECTION OF FINISHED WORK

A. Do not permit traffic over finished floor surface for 4 days after installation.

B. Use all means necessary to protect tile materials before, during, and after installation and to protect the installed work of other trades. In the event of damage, immediately make all repairs and replacements necessary to the approval of and at no additional cost to AAFES.

END OF SECTION

SECTION 09510 - SUSPENDED ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
   1. Non-rated suspended metal grid system and perimeter trim.
   2. Acoustic tile.
   3. Seismic bracing.

1.2 SYSTEM DESCRIPTION

A. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of ℓ/360.

1.3 SUBMITTALS

A. General
   1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
   1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Product Data: Provide data on metal grid system components and acoustical units.

D. Samples: Submit architectural size samples 4 x 12 inch in size illustrating material, color and finish of acoustical units.

E. Manufacturer's Installation instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.4 QUALITY ASSURANCE

A. Conform to CISCA Requirements.

B. Grid Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

C. Acoustical Unit Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

D. Protect ceiling tile from damage before, during and after installation. Replaced damaged tiles with new where touch-up is impracticable or unsatisfactory to the Contracting Officer and at no additional cost to AAFES.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire-related assembly and combustibility requirements for materials.

B. Fire performance characteristics: identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organizations.
   1. Surface Burning Characteristics: As follows, tested per ASTM E84 & complying with ASTM E1264 for Class A products.
      a. Flame Spread: 25 or less
      b. Smoke Developed: 50 or less

1.6 EXTRA MATERIALS

A. Provide 5% of each type of acoustic ceiling tile specified, but not less than 1 full box.

B. Turn over the extra materials to the Contracting Officer at project closeout.

1.7 DELIVERY, STORAGE & HANDLING

A. Deliver, store, protect & handle products to site.

B. Deliver materials to site in original, unopened, undamaged packages. Inspect to verify acceptability.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged unit in anyway.

1.8 ENVIRONMENTAL REQUIREMENTS

A. SECTION 01600 - MATERIAL AND EQUIPMENT: Environmental conditions affecting products on site.

B. Maintain uniform temperature of minimum of 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.9 PROJECT CONDITIONS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat or air conditioning is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustic units after interior wet work is dry.

PART 2 - PRODUCTS

2.1 SUSPENSION SYSTEM MATERIALS

A. Materials shall be in accordance with ASTM C635, and ASTM E1264.

B. Manufacturers:
1. See Finish Materials List on Contract Drawings.

C. Non-fire Rated Grid: ASTM C635, intermediate duty; exposed T; components dye cut and interlocking.

D. Grid Materials: Commercial quality cold rolled steel with galvanized coating.

E. Grid Finish: To match ceiling color.

F. Accessories: Stabilizer bars, clips, splices, edge moldings, and hold down clips required for suspended grid system.

G. Support Channels and Hangers: No. 12 Galvanized annealed steel; pre-straightened, size and type to suit application, and ceiling system flatness requirements specified. Spaced 48” o.c. maximum along main beams.

2.2 ACOUSTIC UNIT MATERIALS

A. Manufacturers:
1. See Finish Materials List on contract drawings.

2.3 ACCESSORIES

A. Touch up Paint: Type and color to match acoustic and grid units.

2.4 SEISMIC REQUIREMENTS

A. See drawings for seismic details and requirements.

Note: this paragraph is applicable is the SDC is C or greater.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.2 INSTALLATION - LAY-IN GRID SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, the manufacturer's instructions, and as supplemented in this section.

B. Install system capable of supporting imposed loads to a deflection of ℓ/360 maximum.

C. Locate system on room axis according to reflected ceiling plan in Contract Documents.

D. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.

E. Hang suspension system independent of walls, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located with 6 inches of each corner; or support components independently.

H. Do not eccentrically load system, or produce rotation of runners.

I. Perimeter Molding:
   1. Install edge molding at intersection of ceiling and vertical surfaces.
   2. Use longest practical lengths.
   3. Miter corners.
   4. Provide edge moldings at junctions with other interruptions.

3.3 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Install units after above ceiling work is complete.

D. Install acoustical units level, in uniform plane, and free from twist, warp and dents.

E. Cut tile panels to fit irregular grid and perimeter edge trim. Field rabbett tile panel edge. Double cut and field paint exposed edges of tegular units.

F. Install hold-down clips to retain panels tight to grid system within 20 feet of an outside door or vestibule.

3.4 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch to 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.5 CLEANING

A. Clean work under provisions of SECTION 01720 - CLEANING.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, & suspension members. Comply with manufacturer's instructions for cleaning & touch up of minor finish damage.

C. Remove & replace work that can't be successfully cleaned & repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09650 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Resilient base.
2. Resilient Reducer Strips.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
3. VOC Compliance - Submit documentation indicating VOC content of adhesives.

C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.

D. Samples:
1. Submit manufacturer’s standard size samples of base material for each color specified.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.3 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame/smoke rating requirements of 45/450 in accordance with ASTM E648-06a and ASTM E662.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of SECTION 01310 - SUBMITTALS.

B. Do not store roll goods on end.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Store materials for three days prior to installation in area of installation to achieve temperature stability as required by material manufacturer.

B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.6 MAINTENANCE DATA

A. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.7 EXTRA MATERIAL

A. Provide 5% of each type, color and pattern of resilient base.

B. Turn over to Contracting Officer at project closeout.

PART 2 - PRODUCTS

2.1 MATERIALS - BASE

A. Base: FS SS-W-40, Type I rubber; Rubber

B. See Finish Materials List on Contract Documents.
   1. Length - **Roll**.
   2. Premolded end stops and inside and outside corners to match base color.
   3. Style - Use straight base without cove where floor is carpeted. Use top-set coved base at all other areas.
   4. Manufacturers:
      a. Armstrong, Style as indicated on drawings.
      b. Johnsonite, Style as indicated on drawings.

C. Substitutions: Substitutions not permitted - AAFES standard material.

2.2 ACCESSORIES

A. Primers and Adhesives:
   1. Waterproof; types recommended by flooring manufacturer
   2. All adhesives and primers shall comply with applicable regulations regarding toxic and hazardous materials, South Coast Air Quality Management District Rule 1168.
      a. Cove base adhesives: 50 g/L (less water)

B. Transition Strips: As manufactured by Johnsonite or approved equal. Color to match rubber base (RB-1). Material to be installed per manufacturers instructions.
   1. See sheet A8.0 for transition strip details.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The means and methods used to prepare the surface shall be in accordance with the setting material manufacturer's written recommendations.

B. Material inspection: visually inspect materials prior to installation. Materials with visual defects shall not be installed.

3.2 PREPARATION

A. Protect adjacent work areas and finish surfaces from damage during product installation.

B. Apply primer to wall surfaces.

3.3 INSTALLATION - BASE

A. General:
   1. Install base around perimeter of room or space and around front of casework.
   2. Do not install base behind casework, AF/AI retail wall fixtures, AAFES furnished fixtures, or at aluminum storefront. Coordinate rubber base locations prior to installation.
   3. Unroll base material and cut into accurate lengths as required for a minimum number of joints.
   4. Match edges at all seams or double cut adjoining length.
   5. Install with tight butt-joints with no joint widths greater than 1/64 inch.

B. Top-Set Base:
   1. Apply adhesive and firmly adhere to wall surfaces.
   2. Press down so bottom of cove edge follows floor profile.
   3. Scribe to fit door frames and other interruptions.

3.4 CLEANING

A. Clean work under provisions of SECTION 01720 - CLEANING.

B. Clean base surfaces in accordance with manufacturer's instructions.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished Work.

END OF SECTION

SECTION 09680 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes modular, tufted carpet tile.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.

B. Shop Drawings: Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch- long Samples.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency.

E. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

F. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling."

1.5 PROJECT CONDITIONS

A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."

B. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.6 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Limited Lifetime Modular Warranty.
2. Lifetime Static.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Basis of this Specification is J & J Invision - Broken Slate 7950M commercial carpet. Subject to compliance with the requirements and properties of the product listed, including acceptable color and texture.

1. Carpet tile shall meet the testing and product requirements of the Carpet and Rug Institute Green Label Plus program.

B. Description:

1. Construction: Textured pattern loop.
2. Face Weight: 35 oz./sq. yd.
3. Gauge: 1/12.
4. Stitches per Inch: 11.0.
5. Pile Height Average: 0.150 inch.
6. Fiber System: Ultron nylon BCF.
7. Dye Method: Beck Dyed.
8. Protection Treatment: ProTex (soil release).
9. Color and Style as indicated in Finishes Legend on individual drawing sheets.
10. Size: 24” x 24”.
11. Installation: Brick Ashlar.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

1. VOC Limits: Provide adhesives with VOC content not exceeding 50 g/L.:

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

1. Remove any remaining pieces of previous floor finish.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

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

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern as shown on drawings, parallel to walls and borders.

H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

SECTION 09720 - WALL COVERING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
   1. Surface preparation and prime painting.
   2. Vinyl Coated Fabric Wall covering.

1.2 SUBMITTALS

A. General:
   1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
   1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Product Data: Provide data on wall covering and adhesive.

D. Samples: Submit samples of wall covering, 8 x 10 inches in size illustrating color, finish, and texture.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years experience.

B. Applicator: Company specializing in performing the work of this section with minimum five years experience.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke ratings of 25/50 25/450 when tested to ASTM E84.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site in unbroken or undamaged containers and clearly marked with identification label.

B. Inspect roll materials on site to verify acceptance.

C. Protect packaged adhesive from temperature cycling and cold temperatures.

D. Do not store roll goods on end or cross stack material.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or vinyl covering product manufacturer.

B. Maintain these conditions 24 hours before, during, and after installation of adhesive wall covering.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surfaces.

1.7 EXTRA MATERIALS

A. Provide 10% of each color of wall covering.

B. Package and label each roll by manufacturer, color and pattern, and destination room number; store where directed.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. As indicated on Finish Materials List in Drawings.

2.2 VINYL COATED FABRIC WALL COVERING

A. Vinyl Coated Fabric Wall Covering: ASTM F793, FS L-P-1040, Type II; color and pattern as indicated on Finish Materials List.

B. Substitutions: No Substitutions permitted – AAFES standard material.

C. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.

D. Substrate Filler: As recommended by adhesive and wall covering manufacturers and compatible with substrate.

E. Substrate Primer and Sealer: Alkyd enamel type.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are prime painted and ready to receive work, and conform to requirements of the wall covering manufacturer.

B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply coverings unless moisture content of surfaces are below the following maximums:
   1. Plaster and Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   3. Wood Surfaces: 15 percent, measured in accordance with ASTM D4442-92.

C. Verify flatness tolerance of surfaces does not vary more than 1/4 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.

3.2 PREPARATION

A. Fill cracks and smooth irregularities with filler; sand smooth.

B. Wash impervious surfaces with trisodium phosphate, rinse and neutralize; wipe dry.

C. Sand glossy surfaces; seal marks which may bleed with shellac.

D. Remove electrical, telephone, wall plates and covers.

E. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.

F. Vacuum clean surfaces free of loose particles.

3.3 INSTALLATION

A. Follow manufacturer’s installation instructions for each type of wall covering specified.

B. Apply adhesive and wall covering in accordance with manufacturer's instructions.

C. Apply adhesive to fabric surface immediately prior to application of vinyl coated fabric wall covering. Let contact adhesive set tack free.

D. Use wall covering in roll number sequence. Starting with the largest roll number and each strip in same sequence as cut from roll. Follow manufacturer’s written instructions.

E. Double cut edges on wall as hung. Do not razor cut on gypsum board surfaces.

F. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface. Butt edges tight.

G. Horizontal seams are not acceptable.

H. Do not seam within 2 inches of internal corners or within 6 inches of external corners.

I. Install wall covering before installation of bases, cabinets, hardware, or items attached to or spaced

slightly from wall surface. Do not install wall covering more than 1/4 inch below top of resilient base.

J. Cover spaces above and below windows, and above doors, in pattern sequence from roll.

K. Hang wall covering alternating top and bottom strips as they come off the roll per manufacturer's instructions for each wall covering specified.

L. Where wall covering tucks into reveals, or metal wallboard or plaster stops, apply covering with contact adhesive within 6 inches of wall covering termination. Ensure full contact bond.

M. Remove excess wet adhesive from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

N. Replace electrical, telephone, wall plates and covers after wall covering is installed and cleaned.

3.4 CLEANING

A. Clean work under provisions of SECTION 01720 - CLEANING.

B. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.

C. Reinstall wall plates and accessories removed prior to work of this Section.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished Work.

B. Do not permit work at or near finished wall covered areas.

END OF SECTION

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Surface preparation and field application of paints and coatings.

1.2 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this Section.

1.3 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.
3. VOC Compliance - Submit documentation indicating VOC content of paints and coatings.

C. Product Data: Provide data on all coating products to be utilized including VOC levels.

D. Samples: Submit 12 x 12 inch samples of each coating color. Indicate item number from List of Finish Materials on the back of each sample (ie. P-1). Colors and sheens shall be as indicated on the Contract Documents.

E. Samples: Submit 12x12 inch stained wood samples of type and quality of wood specified for use on project.

F. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.

1.4 QUALIFICATIONS

A. Manufacturer: Company regularly engaged in and specializing in manufacturing the Products specified in this section with minimum five (5) years experience.

B. Applicator: Company specializing in performing the work of this section with minimum five (5) years experience. Applicator shall possess all necessary licenses, certifications, and other written approvals necessary for execution of the work specified in this section and as required by the product manufacturer(s) supplying the coating materials.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site.

B. Deliver products to site in the manufacturer’s original unopened and labeled containers; inspect to verify acceptability.

C. Container label shall be in legible condition and shall include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

D. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when the surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Do not apply exterior coatings during rain or snow, to wet surfaces, when there is a chance of rain within 24 hours after application, or when the relative humidity is outside the humidity ranges required

by the paint product manufacturer.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Minimum Application Temperature for Varnish and Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface during painting applications.

1.7 EXTRA MATERIALS

A. Provide one (1) gallon of each type paint and color specified. Clearly label.

B. Turn over to Contracting Officer at project closeout.

1.8 SUSTAINABILITY

A. All paints and coatings used on the interior of the building shall comply with the following criteria: (LEED - EQ Credit 4.2: low-emitting materials: Paints & coatings) refer to SECTION 01352 LEED REQUIREMENTS for VOC limits.

B. Architectural paints, coating, and primers applied to the interior walls and ceilings: Refer to SECTION 01352 LEED REQUIREMENTS for VOC limits.

C. Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates: Refer to SECTION 01352 LEED REQUIREMENTS for VOC limits.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers - Paint
1. Sherwin Williams.
2. ICI Dulux.
3. Pittsburgh Paints
4. Benjamin Moore

B. Manufacturers - Transparent Finishes
1. Sherwin Williams
2. ICI Dulux.
3. Pittsburgh Paints
4. Benjamin Moore

C. Manufacturers - Stain
1. Sherwin Williams
2. ICI Dulux
3. Pittsburgh Paints
4. Benjamin Moore

D. Manufacturers - Primer Sealers
1. Sherwin Williams
2. ICI Dulux.
3. Pittsburgh Paints
4. Benjamin Moore

E. Substitutions:
1. Manufacturer’s wishing to have their products listed as an approved equal shall submit the following technical information:
   a. Wet film and dry film thickness
   b. Vehicle
   c. Percentage of solids per volume
   d. VOC content
   e. List of painting contractors in the project area that use the manufacturer’s product.
2. Any submittal lacking the information listed above will be rejected.

F. Refer to Finish Materials List on Contract Drawings for color selections.

2.2 MATERIALS

A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating; good flow and brushing properties; capable of drying or curing free of streaks or sags.

B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

C. Patching Materials: Latex filler.

D. Fastener Head Cover Materials: Latex filler.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Gypsum Wallboard: 12 percent.
2. Interior Wood: 15 percent, measured in accordance with ASTM D4442-92.
3. Concrete Floors: 8 percent.

3.2 PREPARATION - COATINGS

A. Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

B. Correct defects and clean surfaces which affect work of this section. Remove existing coatings that exhibit loose surface defects.

C. Seal with shellac or latex stain blocking sealer any marks that might bleed through paint finishes.

D. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.

E. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

F. Concrete Floors: Remove dirt, dust, soap scum, coatings, oil, wax, concrete curing compounds, etc. prior to the start of installation. The means and methods used to remove curing compound shall be in accordance with the coating manufacturer's written recommendations and shall be approved by the Contracting Officer. Acid shall not be used to remove contamination from floor.

G. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.

H. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

I. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand; power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.

J. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

K. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

L. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.

M. Wood and Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.

3.3 APPLICATION - COATINGS

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry.

C. Apply each coat to uniform finish.

D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

E. Sand wood and metal lightly between coats to achieve required finish.

F. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.

G. Allow applied coat to dry before next coat is applied.

H. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

I. Prime concealed surfaces of interior and exterior woodwork with primer paint.

J. Prime concealed surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.4 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to SECTION 15076 - IDENTIFICATION FOR PLUMBING AND HVAC PIPING AND EQUIPMENT and SECTION 16195 - ELECTRICAL IDENTIFICATION for schedule of color coding and identification banding of equipment, duct work, piping, and conduit.

B. Paint shop primed equipment.

C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

D. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.

E. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

F. Paint exposed conduit and electrical equipment occurring in finished areas.

G. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

H. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated on color schedule. Color band and identify with flow arrows names and numbering.

I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.5 CLEANING

A. Collect waste material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.6 SCHEDULE - EXTERIOR SURFACES

A. Masonry - CMU
   1. One Coat of Primer
      a. S-W: Loxon Block Surfacer, A24W200 at 8.0 mils DFT
      b. ICI: Prep & Prime 3010 Interior/Exterior Block Filler Water Based
      c. PPG: SpeedHide Interior/Exterior Masonry Block Filler Latex 6-7 at 4.8 mils DFT

d. B-M: Moore's Hi Build Acrylic Masonry Primer #068 at 1.0 mils DFT

2. Two coats of Latex enamel, gloss
   a. S-W: A-100 Exterior Latex Satin, A82 Series1.3 mils DFT
   b. ICI: Dulux Fortis 6407 Premium 100% Acrylic Exterior
   c. PPG: Int/Ext Semi-gloss Acrylic Metal Finish 7-347 at 1.5 mils DFT
   d. B-M: Impervex Latex High Gloss Enamel #309 at 1.2 mils DFT

B. Steel - Unprimed, Shop Primed (first coat touch up with primer), and Galvanized:
1. One coat of Primer/Sealer
   a. SW: ProCryl® Universal Primer, B66-310 Series at 2.4 mils DFT
   b. ICI: Devflex 4020PF DTM Primer
   d. PPG: Pitt-Tech Acrylic Primer 90-712 at 2.0-3.0 mils DFT
   e. B-M: Acrylic Metal Primer #OM04 at 1.5 to 2.5 mils DFT

2. Two coats of latex enamel, semi-gloss.
   a. S-W: S-W A-100® Exterior Latex Gloss, A8 Series at 1.3 mils DFT
   b. ICI: Dulux Ultra 1506 Advanced Oil Int/Ext
   c. PPG: Pitt-Tech Acrylic Satin 90-474 at 2.0-3.0 mils DFT
   d. B-M: DTM Acrylic semi-gloss #M29 at 2.0 mils DFT.

3.7 SCHEDULE - INTERIOR SURFACES

A. Wood - Painted:
1. One coat of latex prime sealer.
   a. S-W: Harmony Low Odor Interior Latex Primer, B11W900 at 1.3 mils DFT
   b. ICI: Prep & prime 3210 Gripper Primer Sealer Stain Killer
   c. PPG: Seal Grip Interior Acrylic Undercoater 17-955 at 1.6 mils DFT
   d. B-M: Eco Spec Interior Primer Sealer #231 at 1.2 mils DFT
2. Two coats of latex enamel, semi-gloss.
   a. S-W: Harmony Low Odor Interior Latex Semi-Gloss, B10 Series at 1.6 mils DFT
   b. ICI: Dulux Lifemaster 9200 interior
   c. PPG: Speedhide Interior High Lustre 100% Acrylic Semi-Gloss 6-8510 at 1.1 mils DFT
   d. B-M: Eco Spec Interior Latex Semi-Gloss 224 at 1.4 mils DFT

B. Wood - Transparent (products with an * after them do not meet LEED VOC Compliance):
1. One coat stain
   a. S-W: WoodClassics Oil Stain, A49 Series *
   b. ICI: WoodPride 1700 Interior Solventborne Wood Finishing Stain *
   c. PPG: Rez Interior Oil Stain 77-560*
   d. B-M: Benwood Finishes Penetrating Stain #234*
2. Two Coats Polyurethane Varnish:
   a. S-W: WoodClassics Waterborne Polyurethane Varnish, A68 Series
   b. ICI: WoodPride 1808 Interior Waterborne Aquacrylic Varnish
   c. PPG: Rez Interior Polyurethane 77-85 Gloss or 77-89 Satin *
   d. B-M: Benwood Clear Acrylic Gloss #422 or Low Lustre #423
3. Sand between each coat.
   a. Stain to be as indicated on the drawings
   b. Submit stained and finished sample for each species of wood before proceeding with any stain work.

C. Steel - Unprimed, Shop Primer (first coat touch up with primer), and Galvanized:
1. One coat of latex primer.
   a. S-W: ProCryl Universal Primer, B66-310 Series at 2.0 - 4.0 mils DFT
   b. ICI: Devflex 4020PF DTM Primer
   c. PPG: Pitt-Tech Acrylic Primer 90-712 at 2.0-3.0 mils DFT
   d. B-M: Acrylic Metal Primer #OM04 at 1.5 to 2.5 mils DFT

2. Two coats of latex enamel, semi-gloss
   a. S-W: Harmony Low Odor Interior Latex Semi-Gloss, B10 Series at 1.6 mils DFT
   b. ICI: Advanced Oil 1506 Semi-Gloss
   c. PPG: Pitt-Tech Acrylic Satin 90-474 at 2.0-3.0 mils DFT
   d. B-M: Eco Spec Interior Latex Semi-Gloss 224 at 1.4 mils DFT

D. Gypsum Board:
   1. One coat interior latex primer
      a. S-W: Harmony Low Odor interior wall Primer at 1.6 mils DFT.
      b. ICI: Lifemaster 2000 LM 9116 Primer Finish.
      c. PPG: Speedhide Interior Latex Primer 6-2 at 1.2 mils DFT
      d. B-M: Pristine Eco Spec Latex Primer #231 at 1.2 mils DFT.
   2. Two coats interior latex eggshell enamel.
      a. S-W: Harmony Low Odor Interior Latex Enamel 1.6 mils DFT.
      b. ICI: Lifemaster 2000 LM 9300at 1.5 - 2.0 mils DFT.
      c. PPG: Pure Performance Low Odor Eggshell Latex 9-300 at 1.4 mils DFT
      d. B-M: Pristine Eco Spec Latex #223 at 1.4 mils DFT.

E. Concrete Block (new):
   1. One coat of interior epoxy filler/sealer
      a. S-W: Approved Equal
      b. ICI: Approved Equal
      c. PPG: Approved Equal
      d. B-M: Waterborne Epoxy Block Filler #OM31 at 8.0 to 12.0 mils DFT
   2. Two coats of interior epoxy gloss
      a. S-W: Approved Equal
      b. ICI: Approved Equal
      c. PPG: Approved Equal
      d. B-M: Acrylic Epoxy Gloss Coating #OM43 at 2.0 mils DFT

F. Concrete Block (existing):
   1. Two coats of interior epoxy gloss
      a. S-W: Approved Equal
      b. ICI: Approved Equal
      c. PPG: Approved Equal
      d. B-M: Acrylic Epoxy Gloss Coating #OM43 at 2.0 mils DFT
      e. Provide test patch to check product compatibility with existing surface paint.

G. Concrete Floor Paint:
   1. Two coats of epoxy floor coating
      a. S-W: Approved Equal
      b. ICI: Tru-Glaze-WB 4406 Waterborne Epoxy Semi-Gloss coating
      c. PPG: Approved Equal
      d. B-M: 100% Solids Epoxy Floor Coating #OM40 at 8.0 mils DFT
      e. Provide test patch to check product compatibility with existing surface paint.

H. Mechanical and Electrical Equipment:
   1. Mechanical and Electrical items such as ductwork, conduit and pipes shall be primed and painted with (2) finish coats as described in the drawings and this specification.

I. All equipment attached to the ceiling such as HVAC grilles, speakers and electrical equipment must be painted to match drywall ceiling or ceiling tile and grid color. (Except factory painted light fixtures and equipment.)
   1. One coat of alkyd spray enamel primer:
      a. S-W: Approved Equal
      b. ICI: Approved Equal
      c. PPG: Approved Equal
      d. B-M: IronClad Metal & Wood Aerosol Primer #4930113

   2. Two coats of an alkyd semi-gloss spray enamel:
      a. S-W: Approved Equal
      b. ICI: Approved Equal
      c. PPG: Approved Equal
      d. B-M: IronClad Wood & Metal Low Lustre Enamel #495 series
      e. The above equipment painting shall be accomplished before installation into ceiling.

3.8 PROTECTION OF FINISHED WORK

A. Protect finished coatings from damage until completion of project.

B. Touch-up damages coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

3.9 CLEANING

A. Clean work under provision of SECTION 01720 - CLEANING.

END OF SECTION

SECTION 10100 - VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
   1. Bulletin boards

1.2 SUBMITTALS

A. General:
   1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
   1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Product Data: Provide data on bulletin boards, tack board surface covering, flame and smoke spread ratings, trim, accessories and installation details.

D. Samples: Submit manufacturer's standard fabric samples and frame color samples for selection.

1.3 REGULATORY REQUIREMENTS

A. Conform to the Uniform Building Code, latest edition, for acceptable flame/smoke rating of fabric covered tack boards in accordance with ASTM E84.

1.4 PROJECT CONDITIONS

A. Coordinate the work with wall or partition sections for installation of concealed blocking or anchoring devices.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years experience.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Bulletin boards shall be manufactured by:
   1. Series 800, Lynn Bulletin and Directory Board Manufacturing Company.
   2. Style S-195, The tablet and Tribet Company
   3. Approved Equal

B. See drawings for Bulletin Board locations.

2.2 PRODUCTS

A. Bulletin boards shall be standard manufacture with satin anodized extended aluminum frames. Doors shall be sliding type, ¼" polished plate glass, equipped with finger slots and keyed lock. Tack board material shall be cork or fibrous material (covered in burlap), ¼" minimum thickness, mounted on hardboard or plywood backing.

2.3 FINISHES

A. Tack board Surface to be selected by Architect from manufacturer's standard fabric selection.

B. Aluminum Frame: Finish to be selected by Architect from manufacturer's standard finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that internal wall blocking is ready to receive work and positioning dimensions are as instructed by the manufacturer.

3.2 INSTALLATION

A. Install tack board in accordance with manufacturer's instructions.

B. Locate tack board where indicated on the drawings.

C. Establish top of tack board at 84 inches above finished floor.

D. Secure tack board level and plumb.

3.3 CLEANING

A. Clean work under provisions of Specification SECTION 01720 – CLEANING.

B. Clean tack board and adjacent surfaces prior to final inspection.

3.4 SCHEDULE

A. As indicated on the Contract Drawings.

END OF SECTION

SECTION 10260 - WALL AND CORNER GUARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Corner guards.
2. Bumper Guards

1.2 PERFORMANCE REQUIREMENTS

A. Corner Guards: Resist lateral impact force of 100 lbs at any point without damage or permanent set.

B. Impact Strength: Provide assembled wall protection units that have been tested in accordance with the applicable provisions of ASTM F476.

C. Chemical & Stain Resistance: Provide wall protection system with resistance in accordance with ASTM D1308.

D. Fire Performance Characteristics: Provide wall protection system components with UL label indicating they are identical to those tested in accordance with ASTM E84.

1.3 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.4 REGULATORY REQUIREMENTS

A. Conform to ANSI A117.1 requirements for the physically handicapped.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years experience.

B. Installer: Company specializing in performing the work of this section with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials in original, undamaged packaging. Materials must be stored flat.

1.7 PROJECT CONDITIONS

A. Coordinate the work with wall or partition sections for installation of concealed blocking or anchor devices.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Wall and corner guards shall be manufactured by:
1. Pawling Corporation
2. Balco., Inc.

3. CS Acrovyn
4. Approved Equal

2.2 COMPONENTS

A. Corner Guards - Surface Mounted:
1. Acceptable product:
a. Pawling CG-51
2. Product Description - Stainless Steel Surface mounted corner guards (2 inch x 2 inch) with extruded aluminum retainer.
3. Length - As indicated on Contract Documents.
4. End caps - Molded end caps to color match covers.

B. Mounting Brackets and Attachment Hardware: Types specified in manufacturer’s printed instructions for component and substrate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that rough-in for components are correctly sized and located.

3.2 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.

B. Position corner guards and bumper guards as indicated on drawings.

C. Install all corner guards above the base material.

D. Install corner guard in single-piece length for each location; except as otherwise indicated, end-to-end butt joints are not permitted.

E. Adjust installed end caps as necessary to ensure tight seams.

3.3 CLEANING

A. Clean work under provisions of Specification SECTION 01720 – CLEANING.

B. Clean wall, corner guards and bumper guards and adjacent surfaces.

3.4 PROTECTION OF FINISHED WORK

A. Protect installed materials to prevent damage by other trades.

END OF SECTION

SECTION 10440 - WALL AND DOOR SIGNS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Engraved plastic signs.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions and mounting methods for each sign.

D. Samples: Submit manufacturer's standard color chart for selection.

1.3 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five (5) years experience.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable code and ANSI A117.1 for requirements for the physically handicapped.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site.

B. Store adhesive attachment tape at ambient room temperatures.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not install signs when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
1. ASI
2. Best Manufacturing Company
3. Takeform Architectural Graphics
4. Or Approved equal.

2.2 ROOM IDENTIFICATION SIGNS

A. Description:
1. Material: Acrylic Plastic matt finish.
2. Plaque Size: 6 inches high by 6 inches wide by 1/8 inch thick. See Contract Documents for types. 9 inch high by 6 inch wide for toilet rooms and code sign.
3. Plaque Shape: Square/Rectangular, with square corners.
4. Plaque Color: Contractor to submit standard colors for selection.
5. Lettering Size: 5/8 inch high.
6. Lettering Style: Helvetica Medium, Capitals, raised 1/32"
7. Lettering Color: White

8. Braille: All lettering shall be accompanied by Grade 2 Braille.
9. Signs shall meet current ADA Standards.
10. Mounting method: Silastic Adhesive Mounting (SAM).
11. Mounting Location and Heights: Indicated on Contract Documents.
12. Schedule: Indicated on the Contract Documents.
13. A maximum of 2 colors will be selected.
14. Toilet room signs shall have pictogram as required by ADA guidelines.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install signs after doors and surfaces are finished.

C. Locate signs where indicated and scheduled on the Contract Documents.

D. Install signs plumb and level.

END OF SECTION

SECTION 10500 - METAL WARDROBE LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Locker units with hinged doors.
2. Metal bases, tops, clothes rod and shelf.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Product Data: Provide data on locker types, sizes and accessories.

D. Shop Drawings: Indicate locker plan layout, numbering plan and clothes hanging area.

E. Samples: Submit color samples of manufacturer’s standard colors.

F. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.3 DELIVERY, STORAGE, AND PROTECTION

A. Material and Equipment: Transport, handle, store, and protect products.

B. Protect locker finish and adjacent surfaces from damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Lockers shall be manufactured by:
1. The Republic Storage Systems.
2. Lyon Metal Products, Inc.
3. Penco Products, Inc.
4. Approved Equal

2.2 MATERIALS

A. Sheet Steel: Mild, cold rolled and leveled unfinished steel; to the following minimum thicknesses:
1. Body and Shelf: 24 gage 0.024 inch
2. Door (One Piece): 18 gage 0.048 inch
3. Door Frame: 16 gage 0.060 inch
4. Hinges: .050 inch thick
5. Base: 20 gage 0.036 inch
6. Sloping Top: 20 gage 0.036 inch
7. Trim: 20 gage 0.036 inch

2.3 FABRICATION

A. Locker: BREAK ROOM 106:
1. Units: 16 lockers
2. Width: 12 inches
3. Depth: 18 inches
4. Height: 12 inches
5. Mounting: Floor and wall mounted
6. Base: Metal Base and ends
7. Base Height: 4 inch

8. Top: Sloped metal with closures
9. Locking: Equipped for padlock hasps
10. Ventilation Method: Mini louvers
11. Construction: Standard
12. Color: Manufacturer's standard color.
13. Provide coat rod between locker tiers.

B. Locker Body: Formed and flanged; with steel stiffener ribs; electric spot welded.

C. Frames: Formed channel shape, welded and ground flush, welded to body.

D. Doors: Channel construction, 1 3/16 inch (30 mm) thick; welded construction, channel reinforced top and bottom with intermediate stiffener ribs, grind and finish edges smooth.

E. Hinges: Two for all doors; weld securely to locker body and door.

F. End Panels: Finished end panels at exposed ends.

G. Locking device supplied by Owner.

H. Number Plates: Provide rectangular shaped aluminum plates. Form numbers 3½ inches high of block font style with ADA designation, in contrasting color.

I. Provide ventilation openings at top and bottom of each locker.

J. Form recess for operating handle and locking device.

K. Finish edges smooth without burrs.

L. Fabricate sloped metal tops and closure pieces.

M. Provide end panels and filler strips.

N. Fabricate 4 inch high steel bases with end closures.

2.4 FINISHES

A. Clean, degrease, and neutralize metal; prime and finish with one coat of baked enamel.

B. Paint locker units of 1 color throughout.

C. Color: As selected by Architect from manufacturer's standard range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that area is ready for locker installation.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install lockers plumb and square.

C. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 lb.

D. Bolt adjoining locker units together to provide rigid installation.

E. Install filler panels, sloped tops, and bases.

F. Install accessories.

G. Replace components that do not operate smoothly.

3.3 CLEANING

A. Clean lockers and adjacent surfaces under provisions of SECTION 01710 - CLEANING.

B. Clean interior and exterior surfaces of all lockers.

END OF SECTION

SECTION 10520 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section shall include the following:
   1. Fire extinguishers.
   2. Fire extinguisher cabinets.

1.2 SUBMITTALS

A. General:
   1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
   1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, and locations.

D. Product Data: Provide extinguisher operational features, color and finish, anchorage details and special criteria and wall opening coordination requirements.

E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.3 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS

A. Manufacturers:
   1. Larsen's Manufacturing Co.
   2. J.L. Industries.
   3. Potter - Roemer
   4. Approved Equal

B. Dry Chemical Type: Enameled Cast steel tank, with pressure gage; Class 4A-60B:C, 10 lb. nominal capacity, Type ABC.

C. Wet Chemical Type: Enameled Cast steel tank, with pressure gage; Class 2A-1B:K, 12-3/4 lb. nominal capacity.

D. Provide and install one fire extinguisher for every cabinet indicated on the Contract Documents.

2.2 FIRE EXTINGUISHER CABINETS

A. Manufacturers:
   1. Larsen's Manufacturing Co.
   2. J.L. Industries.
   3. Potter - Roemer
   4. Approved Equal

B. Metal: Formed aluminum; 5/8 inch thick.

C. Configuration: Semi-recessed type, sized to accommodate accessories exterior nominal dimensions of 9½ inch wide x 24 inch high x 6 inch deep.

D. Trim Type: Returned to wall surface, with 2½ inch projection.

E. Door: 5/8 inch thick, reinforced for flatness and rigidity; latch vertical partial glass.

F. Door Glazing: Clear, tempered safety glass.

G. Cabinet Mounting Hardware: Appropriate to cabinet.

H. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim and door stiles.

I. Pre-drill for anchors.

J. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon catch.

K. Weld, fill, and grind components smooth.

L. Glaze doors with resilient channel gasket glazing.

M. Finishing Cabinet Exterior Trim and Door: Clear anodized finish.

N. Lettering: Color- Black, vertical orientation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings and on steel tube columns, 56 inches from finished floor to top of cabinet.

C. Secure rigidly in place.

D. Remove fire extinguisher from packaging and place extinguishers in clean fire extinguisher cabinets.

3.3 ADJUSTMENTS

A. Adjust fire extinguisher doors to operate smoothly.

3.4 CLEANING

A. Clean fire extinguishers, outside of fire extinguisher cabinets, and interior of fire extinguisher cabinets under provisions of SECTION 01710 - CLEANING.

B. Clean debris from adjacent surfaces.

END OF SECTION

SECTION 10670 - STORAGE SHELVING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Installation of open storage shelf units.

1.2 COORDINATION

A. Coordinate delivery of storage units with AAFES Project Manager

B. Notify AAFES Project Manager when Contractor will be ready to install storage shelving.

PART 2 - PRODUCTS

(Not Used).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that existing conditions are acceptable and ready to receive work before starting work.

3.2 INSTALLATION

A. Install equipment in accordance with manufacturer's instructions.

END OF SECTION

SECTION 10710 - METAL SUN SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Modular, shop fabricated, metal sun shades to mount on exterior curtain wall framing and building walls.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.
a. Product data for sun shade components and finish.
b. Shop drawings showing layout, dimensions, spacing of components, and anchorage and installation details.
c. Calculations for support system.
d. Sample: 10 by 10 inches minimum size sample of sun shade panel illustrating design, fabrication workmanship, and selected color coating.
e. Copy of warranty specified in Paragraph 1.5 for review by Architect.

1.3 QUALITY ASSURANCE

A. Design structural support framing components for sun shades under direct supervision of professional structural engineer.

B. Installer qualifications: Approved by manufacturer for installation sun of shade system.

1.4 WARRANTY

A. Provide in accordance with Section 01 77 00 - Closeout Procedures:
1. 10 years warranty for factory finish against cracking, peeling, and blistering under normal use.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Ametco® Manufacturing Corporation, 4326 Hamann Parkway, P.O. Box 1210, Willoughby, Ohio 44096; 800-362-1360.

B. Requests to use equivalent products of other manufacturers shall be submitted in accordance with SECTION 00404 – PRODUCT SUBSTITUTION.

2.2 MATERIALS

A. Steel bar stock: ASTM A36.

B. Steel tubing: ASTM A500, Grade B.

C. Steel sheet: ASTM A526 galvanized or ASTM A792 Galvalume.

D. Extruded aluminum: ASTM B221, Alloy 6063, Temper T-6.

E. Sheet aluminum: ASTM B209 6063, Temper T-6.

2.3 SUN SHADE SYSTEM

A. Type: Aluminum sun shades consisting of modular framed panels with louver infill for mounting on window framing and exterior wall surfaces; Sun Shades as manufactured by Ametco® Manufacturing Corporation or approved equal.

B. Sun shade panel: Modular panel with perimeter frame.
1. Panel size: As indicated on Drawings and approved shop drawings.
2. Panel infill: Bar grill type consisting of flat, vertical bars connected with cross bars; Style 103 as manufactured by Ametco® Manufacturing Corporation or approved equal.
a. Incident angle of sun shade: 45 degrees.
b. Main bars: 4-inch by ½ -inch bars on 2-13/16 inches on center.

C. Support system: Provide outriggers or other means for support of sun shade panel fabricated from same material as panel. System shall be designed to resist applicable dead, live, wind, and seismic loads.
   1. Type: Straight projecting outriggers.
   2. Construction: Welded fabrication consisting of attachment plate, double support angles, and tapered plate extension as detailed and dimensioned on Drawings and approved shop drawings.
   3. Size: As required to provide sufficient structural support of panels.

D. Fasteners: Stainless steel bolts, studs, and other types of size and spacing as recommended by manufacturer for specific condition and detailed on approved shop drawings.

2.4 FACTORY FINISH

A. Sun shade panels, outriggers, and other components shall receive electrostatically applied colored polyester powder coating heat cured to chemically bond finish to metal substrate.
   1. Minimum hardness measured in accordance with ASTM D3363: 2H.
   2. Direct impact resistance tested in accordance with ASTM D2794: Withstand 160 inch-pounds.
   3. Salt spray resistance tested in accordance with ASTM B117: No undercutting, rusting, or blistering after 500 hours in 5 percent salt spray at 95 degrees F and 95 percent relative humidity and after 1000 hours less than [3/16 inch] [5 mm] undercutting.
   4. Weatherability tested in accordance with ASTM D822: No film failure and 88 percent gloss retention after 1 year exposure in South Florida with test panels tilted at 45 degrees.

B. Color: Custom color as selected by Architect.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to fabrication, field verify required dimensions.

B. Coordinate sun shade installation with provision of exterior wall system and curtain wall system to ensure proper structural support is provided, attachment of sun shades is compatible with substrate, and weathertightness of exterior envelop is maintained.

3.2 INSTALLATION

A. Install sun shades in accordance with manufacturer's installation instructions and approved shop drawings.

B. Insulate dissimilar metals to prevent electrolysis with bituminous paint or non-absorptive gasket to prevent contact.

C. Allow for thermal expansion and contraction of metal components.

D. Install shade panels plumb, level, free from distortion, and aligned with building elements and adjacent shade panels.

E. Do not installed bent, bowed, or otherwise damaged panels. Remove damaged components from site and replace.

F. Attach shade panels to outriggers with appropriate fasteners for secure, permanent installation.

G. After installation, touch-up damaged finish with paint supplied by manufacturer and matching original coating.

END OF SECTION

SECTION 10800 - WASHROOM ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section includes the following:
1. Washroom accessories.
2. Grab bars.
3. Attachment hardware.

1.2 SUBMITTALS

A. General:
1. Submittals shall be in accordance with SECTION 01310 - SUBMITTALS.

B. Sustainability:
1. Indicate recycled content - Indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
2. Local/Regional Materials - Indicate distance between manufacturing facility and the project site. Indicate distance between extraction, harvesting, and recovery and the project site.

C. Product Data: Provide data on accessories describing size, finish, details of function, and attachment methods.

D. Shop Drawing: Provide a detailed schedule indicating location and number of accessories to be provided keyed to the room numbers on the contract documents.

E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and coordination.

1.3 REGULATORY REQUIREMENTS

A. Conform to ANSI A117.1 code for access for the handicapped.

1.4 COORDINATION

A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

1.5 DELIVERY, STORAGE AND PROTECTION

A. Maintain protective covers on all units until installation is complete. Remove protective covers at final clean up of installation.

B. Replacing: All cracked, broken, or imperfect glass mirrors which cannot be properly cleaned shall be replaced at no cost to AAFES.

1.6 WARRANTY

A. All mirrors shall be warranted against silver spoilage for 15 years.

B. Accessories shall be warranted for a period of one (1) year from defects in workmanship and material.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Washroom accessories shall be manufactured by:
1. Bobrick Washroom Equipment, Inc.
2. The following manufacturers are considered approved equals:
a. American Specialties, Inc.
b. Bradley Corporation

B. Child protection seat and diaper changing station shall be manufactured by:
1. Koala Corporation
2. Bobrick Washroom Equipment, Inc.
3. Approved Equal

C. All washroom accessories indicated in the Schedule shall be furnished and installed by the Contractor.

D. All accessories shall be complete with screws and fittings, including concealed anchorage where required, to provide a secure mechanical attachment for each item. Attachment with adhesives or tape is not permitted unless specified for specific items. Model numbers specified are to establish general type and quality. Equipment shall incorporate all characteristics required by description following each model.

E. All accessories to comply with most current accessibility requirements, including size and location of grab bars, and heights of dispensing units.

F. All items of each type to be made by the same manufacturer.

G. Mirrors to be compliant with FS-DD-M-411C.

2.2 MATERIALS

A. Stainless Steel.
   1. Stainless Steel Sheet: ASTM A167, Type 304.
      a. 22 gauge minimum.

2.3 FABRICATION

A. Weld and grind joints of fabricated components, smooth.

B. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.

C. Shop assemble components and package complete with anchors and fittings.

D. Provide steel anchor plates, adapters, and anchor components for installation.

E. Provide locks for all dispensing units.

2.4 KEYING

A. Key alike all accessories.

B. Supply one key for each accessory and deliver with instruction sheets to the AAFES Facility Manager.

2.5 FINISHES

A. Galvanizing: ASTM A123 to 1.25 oz/sq yd. Galvanize ferrous metal and fastening devices.

B. Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats vitreous enamel.

C. Stainless Steel: No. 4 satin luster finish.

D. Back paint components where contact is made with building finishes to prevent electrolysis.

2.6 ACCESSORIES SCHEDULE

A. See Accessory List on Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that openings scheduled to receive recessed or semi-recessed units are ready to receive work, are the correct dimensions as instructed by the manufacturer, and are plumb and square.

B. Verify that areas scheduled to receive surface mounted units are ready to receive work.

C. Verify exact location of accessories prior to installation.

D. Verify that field measurements are as instructed by manufacturer.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions and ANSI A117.1.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting heights and locations shall be as indicated on the drawings and in accordance with ADA accessibility regulations.

3.4 ADJUST AND CLEAN

A. Clean under provision of SECTION 01720 - CLEANING.

B. Adjust accessories for proper operation.

C. Clean and polish all exposed surfaces after completion of installation.

END OF SECTION

SECTION 13048 - CANOPY

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. All labor, equipment and material and incidentals to design, furnish and install a prefabricated metal canopy to include footings and lighting where shown on the drawings and described herein:

1.2 QUALITY ASSURANCE

A. Structures shall be the product of a manufacturer with a minimum of 20 years documented experience in the design and fabrication of steel canopies.

B. Electrical devices factory installed within the prefabricated canopy shall be UL listed. Factory installed wiring system shall bear UL Classification label certifying compliance with the National Electric Code.

C. A registered professional structural engineer licensed in the State the project is occurring in shall accomplish structural design. Design shall be accomplished in accordance with International Building Code (IBC), State and local building codes.

D. Verify all dimensions shown on drawings by taking field measurements to insure proper fit and attachment of all component parts.

1.3 SUBMITTALS

A. Furnish complete literature and installation and assembly drawings to the Contracting Officer for review prior to fabrication and installation to include:
   1. Manufacturer's data.
   2. Drawings shall indicate materials, finish size and methods of fabrication, assembly, and installation.
   3. Calculations for design of the canopy structure and footings shall be submitted for approval prior to fabrication. A professional engineer in the State the project is occurring in for entire canopy structures and footings shall seal design calculations. A subsurface investigation, if available, will be presented in Section 02050. If a subsurface investigation is not presented, all investigations required for the design of the canopy and footings shall be acquired by and at the expense of the Contractor.

B. Submit color charts illustrating all finish colors and patterns.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver items in manufacturer's original protective packaging.

B. Handle so as to prevent damage to finished surface.

C. Maintain protective covers on all items until installation is complete.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL FRAMING

A. Columns shall be fabricated from hollow structural sections conforming to ASTM A500 Grade B, with minimum yield strength of 46 ksi. ASTM A36 structural steel plate with minimum yield strength of 36 ksi with pre-punched or pre-drilled boltholes shall be used for column top and base plates. Columns shall be provided with electrical access openings, cover plates, conduits and drains per owner requirements.

B. Wide flange beams conforming to ASTM A572 Grade 50 with minimum yield strength of 50 ksi shall be used as the primary roof-framing members. Other roof-framing members (channel, angle, or tees), if used, shall conform to ASTM A36 with minimum yield strength of 36 ksi. Bracing shall be designed as

required by design.

C. Structural steel plate shall conform to ASTM A36 with minimum yield strength of 36 ksi.

D. Structural bolts shall conform to ASTM A325 Specification for High Strength Bolts for Structural Steel Joints. All structural steel framing members shall be shop fabricated for field bolted assembly, unless otherwise specified on drawing.

E. Anchor bolts shall conform to ASTM A36 with minimum yield strength of 36 ksi. Double nuts and washers shall be provided with each anchor bolt, with one set to be used for leveling column.

F. All structural steel framing members shall be cleaned to remove loose mill scale and other foreign matter.

G. After cleaning, all members shall be given one shop coat of rust-inhibitive primer. The primer coat thickness shall be a minimum of 1 mil.

2.2 DECK PANEL

A. Roof deck panels shall conform to ASTM A653 Grade 40 steel with minimum yield strength of 40 ksi, with a G60 galvanized surface per ASTM A924.

B. Panel profile shall have a minimum thickness of 24 gauge.

C. Panels shall have a finish side coated with a full coat of white polyester paint baked on over an epoxy primer. A white wash coat baked on over an epoxy primer shall protect the interior side of the panel.

D. Panels shall be fastened to the bottom flange of the wide flange purlin beams with a system, which requires no "through the panel" fasteners.

E. Deck panels shall not be spliced.

2.3 FASCIA SYSTEM

A. Provide and install one of following approved fascia systems:

1. Type 1 – Smooth vertical 18 gauge preformed steel panels shall conform to ASTM A653 Grade CS with minimum yield strength of 25 ksi, with a G90 galvanized surface per ASTM A924. Panel shall be provided with a powder coat paint finish, in a size and color per AAFES requirements.

2. Type 2 – Aluminum Composite Material Panels shall be provided with a 3 mm thick pre-finished aluminum composite material substrate. Finish color shall be factory applied. color per AAFES requirements.

3. Type 3 – Foam core laminated steel panels shall be provided with a 24 gauge G90 galvanized steel front and back with a 2 inch thick core of expanded polystyrene with 1.5 pcf density. Panels shall have a finish side coated with a full coat of polyester paint baked on over an epoxy primer, color per AAFES requirements.

B. Fascia outriggers shall be cold formed 2” x 2” x 20 gauge steel angles conforming to ASTM A653 Grade CS with a minimum yield strength of 25 ksi, with a G90 galvanized surface per ASTM A924. 2” x 2” x 18 gauge or 2” x 2” x 1/8 inch structural angle shall be used as required by design. Outrigger spacing per design requirements.

C. There shall be no exposed fasteners on exterior or bottom face of fascia panels.

D. Vertical seams shall be sealed from backside.

24 gauge flashing shall be used as required by design

2.4 GUTTER

A. Gutter shall conform to ASTM A653 Grade 40 steel with minimum yield strength of 40 ksi, with a G60

galvanized surface per ASTM A924.

B. Profile shall be at a minimum be 12-inch wide x 4-inch deep, 24 gauge thick.

C. Gutters shall have a finish side coated with a full coat of polyester paint baked on over an epoxy primer. A white wash coat baked on over an epoxy primer shall protect the interior side of the gutter.

D. Gutter leaders to column drain shall be one of the following options: 3 inch diameter PVC pipe with a 24 gauge leader cover (dry leader) or an 8 inch wide tapered (4 inch to 6 inch deep) 24 gauge steel leader (wet leader). Larger gutters shall be used where required for proper drainage.

2.5 DOWNSPOUTS

A. Internal downspouts shall be 3 inch diameter PVC with couplings provided at gutter leader attachment location. Extend downspout through column at base. Reinforce column structurally at drain penetration hole.

2.6 LIGHTS

A. Lighting layout and fixtures shall be per requirements shown in the plans.

2.7 SIGNS

A. Signs and logos shown in the drawings will be furnished and installed by AAFES. Signs and logos are shown in drawings for information only.

2.8 SEALANTS

A. Exposed joints shall be sealed with a high-quality silicone caulk color to match.

B. Non-exposed joints shall be sealed with white or bronze polyurethane sealant.

C. Other sealant such as Black Mastic, strip caulk or double-sided tape shall be used as required by design.

2.9 FOOTINGS

A. Footings shall be designed and installed by the fabricator. Designs shall conform to State and local building codes. A professional engineer in the State the project is occurring in shall seal design calculations. Calculations shall be submitted for approval prior to placing the footings. Footings shall be reinforced concrete. Subsurface investigations shall be the responsibility of the fabricator.

B. Concrete shall conform to ACI 301.

C. Reinforcement shall conform to ASTM A615.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Footings shall be placed in conformance with CRSI 63 and 67. Anchor bolts and templates shall be shipped to owner prior to pouring canopy footings.

B. Structural steel shall be set plumb, square and level in accordance with Erection drawings provided by the fabricator. Erection of structural steel shall be in accordance with the latest AISC Specifications and Code of Standard Practice. All structural bolts shall be tightened by the turn-of-the-nut method as specified in the latest RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts.

C. Deck, fascia, and gutter systems, as well as other accessories shall be assembled in accordance with by the fabricator.

3.2 ADJUST AND CLEAN

A. After installation, make final adjustments to ensure all members fit and are aligned properly.

B. After final adjustment, all metal surfaces shall be cleaned in accordance with the manufacturer's

recommendations.

C. Leave work area clean and free of debris.

END OF SECTION

SECTION 13050 - GASOLINE DISPENSING AND UNDERGROUND STORAGE TANK SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide a complete gasoline fueling system, including but not limited to underground storage tanks, submersible turbine pumps, electrical wiring, electronic control/monitoring/leak detection system, Stage I & II vapor recovery system, vent lines, fill risers, product piping, fittings, valves, caps, unions and necessary appurtenances, specified, shown on the drawings, and required for a complete and operating system. The complete fueling system shall include AAFES-furnished, Contractor-installed gasoline dispensers, and electrical controls (POS) system.

B. The complete operational gasoline dispensing system must be successfully tested, certified, and registered, and shall have all necessary permits to conduct sales of gasoline. Contractor shall obtain and pay for all required testing, certifications and registrations.

C. Provide complete double-wall product piping system, including secondary containment and accessories specified, shown on the drawings, and required to prevent the possibility of contamination of air, soil, water, or groundwater.

D. Install AAFES-furnished electronic gasoline dispensing system including dispensers, control consoles, interconnecting devices and accessories furnished by AAFES and required for a complete and operating system.

E. Provide submersible turbine fuel pumps including pump riser pipe as specified, shown on the drawings, and required for a complete and operating installation. Provide check valves, ball valves, metal flex connectors and shut-off (isolation) valves required.

F. Provide fiberglass-reinforced plastic (FRP) double-wall underground fuel storage tanks including hold-down devices, (deadman or slab), recommended by the tank manufacturer, and sealed turbine pump enclosures specified, shown on the drawings, and required for a complete and operating system.

G. Provide tank monitoring/inventory control/release detection system including console with alarm capability, automatic tank gauging equipment, electronic line leak detectors for primary piping of double-walled product piping, sensors for all secondary containment (including tank, piping and dispenser sumps), an overfill alarm with acknowledgement switch, and accessories specified, shown on the drawings, and required for a complete and operating system.

H. Provide the excavation, trenching, and backfilling required for installation of the fuel system.

I. Contractor shall prepare and pay for all required State, County, and Local permits, applications and registrations or other documents required for the installation and operation of gasoline storage and dispensing facilities. This includes preparation of documentation to satisfy the initial notification and notification of compliance status requirements under 40 CFR 63.11124. Coordinate the preparation and submission of documents with the Post or Base Environmental Office. Contractor shall also hire a State certified inspector to inspect fuel system within 6 months after installation is complete.

J. Coordinate installation construction with applicable sections within Division 16 - Electrical work.

K. Related work specified elsewhere (as applicable to the project):
1. Earthwork - Section 02300.
2. Cast-in-Place Concrete - Section 03300.
3. Mechanical Work - Division 15.
4. Electrical work - Division 16.

1.2 QUALITY ASSURANCE

A. Comply with the following codes and standards (use the most recent version and most stringent requirements):

1. NFPA No. 30, Flammable and Combustible Liquids Code.
2. NFPA No. 30A, Automotive and Marine Service Station Code.
3. NFPA No. 70, National Electrical Code
4. NFPA No. 329, Handling Underground Release of Flammable and Combustible Liquids
5. EPA 40 CFR Part 280, Technical Standards and Corrective Action Requirements for Contracting Officers and Operators of Underground Storage.
6. EPA 40 CFR Part 63, National Emission Standards for Hazardous Air Pollantants for Source Categories.
7. OSHA 29 CFR Part 1910.106, Flammable and Combustible Liquids.
8. ASTM D2310, Standard Classification for Machine-Made Reinforced Thermosetting-Resin Pipe.
9. ASTM D2517, Standard Specification for Reinforced Epoxy Resin Gas Pressure Pipe and Fittings.
10. ASTM D2996, Standard Specification for Filament-Wound "Fiberglass" (Glass Fiber-Reinforced Thermosetting Resin) Pipe.
11. ASTM D4021, Standard Specification for Glass-Fiber-Reinforced Polyester Underground Petroleum Storage Tanks.
12. UL 79, Power-Operated Pumps for Petroleum Product Dispensing Systems.
13. UL 87, Power-Operated Dispensing Devices for Petroleum Products.
14. UL 567, Pipe Connections for Flammable and Combustible Liquids and LP-Gas.
15. UL 842, Valves for Flammable Fluids.
16. UL 860, Pipe Unions for Flammable and Combustible Fluids and Fire Protection Service.
17. UL 971, Nonmetallic Underground Piping for Flammable Liquids
18. UL 1238, Control Equipment for Use with Flammable Liquid Dispensing Devices.
19. UL 1316, Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products.
20. API 1615 Installation of Underground Petroleum Storage Systems.
21. API 1628 A Guide to the Assessment and Remediation of Underground Petroleum Releases (if a release is expected).
22. California Air Resources Board (CARB) Executive Orders applicable to system.
23. California Air Resources Board (CARB) Test Procedures applicable to system.
24. PEI RP 100 Recommended Practices for Installation of Underground Storage Systems.
25. PEI RP 300 Recommended Practices for Installation and Testing of Vapor Recovery Systems at Vehicle Fueling Sites.
26. PEI 400 Recommended Procedures for Testing Electrical Continuity of Fuel-Dispensing.
27. All other applicable ASTM and UL standards.
28. All applicable EPA requirements relating to release detection, spill and overfill prevention, and corrosion protection.
29. The Code of Maryland Regulation (COMAR) and Maryland Department of the Environment, Land Management Administration, Oil Control Program.
30. Maryland Department of the Environment, Air and Radiation Administration, Air Quality Permits Program.
31. All other applicable Local, County, State, and Federal codes, standards, licensing and registration requirements.

B. Contractor Experience and Licensing:

1. Contractor shall certify that he (or his installation sub-contractor) has at least four years experience installing underground gasoline storage tanks and dispensing equipment and holds all certifications or licenses required by the State in which the project is to be constructed. He shall also assure that the designed gasoline fuel system shall be installed by skilled workmen, licensed by the State in which the project is constructed (if required by State regulations) or certified by the equipment manufacturers. Contractor's installer and electrician shall have prior experience with fuel systems and related equipment. As evidence of this experience, a list of the most recent three fuel system installations performed by this contractor with complete descriptions of the location, the project name, and the equipment installed and date of project shall be submitted to the Contracting Officer prior to award of contract.
2. Contractor Certification of Authorized Factory Service Personnel. Contractor shall certify that he (or his installation subcontractor) is a certified installer and/or Authorized Service Contractor for the following equipment manufacturers, as applicable to the system being installed:
   a. Dresser Wayne.
   b. Veeder-Root Monitoring/Inventory/Leak Detection System.
   c. Veeder-Root, Red Jacket Pump Division
   d. OPW / FlexWorks
   e. Xerxes, Inc.
   f. Ameron International, Fiberglass Pipe Division.
   g. Containment Solutions, Inc.
3. Contractor shall also certify that he (or his installation subcontractor) holds all necessary licenses for construction and installation required under this contract at the project location. These certifications shall be submitted in writing to the Contracting Officer before award of contract. Changing subcontractors after this certification will require re-certification of the new contractor, showing requisite experience.
4. Contractor shall certify that the installation of the petroleum-system-related electrical components will be done by an experienced contractor or subcontractor. This contractor shall have fuel electrical system experience with systems similar to those installed under this contract. (Petroleum-system-related components are those essential to the legal operation of the petroleum storage, dispensing, leak detection, and emergency equipment. They include, but are not limited to: dispensers, submersible pumps, pump controllers, leak detection equipment, vapor recovery systems, emergency shut-off switches, and all conduit related to these systems.) As evidence of this experience, a list of the most recent three fuel system installations performed by this contractor with complete descriptions of the location, the project name, and the equipment installed and date of project shall be submitted to the Contracting Officer before award of contract. NOTE: It is preferred but not mandatory that the petroleum electrical subcontractor be a subcontractor to the petroleum system installer. If the petroleum electrical installer is a subcontractor of the petroleum systems installer described in 1, above, and worked on the projects submitted under that paragraph, contractor shall so certify and no additional projects need be reported.

C. Detailed drawings of proposed departures due to actual field conditions or other causes shall be submitted to the Contracting Officer for coordination of approval. The contractor shall carefully examine the drawings and shall be responsible for the proper fitting of materials and equipment without substantial alteration. Materials and equipment installed in the system shall be suitable for the pressures and temperatures expected to be encountered and suitable to the climate and environmental conditions of the location of the project.

D. Contractor's responsibilities under this quality assurance section include, but are not limited to, the following:

1. Receipt and storage of all items of equipment in a location protected from theft, vandalism, inclement weather, or other damage.
2. Providing required interconnections to product pumps and emergency disconnect systems.

3. Construction of openings, depressions, and sleeves for mechanical and electrical piping and conduit as required.
4. Providing hardware and related items as required to assure that equipment components are properly mounted, securely anchored, adequately ventilated, or where required, are adequately sealed from vapors.
5. Verifying size of components to assure space required for dispensers, consoles and interconnecting devices does not exceed designated space available as indicated on drawings.
6. Determining if unusual conditions or circumstances exist at the site (or in the vicinity of the installation) which could damage the electronic components or circuitry, or otherwise impair the proper function of the system, and incorporating, in such event, the necessary protective devices into the installation.

1.3 SUBMITTALS

A. Submit shop drawings for the following in accordance with Section 01300 requirements:
1. Dispenser Sumps
2. Product and vent piping and fittings
3. Pump Sumps
4. Spill Containers
5. Submersible fuel pumps
6. Underground fuel storage tanks
7. Tank monitoring / inventory control / release detection system

B. No work shall be performed without the shop drawing having been approved by Contracting Officer or Contracting Officer's designee.

C. Contractor shall provide a proposed schedule of the phases of the work for the installation of the gasoline storage tanks, piping and dispensing systems.

D. Other underground fuel storage tank submittals shall include:
1. Contractor shall submit six copies of shop drawings for each tank of same size. Drawings shall include all critical dimensions and show locations of all fittings and accessories, i.e., manways, hold-down straps, etc. All shop drawings shall be submitted at the same time.
2. Contractor shall submit six copies of equipment information from manufacturer's catalog data, installation instructions and calibration charts.
3. Two conversion charts shall be left with the Facilities Manager upon the completion of construction.
4. Fuel System Environmental Compliance Documentation and Records. The following documents or the state or location's equivalent of these records will be furnished in two copies, one left at the AAFES facility manager's office and one furnished to the Contracting Officer for delivery to the installation environmental office. See Part 3.20 of this Section.
5. Digital photographs of main stages of tank installation and other construction activities, as shown below. Sufficient photographs to adequately document and represent the activity will be taken. Any problems encountered or authorized deviations from the drawings or specifications will be documented with appropriate photographs. The contractor will submit the photographs via the internet to the AAFES Contractware website as soon as possible but not later that 5 business days prior to any scheduled AAFES technical inspection (or 5 business days prior to the final inspection, if documenting work done between the last AAFES technical inspection by the AAFES A-E inspection and the final inspection).

6. Four copies of a chronological Installation Report of the complete tank system installation construction documenting all major activities related to the installation of the underground storage tanks, piping, dispensing and release detection equipment and Stage II Vapor recovery system (if required) shall be provided to AAFES Contracting Officer. Contractor's Installation Report shall include documentation of construction activities and photographs of the construction work in progress. Documentation of specific construction activities shall include, at a minimum the following:

	CONSTRUCTION ACTIVITIES	DOCUMENTED BY	REMARKS
1	Excavation of Tank Hole	Photographs Installation Report	Report shall include measured dimensions of the excavation and details about shoring and site conditions.
2	Final Tank Hole Excavation (with fabric liner as applicable under site specific conditions)	Photographs Installation Report	Report shall include final measured dimensions of the excavation and details about preparation for tank placement.
3	Delivery of the Underground Storage Tanks	Shipping manifest	Report shall note delivery condition of tanks
4	Air Test of Tanks Upon Delivery (Pre-Installation)	Statement of testing protocol with results of air testing (signed by tank contractor)	Air test must be conducted at 3-5 PSI (air gauge must be equipped with a pressure relief valve set at 5 PSI), and must follow manufacturer's procedures
5	Deadman Anchors or Slab Construction	Photographs, Field notes in Installation Report	Report shall note size and quantity of rebar used, as well as, final measured dimensions of anchoring devices
6	Placement of Tanks on Clean Backfill	Photographs, Field notes in Installation Report	Report shall note placement details to include conditions like wet-hole, caving, amount of backfill beneath the tanks, etc.
7	Tank Hole Excavation Backfilling Operations	Photographs, Field notes in Installation report	Report shall indicate how manufacturer's recommended procedures were followed
8	Installing the Product Lines	Photographs	Follow piping manufacturer's procedures
9	Installing the Vapor Recovery Lines	Photographs	Follow CARB and RP300 procedures
10	Installing the Tank Vent lines	Photographs	Ensure proper slope of vent lines
11	Air / Soap Testing of All Piping	Photographs Field notes (signed)	Air test must follow manufacturer's procedures (air gauge must be equipped with a pressure relief valve set @ 60 PSIG)
12	Placement of Containment Sumps	Photographs	Follow sump manufacturer's procedures
13	Placement of Electrical Conduit	Photographs	
14	Forming / Pouring Concrete for Canopy Footings	Photographs	
15	Backfilling the Pipechase	Photographs	Document proper installation of piping
16	Installation of Dispensers	Photographs	
17	Purging of Product Piping of Air	Field notes (signed)	
18	Notification of System Testing to Regulators	Copy of Notification	
19	Calibration of Dispensers	Field Notes (signed)	Verify proper calibration tolerances
20	Flow Rate Determination	Field Notes (signed)	Verify flow rate not to exceed 10 GPM
21	Certification of Fueling System: Tank & Line Tightness Tests	Test Reports, copy of the Performance Criteria for the Test	Using an EPA third-party certified method
22	Certification of Vapor Recovery System: Stage I	Test Reports	Following CARB Test Procedures
23	Certification of the Fueling Facility Operators (Training Documentation)	Outline of Course Content & Rosters	
24	Installer Certification of UST Installation	Affidavit/Oath	Signed EPA Form 7530 or State Form
25	Registration of Tank System	Copy of Registration	Signed EPA Form 7530 or State Form
26	Registration of Vapor Recovery System (as required)	Copy of Registration	Signed State Form
27	Warranty/Registration Paperwork for Equipment	Copy of Warranty and Registration	

E. Contractor shall submit six copies of catalog data of submersible turbine pumps along with proper pump selection, performance chart, and installation, operation and service manuals.

F. Contractor certification and licensing:
   1. Contractor shall submit certification for licensing for construction and installation of gasoline storage and dispensing systems, List of three his most current system installations, etc. specified in “Quality Assurance”, paragraph 1.2.B. above.
   2. Contractor shall submit certification for licensing of electrical subcontractor for electrical construction and installation of gasoline storage and dispensing systems, List of three subcontractor’s most current system installations, etc. specified in “Quality Assurance”, paragraph 1.2.B. above.

G. Contractor shall provide for approval the name of the testing company he will use to perform pressure testing of tanks and piping, and startup compliance testing of the Vapor Recovery system per manufacturers' instruction and as specified in this specification. Contractor-retained testing company shall have a minimum of three years of experience in performing such tests for retail gasoline stations and shall be responsible for notifying AAFES of the schedule for testing, following proper testing protocol, and prompt notification of test results.
   1. All test procedures for gasoline equipment and systems shall be in accordance with manufacturer’s instructions and recommendation, EPA requirements, CARB requirements and Commonwealth of Virginia, Department of Environmental Quality requirements.
   2. AAFES may retain another independent testing agency to observe and monitor the tanks and piping installation and testing performed by the contractor and his testing agency. AAFES-retained testing agency shall have access to the site, work area, shop drawings and results of testing during the construction period. Any changes or comments recommended by AAFES-retained agency must be approved by the Contracting Officer prior to implementation by the contractor. Any testing conducted by AAFES-retained testing agency is separate and independent of the contractor’s requirements and SHALL NOT be considered a substitute for any tests required to be performed by contractor. The General Contractor’s site superintendent must be notified of any independent testing schedule so that the General Contractor may ensure his representative’s presence during any such test procedure.

H. Contractor shall provide six copies of an Operations and Maintenance (O&M) Manual. This manual will describe all systems and equipment installed by the contractor, including but not limited to: underground storage tanks, piping and distribution lines, tank monitoring and release detection systems, vapor recovery systems, dispensers, and alarms. O&M Manual will list the manufacturers (including addresses and telephone numbers), make, model and serial numbers of all equipment and systems. Photocopies of equipment warranty registrations shall be included in the O&M Manual. The O&M Manual will be written in simple language and will give the operator information necessary to operate and maintain the system. Maintenance that is required but not normally performed by the operator will be so noted. The requirement for an O&M Manual may be met by compiling copies of materials provided by the manufacturers of the systems or equipment. However, if the manufacturer’s materials do not explain how the system or equipment works as installed, Contractor will provide necessary supplemental information

I. Six copies of the release detection system operation and maintenance manuals shall be provided as follows:
   1. The AAFES Service Station Manager.
   2. The Local General Manager.
   3. The Installation Environmental Office.
   4. Three copies to the Contracting Officer for internal distribution.

J. Copies of all documents, permits, applications and registrations required State, County, and Local shall be submitted to the AAFES Contracting Officer and the Base or Post environmental office in a report documenting details of the installation.

K. **GENERAL CONTRACTOR TO PROVIDE RECORD DRAWINGS OF COMPLETE FUELING SYSTEM TO AAFES PROJECT MANAGER AND CONTRACTING OFFICER PRIOR TO TURNING OVER OF PROJECT.**

1.4 UNATTENDED OPERATION

A. Contractor is on notice that the facility to be constructed may be used for 24-hour unattended self-service operation if customer service conditions warrant and all appropriate approvals are obtained.

B. Contractor will use best professional judgments to suggest any other items that may be required by law at the project site for unattended operation or that may facilitate safe and environmentally sound, unattended operation and should identify those items to the Contracting Officer as soon as they are known.

1.5 DRAWINGS

A. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories that may be required. The contractor shall carefully investigate the site and job conditions affecting all his work and shall arrange his work accordingly, furnishing such fittings, valves and accessories as may be required to meet such conditions, at no additional cost.

1.6 PROTECTION OF MATERIALS AND EQUIPMENT

A. Pipe openings shall be closed and protected with caps or plugs (not tape) during installation. Equipment shall be tightly covered and protected against dirt, water, chemical or mechanical injury. Backfill material shall be kept clear of all trash and debris. Dispenser and tank sumps shall be closed or covered to prevent water and construction debris from accumulating within. Underground storage tanks and piping system shall be protected by barricades and construction fencing. Upon completion of all work, the materials and equipment shall be thoroughly cleaned, adjusted and operated. Belts, pulleys, gears, couplings, projecting setscrews, keys and other rotating parts shall be fully enclosed or properly guarded.

1.7 WARRANTIES

A. Contractor shall warrant the work specified according to the terms of the General Provisions. In addition, upon acceptance of the gasoline dispensing system for beneficial use by AAFES, he shall provide to the Contracting Officer the manufacturer's standard equipment warranty or warranties covering both parts and labor for a minimum period of one year. Warranty service shall be provided promptly upon request within 12 hours on weekdays and 24 hours on weekends. Contractor shall be responsible for the warranty of the equipment he furnished. Contractor is responsible for defects in installation of AAFES-furnished equipment.

B. Fuel storage tanks shall carry a thirty-year warranty against failure from internal or external corrosion and from structural failure. Manufacturer’s installation checklist must be completed and submitted to the manufacturer by the Contractor in order to provide a valid warranty. A photocopy of this document shall be included in the O&M manual and also be provided to the Contracting Officer.

PART 2 - PRODUCTS

2.1 GENERAL

A. Contractor-furnished materials and equipment shall be as specified and/or as shown on the drawings. Equipment shall be the product of manufacturers regularly engaged in the manufacture of such products and shall be of the best quality used for the purpose in commercial practice. Each major component of equipment shall have the manufacturer's name, address and catalog number on a durable plate securely affixed in a conspicuous place. The nameplate of the distributing agent only will not be acceptable. Substitution of the specified equipment is acceptable upon review and approval by the Contracting Officer or his authorized agent. To obtain approval, Contractor shall make a written request to the Contracting Officer. Contractor’s request will include or attach all data and information available on the equipment including warranties, guarantees, and UL certifications (if applicable). Refer to Section 00404 – Product Substitution.

2.2 PIPING, FITTINGS AND SPECIALTIES

A. All pipes, fittings, appurtenances, manways, accessories, and valves shall be provided by the Contractor after submittal to the Contracting Officer of shop drawings showing manufacturer and model number of each.

B. All-metal flex connectors shall be used in all dispenser containment sumps, and be as shown in the drawings with all-metal tubes (no Teflon), hose ends, galvanized malleable iron nipples at both ends affixed with crimped fittings, maximum overall length 24".

C. Aboveground vent piping shall be schedule 40 galvanized steel pipe with 150 lb. malleable iron screw fittings and couplings. Joints shall be connected using appropriate adhesive/sealant compatible with gasoline, alcohol-gasoline blended, and reformulated fuels. Vents shall be a minimum of 12 feet above finished grade or 24 inches above the building exterior wall. Vents shall be mounted (as shown on the drawings) to the building exterior wall or braced to stainless steel or galvanized steel pole which shall extend to 12 inches below the top of the vent. Vents shall be primed and painted with two coats of rust inhibiting paint in a carb-approved color that has been approved by both AAFES and the installation.

D. Underground vent and vapor recovery piping (if required) shall be Underwriters Laboratory, Incorporated approved double wall rigid fiberglass-reinforced plastic (FRP) pipe with molded fittings and adapters. Manufacturer for vent and vapor recovery piping is Ameron Dualoy 3000/LCX as manufactured by Ameron International.

E. Provide buried warning tape or line markers for all underground piping to allow for verification of the piping location in the future. Fill piping and vapor recovery risers shall be schedule 40 galvanized steel piping. As a minimum, couplings and fittings should be 150-pound malleable iron. A thread sealant certified for petroleum service should be used for all fittings. Sealants certified for methanol and other fuels (for example, ethanol and MTBE blends) should be used when these substances are to be placed in the UST system. Projects being built where there are containment requirements for fill risers shall comply with that requirement.

F. Tank manufacturer shall provide double wall FRP sumps and containment collars. Contractor shall provide manway covers as shown on the drawings. Each manway cover will be API color-coded with matching skirt, stabilizer kit and locking mechanism. Lifting tools will be supplied for each manway by contractor. An FRP ID plate will be provided by the manufacturer for each manway. The ID plates will specify the tank number, tank capacity, and product type. The manway cover assembly shall be as shown on the drawings.

2.3 DOUBLE-WALL PRODUCT PIPING AND SECONDARY CONTAINMENT SYSTEM

A. All underground product piping (as shown on the drawings) shall be 2-inch double wall rigid FRP Ameron Dualoy 3000/LCX with bonded clamshell fittings as manufactured by Ameron International or 2- inch double wall primary w/ 4 inch access pipe Flexworks as manufactured by OPW.

B. The piping installation shall strictly follow the recommended installation practices described by the manufacturer. Piping shall be continuous with connections occurring only within containment chambers which provide a means of surface access and is monitored for releases by a probe or sensor that will alarm if a release is detected. The secondary containment pipe shall contain product leaked from the product pipe and drain to the sealed pump manway enclosure for leak detection and recovery of the released product.

1. The primary piping shall be capable of successfully passing an air pressure test at sixty pounds per square inch after bleed back pressure stabilization, which shall be established by bringing the line pressure to sixty pounds per square inch for a minimum of three hours. During the pressurizing period all fittings shall be observed for leaks by applying a soapy water solution. The secondary piping shall be capable of maintaining ten pounds per square inch for a one hour period during integrity testing.

2. The contractor shall follow the manufacturer's recommendation that after the primary piping has passed a 60 psig pressure test, the product line pressure should be reduced and maintained at a pressure of 25 psig until all paving has been completed, with OPW pressure gauge assemblies in place on each line for daily observation and verification that the pipe is holding pressure.
3. Pressure gauge assemblies for testing shall be calibrated prior to use and be equipped with the proper pressure safety valve as recommended by piping manufacturer's testing procedures.

C. Termination of product lines shall be within containment sumps with proper sealing of the ends to prevent water, liquid and debris from entering the sumps.

D. All containment sumps (piping/STP sumps, under-dispenser containment, and fill point spill containment) shall be liquid tight and shall be capable of passing a hydrostatic water test to ensure that the sumps are product- and vapor tight. Contractor will provide certification of passing of tests to the contracting officer.

2.4 ELECTRONIC FUEL DISPENSING SYSTEM: AAFES - FURNISHED/ CONTRACTOR - INSTALLED

A. AAFES shall furnish multi-product, blending dispensers to the contractor for installation. A Wayne control data distribution box as well as an Allied Equipment isolation board shall be furnished by AAFES and installed by contractor to connect the dispensers as indicated on the drawings. The dispensers shall be delivered directly to the contractor on site. The contractor is responsible for receiving, verifying, storing, uncrating and protecting the equipment. Contractor shall coordinate the delivery and installation dates with contracting officer in advance to meet the construction schedule.

B. AAFES-furnished dispensers will be Dresser Wayne "Ovation". Hoses, nozzles, swivels and safety breakaways will be provided by the Contractor. Appropriate dispenser components will be furnished by AAFES as required.

C. A Dresser Wayne service representative under AAFES equipment contract will review and assist the contractor during installation and will perform initial start-up of each dispenser. Actual installation of the dispenser is not the responsibility of this service representative. The general contractor is responsible for providing knowledgeable Wayne equipment installers as well as coordinating the assistance of the Wayne Dresser representative.

2.5 SUBMERSIBLE TURBINE PUMPS

A. Pumps shall have an explosion-proof motor that is electrically compatible with the local power service and shall carry UL listing. Pumps shall have standard 4" NPT tank fitting. Upper assembly shall contain all functional elements, check valve, air eliminator, expansion relief valve, siphon nozzle and venture, siphon check valve and pressure test screw. The entire assembly shall be removable. The pump shall have a thermal overcurrent overload protector with automatic reset. Capacitors and electric disconnect shall be accessible. Lower assembly shall consist of permanent split-phase capacitor motor, 25% glass-filled "Celcon" impeller and diffuser. Impeller shall be hydraulically balanced providing a positive and evenly distributed drive. The pumps shall be design or equipped so that no part of the system shall be subjected to pressure above its allowable working pressure. Pumps shall de designed for Class 1, Group D atmosphere. Pump shall be cooled and lubricated by discharging the pumped fluid into the storage tank regardless of dispensed quantity. An isolation valve (ball valve) shall be installed in an assembly connecting the pump to the product line to facilitate isolation of the product line during tightness testing. The contractor shall size the pumps for 8 to 10.0 gallons per minute flow rate at the nozzles.

B. Manufacturer of Pumps and Controllers: Red Jacket by Veeder Root, Inc. No other substitute pumps shall be allowed.

2.6 UNDERGROUND FUEL STORAGE TANKS - DOUBLE-WALL FRP

A. Requirements:

1. Tanks shall be capable of storing gasoline, or gasohol (minimum 50% methanol or ethanol) fuel at ambient underground temperatures.
2. All tanks shall be equipped with a fiberglass brine reservoir.
3. All tanks shall show hold down strap locations.
4. All tanks shall be supplied with manufacture's designed concrete deadman anchoring system.
5. Tanks shall be designed to provide hydrostatic monitoring capability. Tanks shall have one 4" NPT fitting located as per drawings for accessibility to the tank bottom between the primary and secondary walls. This fitting shall have counter-sunk pipe plug provided by manufacturer.
6. Provide glass fiber-reinforced plastic anchor straps for each tank. Location and quantities quantities of straps shall be as specified by manufacturer. Straps shall be standard as supplied by the tank manufacturer.
7. Underwriter's Laboratory label shall be permanently affixed to each individual underground storage tank.
8. Provide lifting lugs on all tanks. Lugs shall be capable of withstanding weight of tank with a safety factor of 3-to-1.
9. Tank bottom deflector gauge plates shall be provided under all primary tank fittings to prevent tank damage.
10. Provide containment collar around the tank manways.
11. Fiberglass tanks shall have hydrostatic monitoring system. System shall be an integral part of the tank.
12. Reservoir sensor shall be as specified in paragraph 2.07 of this specification.
13. Hydrostatic monitoring system shall have third party certification that it meets EPA and NFPA 329 criteria as a precision tank test. The test procedure shall be documented.

B. Manufacturer of Tanks:
1. Containment Solutions
2. Xerxes International

2.7 TANK INVENTORY CONTROL AND RELEASE DETECTION SYSTEM

A. Provide Veeder-Root TLS-450 (860090-100) with integral printer and full VGA LCD display with SiteFax (332818-001), USB/Ethernet dual interface module (332913-001) and CSLD (332972-006) UST monitoring system. The Veeder-Root system consists of tank inventory control, release detection system (for tank, piping, and all sumps), control console, integral printer, tank probes, hydrostatic interstitial tank monitoring probes, sump sensors, fittings, etc., for a complete and operating system.

B. Tank monitor and inventory control system shall have the following features:

1. Console – 8247 Microprocessor-based, 66MHZ system clock, 128MB RAM on Central Processing Unit. Standard model console provided with RS232 abd RS422 communication interface ports with external communication capability for automatic inventory control. Approximate console size 18.5" x 11.5" x 8.5". The console shall be wall mounted using external mounting tabs, at a height of not more than 5 feet from the floor.
2. Inventory/Leak Detection Probe: Veeder-Root Series 846390-109-MAG Plus magnetostrictive probe.
3. Mag Sump Sensor: Veeder-Root Series 857080-112.
4. Digital Pressure Line Leak Detector: Complete assemblies for detecting leaks in product piping. Veeder-Root Series DPLLD 859080-001 for TRJ Red Jacket Pumps connected to controller in the building.
5. Hydrostatic Reservoir Sensor (dual-point): Veeder-Root Series 794380-303 to be incorporated into the integral tank reservoir.
6. Dispenser Mag Sump/Pan Sensor: Veeder-Root Series 857080-111.
7. Overfill Alarm and Acknowledgement Switch: Veeder-Root Series 790091-001 for the alarm and Series 790095-001 for the acknowledgement switch.

8. Modules:
   a. One SiteFax Interface Module #332818-001.
   b. One RS-232/RS-485 Dual Interface Module #332870-001.
   c. One CSLD Software Enhancement Module #332972-006.
   d. One Sixteen-Input Universal Probe/Sensor Interface Module #332812-001.
   e. One Universal Input/Output Interface Module #332813-001.
   f. One Risk Management Software Enhancement for DPLLD #332972-008.
   g. One USB/Ethernet Dual Interface Module #332913-001.
   h. One 'L2 Three Year Extended Storage Module #332971-003.
9. Console Features:
   a. Printer: The console shall be equipped with an integral, thermal printer for hard-copy documentation of reports. Reports shall be printed in rows/columns format.
   b. Display: The console shall be equipped with 7.4 inch full VGA LCD touch screen display for on-site viewing of information, programming, operating and reporting functions.
   c. Modem: Internal 300/115200 baud capability for future expansion. (SiteFax Modem 332818-001).
   d. Remote Access/Control: Direct Access TM.

2.8 DISPENSER, TANK AND PIPING SUMPS

A. The contractor shall furnish and install pump and piping sump/enclosure as shown on the drawings. Depending upon the burial depth of the tanks, the contractor shall furnish and install the appropriate sump with the required extension as directed by the manufacturer. Depending on the presence of high groundwater, the contractor shall ensure the selection of a sump that is designed for keeping water out of the sumps under such high groundwater conditions. The contractor shall furnish and install tank sump accessories including, but not limited to, manway adapter kit, tank fitting adapters, collar adapter kit, sump access covers, and flexible entry boots for sump as manufactured and designed by the piping manufacturer selected.

B. The sumps and accessories shall be chemically comparable with products to be stored (gasoline, gasoline with 9.5% oxinol, gasoline with 5% methanol and cosolvent, gasoline with 10% ethanol, and gasoline with 20% MTBE).

C. All joints, connections, covers, pipe and conduit entries (including angular entries) shall be liquid-tight.

D. Sumps shall not be deformed by backfill pressure or backfilling operations.

E. The contractor shall furnish and install liquid-tight dispenser containment sumps under the product dispensers, to prevent any leaks or spills from escaping into the environment. The dispenser sumps shall be made of non-corrosive material and shall be compatible with the product being dispensed and with the chemicals and conditions found naturally in the underground environment.

F. Dispenser sumps shall be specifically designed for installation with Dressler Wayne Ovation dispensers. All required stabilizers for shear valves and pipe entry conduits shall be factory-furnished. All sumps shall be liquid-tight to ground and surface water.

G. Dispenser containment sumps shall be as compatible with the piping system selected.

H. All containment sump shall be hydraulically tested to ensure sumps are air and liquid –tight. Sumps shall be filled with water to 6" above the highest piping or conduit penetration. Inspect sumps for leaks and repair all leaks. Test shall be considered complete when water level in sump does not drop for one hour.

PART 3 - EXECUTION

3.1 INSTALLATION OF RIGID FRP VENT PIPING

A. Materials will be observed for signs of damage and to confirm compliance with specifications. Storage and handling, stringing, joining, layout and preparation for installation, cutting, tapering, bonding, curing, adapters to steel piping or flexible connectors shall be in accordance with manufacturer's instructions. Contractor must be familiar with pertinent manufacturer's recommended installation practices and testing procedures and adhere to them. Contractor shall resolve any conflict between contract documents and manufacturers instruction prior to installing equipment or piping, and no later than prior to backfilling.

B. All unconnected pipe stubs or runs shall be protected during construction against the intrusion of dirt or other foreign material into the piping system. Protective caps used in shipping the pipe are suitable if taped securely in place.

3.2 INSTALLATION OF DOUBLE-WALL PIPING SYSTEM WITH SECONDARY CONTAINMENT

A. The Contractor shall install the double-wall piping system in strict accordance with manufacturer's recommended installation practices and instructions. Particular attention will be paid to connection of fittings according to manufacturer's specifications. If the piping manufacturer specifies the use of particular tools to avoid over-tightening of fittings and damage to O-rings, contractor shall obtain and use recommended tools.

B. The interstitial space of the double-wall product line shall be air tested at the pressure recommended by the manufacturer and not to exceed 10 psig and the primary product line shall be tested at 1-1/2 times the operating pressure. The test pressure shall be held for one hour. The contractor shall conduct at least two tests, one at the time of installation, and the other during system startup. The Contractor shall furnish written reports of the test results to the Contracting Officer.

3.3 INSTALLATION OF ALL-METAL FLEXIBLE CONNECTORS

A. All-Metal flexible connectors (flex connectors) are to be installed as indicated on the drawings.

B. Flexible connectors shall be installed so that there is no radial stress or twist in the hose when joints are assembled. Follow manufacturer's installation instructions.

C. Flex connectors shall be UL-listed for such application and meet the requirements of NFPA 30A for being fire-safe. Teflon-lined flex connectors will not be permitted.

3.4 SLOPING OF VENT LINES AND VAPOR RETURN PIPING

A. A minimum slope of 1/8" per foot (sloping downward toward the tanks) is required for all underground vent and vapor return piping. No less than this minimum slope shall be used within requirements for cover over piping and depth of tanks. Only rigid FRP piping compatible with the fuel stored shall be permitted for vent and vapor return piping. Pipe cover requirements are detailed on the drawings. Piping shall be installed on pre-graded compacted bed material. No support or spacing material other than the bed and backfill will be left in contact with the piping. This method of installation should prevent the possibility of any sags or sumps which might cause a liquid trap in the lines and which will not be permitted.

3.5 INSTALLATION OF TANK FITTINGS, MANWAYS AND APPURTENANCES

A. Requirements for Tank Fittings, Manways, and Appurtenances:

1. Contractor shall be responsible to provide proper clearance between tank shell and submerged pumps or fill tubes. Contractor shall check the tank diameter at the pump and fill pipe opening and make necessary adjustments to maintain the specified minimum clearance of six inches from the bottom of the tank.

2. When installing spill containment basins at the fill points and Stage I vapor recovery adapters, contractor shall provide a minimum of 3" and a maximum of 6" clearance between the top of the cap and bottom of the manway cover. Proper clearance shall be provided between the top of the automatic tank gauge and its cover, and the interstitial monitoring probe and its cover.
3. Pump and fill manways and/or connecting piping shall be self-supporting and shall not contact the tank. No spacing materials shall be allowed on the top of the tank.
4. All manway covers and lids will be API color-coded according to the following: Regular unleaded covers will be white with a black cross, mid-grade unleaded covers will be blue with a white cross, and high-grade (premium) will be red with a white cross. Vapor Recovery covers will be orange. Observation well covers will be white with a black triangle. If applicable to the project, used oil covers will be marked with a purple square.

3.6 TRENCHING AND PIPE CHASES

A. Pipe trenches must be large enough to accommodate the piping, together with sufficient spacing and backfill material to provide protection from damage that might be caused by settlement, abrasion, vibration, expansion, contraction, or foreign materials. Vapor-return piping will be separated from product piping by at least twice the largest nominal pipe diameter, with at least six inches of distance between the piping and the trench excavation walls. Trenching width shall be sufficient to maintain the clearance between the pipes and side walls as shown on the drawings and of a depth sufficient to provide the proper bed and cover, and pitch of the lines. Note that the minimum cover to finish grade over product lines in paved areas is 12 inches and 18 inches in non-paved areas**.** Pipe chase in the concrete or asphalt paving shall be constructed as detailed on the drawings and as located on the plot plan. The minimum spacing between adjacent pipes is twice the pipe diameter between pipes; however, piping runs shall not be layered. Piping crossover must be minimized, but where piping runs must cross, the manufacturer's crossover fittings shall be used. Piping will be installed in a manner that will facilitate testing, resist corrosion, and prevent damage and movement of system components.

3.7 BEDDING AND BACKFILL MATERIAL

A. Pea Gravel: Standard bedding and backfill material shall be a naturally-rounded aggregate, clean and free flowing, with particle size not less than 1/8" or more than 1/2" in diameter. The pea gravel sieve analysis shall be furnished to the Contracting Officer by the contractor from the supplier.

B. Storage and Handling of Bed/Backfill Material on Site:
1. Contractor shall store these materials so as not to allow bed/backfill material to intermix with any excavated soil or other material on site. Contamination of self-compacting gravel could result in need for mechanical compaction, as the minimum/maximum particle sizes specified are critical for self-compaction.
2. In freezing conditions, material must be kept dry and free of ice.
3. Do not intermix gravel, stone or gravel crushing, or sand in the same excavation or connected excavations.

C. Poor Soil Conditions/Soils Stabilization and Filter Fabric:
1. Where soils of low bearing capacity are found such as plastic clays or where sand/sand-gravel may be of a free-flowing nature, a separation is necessary between the pea gravel backfill and the soil to prevent penetration or migration.
1. Contractor shall line the excavation completely with an inert filter fabric, as per manufacturer's recommendations.
2. Approved manufacturers are:
   a. DuPont "Typar" Style 3401 - 4 oz./Sq. Yd.
   b. Monsanto "Bidim" C-22 - 4 oz./Sq. Yd.
   c. Phillips "Supac" Fabric - 4.1 oz./Sq. Yd.
   d. Celanese "Mirafi" 140 Fabric - 4.1 oz./Sq. Yd.
4. Material shall be cut to an appropriate width for the depth and width of the excavation so that there is sufficient material to overlay the top edges of the excavation during installation. Laps of material along the excavation should be a minimum of 2 feet.

D. Bedding of Product Lines: A minimum of six inches deep compacted bed, graded to give the proper slope of depth of pipe runs, shall be laid in the trench before pipe runs are installed. Pipe runs shall be fabricated at grade and installed and properly spaced on the completed bed. After making necessary connections of runs, branches or fittings which shall be made up in the trench, bed material should be placed back under the piping and properly compacted.

3.8 BACKFILLING OF PIPING

A. After satisfactory completion of required testing and observation of piping, backfilling of trenches to subgrade elevation shall be completed. A minimum of six inches of backfill shall be bedded under the piping and minimum of 18 inches of combined cover (including surface paving and backfill material) over the piping is required. Ensure that marking tape or wire (for future location of piping) has been placed in the backfill at this time.

3.9 INSTALLATION OF PUMPS AND CONTROLLERS

A. Pumps shall be installed in accordance with manufacturer's instructions. Installer shall be familiar with such practices and procedures and shall strictly follow the same during installation.

B. Contractor shall measure the diameter of each tank at each 4" NPT tank fitting.

C. Contractor shall verify length of submersible pump. In any case, there shall be minimum 6" clearance between the tank and the bottom of the pump.

D. Pump shall be installed in 4" tank opening with approved non-setting thread sealant. Sealant shall be compatible/suitable for use with product being stored in the tank.

E. 4" riser pipe shall be tightened and pump shall be lined up with discharge outlet and fuel lines.

F. Electrical connections shall be made with approved fittings to junction box. Install ground wire using standard color codes.

G. Submersible pumps shall not be wired to run continuously.

H. Submersible pumps shall never be used to pump water from the tank.

3.10 INSTALLATION OF UNDERGROUND TANKS

A. Tanks shall be installed in accordance with the manufacturer's instructions. Only pea gravel not less than 1/8" or more than 1/2" shall be used. Proper burial depth shall be determined by a float-out calculation and shall allow for sloping the piping from the dispensers back to the tanks (minimum depth is 36 inches and maximum depth is 7 feet). Anchoring and tank spacing shall be as shown on the drawings. If there is any conflict between the procedure provided in the specification and manufacturer's instructions, contractor shall contact Contracting Officer prior to proceeding with work. AAFES assumes no responsibility or liability for the consequences of any testing practice.

B. Bottom of excavation and hold-down or deadman should be covered with at least 12" of graded and compacted backfill. Install tanks to facilitate removal of water. Carefully place backfill around bottom of one-fourth of tank and tank ends by hand shoveling and tamping to insure full and even support. Place backfill carefully to avoid damage tp the tanks.

C. During construction and prior to final acceptance, all installed tanks shall be ballasted per manufacturer's recommendations. Upon acceptance by AAFES, contractor shall empty the tanks for product fill, disposing of the ballast material in an environmentally safe manner.

3.11 INSTALLATION OF FUEL DISPENSING EQUIPMENT

A. Dispensers will be mounted on islands that are protected from damage from vehicle collisions by posts, bollards or concrete bumpers as denoted on the plans. Installation shall be in strict compliance with manufacturer's written instructions. If unusual conditions or circumstances exist which could damage or impair the system and the special protective measures required are not covered in these instructions, their installation shall be coordinated directly with the manufacturer. Actual installation of equipment and related components shall be under direct supervision at all times to assure compliance with specified requirements. Shear valves or breakaway devices will be installed on each product line and on each vapor return line and carefully tested for functioning. Actuation must be free and unobstructed. Shear valves for the product line must be double-poppetted. Dispenser sumps shall be placed such that the sump edge sets ½ inch above the finished surface of the dispenser island. Dispensers will be securely bolted to their mounting surface according to the manufacturer's instructions to ensure proper functioning of the shear valves.

B. Bottom of excavation and hold-down pad or deadmen should be covered with at least 12 inches of graded and compacted backfill. Install tanks to facilitate removal of water. Carefully place backfill around bottom of one-fourth of tank and tank ends by hand shoveling and tamping to insure full and even support. Place backfill carefully to avoid damage to tanks.

C. Hanging hardware for dispensers shall be tested for continuity by experienced and knowledgeable personnel in accordance with PEI/RP-400-02.

3.12 INSTALLATION OF INVENTORY/LEAK DETECTION SYSTEM

A. Installation of Veeder-Root tank inventory control and release detection system shall be in strict accordance with manufacturer's recommendations. The Contractor shall retain the services of the nearest authorized Veeder-Root distributor/installer. Name of the nearest distributor can be obtained by contacting Veeder-Root. This distributor shall be responsible for receiving and storing equipment, helping contractor to locate the conduits as shown on the drawings and installing the entire system excluding conduits and power wiring. At the completion of the installation, the contractor and installer shall test and shall certify the entire system. This distributor shall provide warranty for his work excluding hardware failure.

B. Programming shall be in accordance with local operational conditions and applicable regulations. The program shall include, but not limited to, tank and line tightness monitoring, tank level monitoring, interstitial monitoring, tank overfill alarms, tank low level alarms, and tank/dispenser sump monitoring. The contractor shall print a complete Veeder-Root program report and leave with the manager. Programming and operations of the Veeder-Root system shall be documented by a certified Veeder-Root technical. Provide initial system and data backup using the USB Flash drive provided with the console. and recommend regularly scheduled system and data backup using the USB Flash drive provided with the console to the AAFES store manager..

C. All circuits shall be run in rigid conduit. Conduit shall be sealed off and jointed in explosion proof boxes. Conductor runs between all inventory and leak detection equipment, and the Veeder-Root system shall be made with continuous conductors (no splices). Inventory and leak detection circuits shall be in separate conduits for dispenser and pump power runs.

3.13 INSTALLATION OF OVERFILL ALARM AND ACKNOWLEDGMENT SWITCH

A. The mounting location for the overfill alarm and acknowledgment switch shall be in the immediate vicinity of the storage tank delivery points and shall be clearly visible to and easily accessible to the fuel delivery driver. Alarm shall activate at 90% of the tank's actual storage capacity.

3.14 EMERGENCY SHUT-OFF SWITCH

A. Install the master emergency shut-off switch inside the building at the register areas. Add additional emergency shut-off switches outside at a well-lighted location that is not less than 20 feet from the nearest dispenser nor more than 100 feet from the farthest dispenser. The switch shall be visible from all dispenser locations; if this requires more than one switch, the appropriate number of duplicate switches will be provided and installed. Each switch will be identified by an all weather sign with letters at least 1 inch high with text as shown in the drawings. Letters will be in contrasting color to sign background, and the sign will be mounted at least 5 feet above ground level. The switch shall be installed in such a manner this it is clearly visible from the dispensers and meets ADA requirements.

B. The emergency shut-off switch shall terminate electric power to all dispensers, pumps, and dispenser control devices. Power for the illumination of all dispensing areas will not be affected by the activation of the switch. The switch shall be of such a design or installed in such a way that it cannot be reset by customers. Unless a fire alarm box or automatically self-dialing telephone is located adjacent to the emergency shut-off, activation of the emergency shut-off switch shall transmit an alarm to the fire station or 24 hour security desk or other emergency agency. Contractor shall coordinate with facility officials regarding the final location of the alarm transmittal.

3.15 SYSTEM CHECKING

A. In addition to normal construction observation, three formal system checks shall be conducted. The Contractor shall inform the Contracting Officer and the Architect/Engineer one week in advance of the day and time of each test. Each test shall be performed in the presence of the Contracting Officer and the Architect/Engineer. The Contractor is cautioned that all components of the system being tested shall be installed, prepared for testing, exposed and in proper operating condition for each test. All costs associated with retesting or additional visits by the Contracting Officer, Architect/Engineer or other third-party technicians shall be at the expense of the Contractor.

B. The manufacturer's recommendations for installation, in addition to the codes and standards listed in paragraph 1.02, A of this specification shall be referenced to determine proper installation and procedures for each system check. Documentation of each test (including copies of field notes) shall be provided to Contracting Officer and the Architect/Engineer. AAFES and the Architect/Engineer assume no responsibility or liability for the consequences of any testing practice.

C. The Contractor shall provide laborers and technicians to assist the Contracting Officer and the Architect/Engineer in the system operation and testing. All testing procedures shall be conducted by the Contactor for observation by the Contracting Officer and the Architect/Engineer. At the preconstruction meeting, the Contractor will be provided a copy of the checklist used by the Contracting Officer and the Architect/Engineer for each test. The following system checks shall be conducted:

1. Tank Installation. Observed for proper installation and use of materials in conformance with plans and specifications. Pressure and soap testing of each tank. Tank bedding and deadman placement shall be observed. Bedding material shall be observed for conformance to specifications. Excavation size and maximum burial depth confirmed. Placement of the tanks observed. Backfill of tank excavation observed.
2. Product/Vent Lines and Sumps. Observed for proper installation and use of materials in conformance with plans and specifications. Observation of proper line placement, bedding and slope. Pressure test of the complete piping system prior to backfilling of piping. Soap test all pipe runs including fittings and joints. Water test all dispenser and tank pump sumps.
3. Final System Check: Observed for proper installation and use of materials in conformance with plans and specifications. Observation of dispenser sumps and sensors. Observation of tank pump, fill, vent and hydrostatic systems, sumps and sensors. Observation of Veeder-Root system programming and detection of sensors flats.

D. At the end of the each system check, all results shall be noted. The Contractor shall provide copies of the manufacturer's certifications indicating designation as a certified installer, authorized service contractor and technician shall be provided during final system check. Copies of the technician's certifications (i.e. Veeder-Root) provided shall be from the individuals responsible for installation of the appropriate system component. Full documentation of test results, including the test procedure used (and a copy of the test procedure's third-party certification) shall be provided to the Contracting Officer and the Architect/Engineer.

E. System checks listed above are not intended to be exhaustive checks or detailed inspections of the work. Therefore, AAFES and the Architect/Engineer assume no responsibility or liability for the completeness or proper installation of the work. The system checks listed above do not relieve the Contractor of responsibilities under this Contract or relieve him of any portion of the system warranty.

3.16 FINAL ITEMS

A. All product piping (including dispensers) shall be bled completely of all trapped air as submerged pumps are tested. System shall be tested for tightness and proper operation of leak detectors and impact valves. At least 300 gallons (100 gallons of each product) of fuel shall be pumped through each nozzle of each dispenser to insure that all trapped air is purged from the product lines.

B. After meter calibration of each dispenser, filters shall be removed and replaced.

C. Flow restriction devices must be installed if the system is determined to dispense fuel at more than 10 gallons per minute (GPM).

D. Projects constructed where rules require Stage I Vapor Recovery Systems to meet efficiency standards, shall be successfully tested by the contractor according to CARB Test Procedures. This project is in a Stage I area, so testing is required.

E. Projects where Stage II Vapor Recovery will be brought on-line immediately shall have appropriate compliance testing conducted by the contractor prior to gasoline being offered for commercial sales. Such testing shall include a Pressure Decay test, Dynamic Backpressure (or liquid blockage) test, a Flowrate Determination, and either a Liquid Removal Device Performance test (for balance systems) or Air/Liquid Ratio test or Vapor/Liquid Ratio test for vacuum assist systems. Any other testing or monitoring required by the California Air Resources Board (CARB) Executive Order for that system shall be conducted or be provided in accordance with the test procedure or monitoring described therein. Where State or local rules allow, contractor may elect to perform Stage II start-up compliance testing after the station has been open. However, the contractor must complete testing within the time allowed by State or local authorities. Since Stage II is immediately required for this project, testing here shall include all of the above described testing. Complete documentation of successful Stage I and applicable Stage II testing will be provided by the contractor.

3.17 TESTING

A. During installation and upon completion of installation, Contractor shall test the UST system in the presence of the Contracting Officer or his representative. This testing shall be conducted using EPA third-party and CARB certified methods as applicable. In addition to any other local requirements, Stage I tests will include CARB TP 201.1E, and TP 201.3 for the system. Certification of successful testing will be provided by Contractor and attached to the Notification of Compliance Status referred to in paragraph (1.01) of this section. Contractor is responsible for providing USEPA and applicable State offices notice of this CARB testing at least 60 days prior to conducting this test. Notification will be writing or in written electronic format (telephone voice notification is not sufficient) and Contractor will provide copies of all notices to the Contracting Officer.

B. At a minimum, tank and line tightness test will be conducted according to manufacturer's instructions and all applicable federal, state and local regulatory requirements. Contractor will document successful completion of these tests.

C. Projects constructed where rules require Stage I Vapor Recovery Systems to meet efficiency standards, shall be successfully tested by the contractor according to CARB Test Procedures. This project is in an Stage I area, so testing is required.

D. Following appropriate testing the Contractor shall show that the system will function under simulated actual use conditions, demonstrating the function and operation of all fuel-related equipment. As a condition of acceptance, written certification shall be furnished to the Contracting Officer in evidence of full compliance with the requirements specified herein.

E. Contractor shall have an inspection completed by a state certified inspector within 6 months of installation.

F. Contractor will test and document passing tests for all secondary containment systems, as recommended by the equipment manufacturers or required by applicable regulations. This testing will include secondary containment for tanks, lines, submersible turbine pump (STP) containment, piping sumps, under-dispenser containment (UDC), and spill containment at fill points.
   1. If no state or federal requirements specify tightness tests for STP containment sumps, piping sumps, UDC, or spill containment, contractor will perform hydrostatic tests.
   2. Hydrostatic tests will be performed as follows:
      a. UDC, STP and piping sumps must be filled with water to a level above all containment wall or bulkhead perforations or penetrations. Spill buckets must be filled with water to a level 2” below the drop tube or fill connection opening.
      b. Mark the liquid line with paint or other indelible marking device.
      c. Let stand for one hour, minimum.
      d. Observe liquid level and record results.

3.18 EMERGENCY SHUT-OFF TESTING

A. The following test protocol will be performed for EACH product grade dispensed and EACH ESO switch at the facility. It is imperative that the test demonstrate the 220 volt power is terminated from each turbine relay one the ESO is activated. WARNING: The functional test must be conducted by a qualified person and after contractor notifies and coordinates test time with the installation fire marshal.
   1. Active the ESO switch.
   2. With a volt-ohm meter, verify each leg (L1, L2, and L3 for 3-phase systems) of the pump controllers does NOT read any voltage. Readings are to be taken from Hot to Neutral for each leg. Verify this for each of the turbine controllers. Please note: You must take voltage readings and cannot rely on pump controller LED lights to verify pump power has been shut off.
   3. Verify dispenser power has been shut off and product flow has been stopped. Please note: Dispenser display may still be activated; if uncertain, open dispenser junction box and verify power has been terminated.
   4. Repeat test for each additional ESO and fuel product.
   5. If ESO fails to terminate 220-volt power to turbines or power to the dispensers as determined by a volt-ohm meter, have a qualified electrician make necessary repairs.
   6. Record test results and submit a copy, signed by the installer contractor and the General Contractor to the Contracting Officer.

3.19 TRAINING OF AAFES PERSONNEL

A. Contractor shall provide total 8 hours of training of AAFES employees on the operation and maintenance of all equipment and systems. Training shall not be conducted during final testing and testing of the tank system, so that the quality of instruction is not compromised. A training attendance roster shall be completed for each training session held. The roster shall indicate the training subject, training date, length of the training class, the name, phone number and signature of the instructor, the name of the company he represents, as well as the full name, office symbol and complete telephone number of each attendee. A copy of class rosters and accompanying photograph of the class attending each session and instructor will be placed in each copy of the O&M manual.

3.20 FUEL SYSTEM DOCUMENTATION AND RECORDS

A. Upon completion of installation and final testing of the gasoline systems, the General Contractor shall submit a separate operating and maintenance manual for the gasoline dispensing and underground storage tank systems which shall contain the following checklist items:

1. ___ Notification of Construction Activities

2. ___ UST registration for each tank including any changes to registration. "Owner" is the Post or Base installation. (May use USEPA Form #7530 or extension to it.)

3. ___ Other permits (such as Air Operating Permit)

4. ___ Installer Certification of the UST system. (May use USEPA Form #7530)

5. ___ As-built plans (or site map with layout of tanks and piping)

6. ___ Third Party Certifications of leak detection systems (equipment or methods)

7. ___ Documentation of corrosion protection, if part of system

8. ___ Manufacturer's manuals (owner's, operator's, and maintenance manuals) for all system components and equipment (including tanks, lines, leak detection components**,** dispensers, nozzles, etc.). CARB Executive Order for Stage II Vapor Recovery System, if installed.

9. ___ Manufacturer's warranty documentation for all system components and equipment (including tanks, lines, leak detection components, dispensers, nozzles, etc.)

10. ___ Initial Compliance Test Records (if not included with Installer Certification listed above)
    - (a) ___ Tanks
    - (b) ___ Lines
    - (c ___ Stage I Vapor Recovery System (CARB TP 201.1E and TP201.3)
    - (d ___ Dispenser Calibration

11. ___ Training Roster for O&M Training given to AAFES associates

12. ___ Fuel System Final Inspection Report

B. At least one set of these records should be given to the on-site gas station/Express manager before final inspection, and kept on file for the life of the system. They should not need to be updated or changed unless the system is modified or has major repairs (except annual permit updates should be added). Other copies go to the AAFES General Manager, the installation environmental office, and the AAFES Contracting Officer.

3.21 FINAL INSPECTION REPORT

A. The following Fuel System Final Inspection Checklist will be completed by the Architect/Engineer. General contractor shall arrange testing of the various components to minimize site visits required by Architect/Engineer.

Final Installation Checklist

Location: _____

FINAL PETROLEUM INSPECTION

Date: _____ Time/Weather: _____

A/E Engineers: _____ Representative: _____

Gen. Contractor: _____ Gen Contractor Rep.: _____

Petroleum: _____ Petroleum Rep: _____

I. TANK SLAB	Final	
	Y/N	Comments
1. Pad in good condition?		
2. Pad pitched to allow for proper drainage?		
3. All manways properly crowned?		
4. All manways lids properly crowned?		
5. All manways properly painted?		
6. Control joints properly located?		
7. Control joints sealed?		
Comments:		

II. TANK SUMP	Final	
	Y/N	Comments
A. Turbine Sump – Regular U/L Tank #1		
1. Sump lid fits properly?		
2. Sump cleaned of liquid and debris?		
3. Any visible leaks?		
4. All entry boots properly installed?		
5. Seal offs installed and poured?		
6. Turbine conduits at the proper height?		
7. Shut off valves installed?		
8. STP line leak sensors installed?		
9. Sump sensors properly installed?		
10. System started up and purged?		
B. Turbine Sump – Regular U/L Tank #2		
1. Sump lid fits properly?		
2. Sump cleaned of liquid and debris?		
3. Any visible leaks?		
4. All entry boots properly installed?		
5. Seal offs installed and poured?		
6. Turbine conduits at the proper height?		
7. Shut off valves installed?		
8. STP line leak sensors installed?		
9. Sump sensors properly installed?		
10. System started up and purged?		
C. Turbine Sump – Premium U/L Tank #3		
1. Sump lid fits properly?		
2. Sump cleaned of liquid and debris?		
3. Any visible leaks?		
4. All entry boots properly installed?		
5. Seal offs installed and poured?		
6. Turbine conduits at the proper height?		
7. Shut off valves installed?		
8. STP line leak sensors installed?		
9. Sump sensors properly installed?		
10. System started up and purged?		

D. Fill/Vapor Spill Bucket – Regular Tank #1		
1. Fill/vapor boxes cleaned of liquid and debris?		
2. Fill/Vapor boxes properly labeled?		
3. Proper fill and vapor cap clearance?		
4. Drop tubes properly installed?		
5. Spill bucket release operates properly?		
E. Fill/Vapor Spill Bucket – Regular Tank #2		
1. Fill/vapor boxes cleaned of liquid and debris?		
2. Fill/Vapor boxes properly labeled?		
3. Proper fill and vapor cap clearance?		
4. Drop tubes properly installed?		
5. Spill bucket release operates properly?		
F. Fill/Vapor Spill Bucket – Premium Tank #3		
1. Fill/vapor boxes cleaned of liquid and debris?		
2. Fill/Vapor boxes properly labeled?		
3. Proper fill and vapor cap clearance?		
4. Drop tubes properly installed?		
5. Spill bucket release operates properly?		
G. Interstitial Monitor – Regular Tank #1		
1. Manhole with secured lid installed?		
2. Explosion proof J-box installed?		
3. Sensor properly installed?		
H. Interstitial Monitor – Regular/Premium Tank #2/3		
1. Manhole with secured lid installed?		
2. Explosion proof J-box installed?		
3. Sensor properly installed?		
J. Monitoring Wells (typical of 2)		
1. 12″ manhole installed?		
2. Lockable cap installed?		
Comments:		

III. DISPENSER	**Final**									
Dispenser #	**#1 Y/N**	**#2 Y/N**	**#3 Y/N**	**#4 Y/N**	**#5 Y/N**	**#6 Y/N**				
1. Anchored correctly?										
2. Product shear valves anchored?										
3. J-boxes tight?										
4. Cross braces installed?										
5. All entry boots properly installed?										
6. Filters installed?										
7. Sumps cleaned of liquid and debris?										
8. Dispensers calibrated and sealed?										
9. Dispensers functionally tested?										
10. Dispensers clean?										
11. Hose breakaways properly installed?										
12. Signage/decals properly installed?										
13. Any visible leaks?										
14. No puddling in front of dispensers?										
Comments:										

IV. DISPENSER ISLANDS AND DRIVE SLAB	Final	
	Y/N	Comments
1. Drive slab concrete in good condition?		
2. Control joints located properly?		
3. Islands at proper height for ADA reqmts?		
4. Island concrete in good condition/level?		
5. Island forms painted and caulked properly?		
6. Fire extinguisher(s) properly installed?		
Comments:		

V. EMERGENCY SHUT OFF	Final	
	Y/N	Comments
1. All E-stop switches properly located?		
2. All E-stop switches properly labeled?		
3. All E-stopswitches functionally tested?		
Comments:		

VI. VENT RISERS	Final	
	Y/N	Comments
1. Proper vent cap installed?		
2. Risers properly mounted and painted?		
3. Riser 12’ in height (minimum)?		
Comments:		

VII. CANOPY	Final	
	Y/N	Comments
1. Paint in good condition (incl. columns)?		
2. Canopy clean?		
3. Decking and fascia in good condition?		
4. Electrical access panels secured?		
5. Lights installed and working properly?		
6. Lighted signage properly installed and functioning?		
7. Cameras installed and operational?		
8. Logo decals installed & correct location?		
9. Stormwater system installed.		
Comments:		

VIII. VEEDER ROOT MONITORING SYSTEM	Final	
	Y/N	Comments
1. Console installed properly?		
2. System programmed?		
3. All leak sensors installed and operationally tested?		
4. Overfill alarm installed, properly located, tested and labeled?		
Comments:		

X. PERMANENT RECORDS PROVIDED BY GENERAL CONTRACTOR	Final	
	Y/N	Comments
1. Notification of Construction Activities		
2. UST registration for each tank (includes any changes to registration)		
3. Other permits (i.e. air permits)		
4. Installer certification of the UST system		
5. As-built plans		
6. Third party certifications of leak detection systems		
7. Documentation of corrosion protection system (if part of system)		
8. Mfgr's manuals (owner's, operator's, & maintenance manuals) for all system components & equipment (incl. tanks, lines, leak detection components, dispensers, nozzles, etc.)		
9. Mfgr's warranty documentation for all system components & equipment (including tanks, lines, leak detection components, dispensers, nozzles, etc.)		
10. Initial compliance test records of tanks		
11. Initial compliance test records of lines		
12. Initial compliance test records of Stage I Vapor Recovery System		
13. Initial compliance test records of dispenser calibration		
14. Training roster for O&M training given to AAFES associates.		
15. Copies of manufacturer’s certification of petroleum system components installer(s)		
16. Copies of state licenses of petroleum system components installer(s) (i.e. Type A&B UST installer license).		
Comments:		

XI. ADDITIONAL COMMENTS

END OF SECTION

SECTION 13720 - INTRUSION DETECTION

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. Intrusion detection with multiplexed, modular, microprocessor-based controls, intrusion sensors and detection devices, and communication links to perform monitoring, alarm, and control functions.

B. Related Sections include the following:
   1. Section 16741: Telephone Service Raceways and wiring for cabling between central-station control units and field-mounted devices and controllers.

1.3 DEFINITIONS

A. LCD: Liquid-crystal display.

B. LED: Light-emitting diode.

C. PIR: Passive infrared.

D. RFI: Radio-frequency interference.

E. UPS: Uninterruptible power supply.

F. Protected or Protection Zone: A space or area for which an intrusion must be detected and uniquely identified, the sensor or group of sensors assigned to perform the detection, and any interface equipment between sensors and communication link to central-station control unit.

G. Standard Intruder: A person who weighs 100 lb or less and whose height is 60 inches or less; dressed in a long-sleeved shirt, slacks, and shoes.

F. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a "standard intruder" in a protected zone.

1.4 SUBMITTALS

A. Product Data: Components for sensing, detecting, and control, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.
   1. Site and Floor Plans: Indicate final outlet and device locations, routing of raceways, and cables inside and outside the building.
   2. Device Address List: Coordinate with final system programming.
   3. System Wiring Diagrams: Include system diagrams unique to Project. Show connections for all devices, components, and auxiliary equipment. Include diagrams for equipment and for system with all terminals and interconnections identified.
   4. Details of surge-protection devices and their installation.
   5. Sensor detection patterns and adjustment ranges.

B. Equipment and System Operation Description: Include method of operation and supervision of each component and each type of circuit. Show sequence of operations for manually and automatically initiated system or equipment inputs. Description must cover this specific Project; manufacturer's standard descriptions for generic systems are not acceptable.

C. Qualification Data: For Installer, testing agency.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For intrusion detection system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:
   1. Data for each type of product, including features and operating sequences, both automatic and manual.
   2. Central-station control-unit hardware and software data.

F. Warranty: Special warranty specified in this Section.

G. Other Information Submittals:
   1. Test Plan and Schedule: Test plan defining all tests required to ensure that system meets technical, operational, and performance specifications within 60 days of date of Contract award.
   2. Examination reports documenting inspections of substrates, areas, and conditions.
   3. Anchor inspection reports documenting inspections of built-in and cast-in anchors.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:
   1. An employer of workers, at least one of whom is a technician certified by the National Burglar & Fire Alarm Association.
   2. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
   3. Installer shall have and present a copy of DAQ certification.

B. Intrusion Detection Systems Integrator Qualifications: An experienced intrusion detection equipment supplier and Installer who has completed systems integration work for installations similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, that is a member company of the National Burglar & Fire Alarm Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7.
   1. Testing Agency's Field Supervisor: Person currently certified as an advanced alarm technician by the National Burglar & Fire Alarm Association to supervise on-site testing specified in Part 3.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. FMG Compliance: FMG-approved and -labeled intrusion detection devices and equipment.

G. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
   1. Altitude: Sea level to 4000 feet.
   2. Central-Station Control Unit: Rated for continuous operation in an ambient of 60 to 85 deg F and a relative humidity of 20 to 80 percent, noncondensing.
   3. Interior, Controlled Environment: System components, except central-station control unit, installed in temperature-controlled interior environments shall be rated for continuous operation in ambients of **36 to 122 deg F** dry bulb and 20 to 90 percent relative humidity, noncondensing.
   4. Interior, Uncontrolled Environment: System components installed in non-temperature-controlled interior environments shall be rated for continuous operation in ambients of **0 to 122 deg F** dry bulb and 20 to 90 percent relative humidity, noncondensing.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of intrusion detection devices and equipment that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: One year from date of Substantial Completion.

PART 2. PRODUCTS MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

B. 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.

2.1 FUNCTIONAL DESCRIPTION OF SYSTEM

A. Supervision: System components shall be continuously monitored for normal, alarm, supervisory**,** and trouble conditions. Indicate deviations from normal conditions at any location in system. Indication includes identification of device or circuit in which deviation has occurred and whether deviation is an alarm or malfunction.
   1. Alarm Signal: Display at central-station control unit and actuate audible and visual alarm devices.
   2. Trouble Condition Signal: Distinct from other signals, indicating that system is not fully functional. Trouble signal shall indicate system problems such as battery failure, open or shorted transmission line conductors, or controller failure.
   3. Supervisory Condition Signal: Distinct from other signals, indicating an abnormal condition as specified for the particular device or controller.

B. System Control: Central-station control unit shall directly monitor intrusion detection devices and connecting wiring in a multiplexed distributed control system or as part of a network.

C. System shall automatically reboot program without error or loss of status or alarm data after any system disturbance.

D. Operator Commands:
   1. Help with System Operation: Display all commands available to operator. Help command, followed by a specific command, shall produce a short explanation of the purpose, use, and system reaction to that command.
   2. Acknowledge Alarm: To indicate that alarm message has been observed by operator.
   3. Place Protected Zone in Access: Disable all intrusion-alarm circuits of a specific protected zone. Tamper circuits may not be disabled by operator.
   4. Place Protected Zone in Secure: Activate all intrusion-alarm circuits of a protected zone.
   5. Protected Zone Test: Initiate operational test of a specific protected zone.
   6. System Test: Initiate system-wide operational test.
   7. Print Reports.

E. Printed Record of Events: Print a record of alarm, supervisory, and trouble events on system printer. Sort and report by protected zone, device, and function. When central-station control unit receives a signal, print a report of alarm, supervisory, or trouble condition. Report type of signal (alarm, supervisory, or trouble), protected zone description, date, and time of occurrence. Differentiate alarm signals from other indications. When system is reset, report reset event with the same information concerning device, location, date, and time. Commands shall initiate the reporting of a list of current alarm, supervisory, and trouble conditions in system or a log of past events.

F. Response Time: Thirty seconds maximum between actuation of any alarm and its indication at central-station control unit.

G. Circuit Supervision: Supervise all signal and data transmission lines, links with other systems, and sensors from central-station control unit. Indicate circuit and detection device faults with both protected zone and trouble signals, sound a distinctive audible tone, and illuminate an LED. Maximum permissible elapsed time between occurrence of a trouble condition and indication at central-station control unit is 20 seconds. Initiate an alarm in response to opening, closing, shorting, or grounding of a signal or data transmission line.

H. Manual Secure-Access Control: Coded entries at manual stations shall change status of associated protected zone between secure and access conditions.

I. Alarm Transmission to Remote Monitoring Station: Transmit all alarm and supervisory indications to a designated remote monitoring station via telephone lines. Transmissions must be compatible with existing monitoring station equipment. Coordinate with local authority having jurisdiction.

2.2 SYSTEM COMPONENT REQUIREMENTS

A. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.
   1. Minimum Protection for Power Lines 120 V and More: Auxiliary panel suppressors complying with requirements in Division 16 Section "Transient Voltage Suppression."
   2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Comply with requirements in Division 16 Section "Transient Voltage Suppression" as recommended by manufacturer for type of line being protected.

B. Interference Protection: Components shall be unaffected by radiated RFI and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25-V RMS injected into power supply lines at 10 to 10,000 MHz.

C. Tamper Protection: Tamper switches on detection devices, controllers, annunciators, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled and when entering conductors are cut or disconnected. Central-station control-unit alarm display shall identify tamper alarms and indicate locations.

D. Addressable Devices: Transmitter and receivers shall communicate unique device identification and status reports to central-station control unit.

2.3 ENCLOSURES

A. Interior Sensors: Enclosures that protect against dust, falling dirt, and dripping noncorrosive liquids.

B. Interior Electronics: NEMA 250, Type 12.

C. Screw Covers: Where enclosures are accessible to unauthorized persons, secure with security fasteners of type appropriate for enclosure.

2.4 SECURE AND ACCESS DEVICES

A. Keypad and Display Module: Arranged for entering and executing commands for system-status changes and for displaying system-status and command-related data.

2.5 DOOR AND WINDOW SWITCHES

A. Available Manufacturers:
   1. ADEMCO Group; Pittway Corporation.
   2. ADT.
   3. Aleph International Corporation.
   4. Amseco; Division of Kobishi America, Inc.
   5. FBII; Pittway Corporation.
   6. GE Interlogix; General Electric Company.
   7. George Risk Industries.
   8. Honeywell International Inc.
   9. Optex.
   10. Ultrak, Inc.; a division of Ademco Video Systems.

B. Description: Balanced-magnetic switch, complying with UL 634, installed on frame with integral overcurrent device to limit current to 80 percent of switch capacity. Bias magnet and minimum of two encapsulated reed switches shall resist compromise from introduction of foreign magnetic fields.

C. Flush-Mounted Switches: Unobtrusive and flush with surface of door and window frame.

2.6 PIR SENSORS

A. Available Manufacturers:
   1. ADEMCO Group; Pittway Corporation.
   2. ADT
   3. Aleph International Corporation.
   4. Crow Electronic Engineering, Inc.
   5. Digital Security Controls, Ltd.

6. FBII; Pittway Corporation.
7. Honeywell International Inc.
8. NAPCO Security Systems, Inc.
9. Optex.
10. Richardson Electronics, Ltd.
11. Visonic Inc.

B. Description: Sensors detect intrusion by monitoring infrared wavelengths emitted from a human body within their protected zone and by being insensitive to general thermal variations.
1. Wall-Mounting Unit Maximum Detection Range: 125 percent of indicated distance for individual units and not less than 50 feet.
2. Ceiling-Mounting Unit Spot-Detection Pattern: Full 360-degree conical.
3. Ceiling-Mounting Unit Pattern Size: 84-inch diameter at floor level for units mounted 96 inches above floor; 18-foot diameter at floor level for units mounted 25 feet above floor.

C. Device Performance:
1. Sensitivity: Adjustable pattern coverage to detect a change in temperature of 2 deg F or less, and standard-intruder movement within sensor's detection patterns at any speed between 0.3 to 7.5 fps across 2 adjacent segments of detector's field of view.
2. Test Indicator: LED test indicator that is not visible during normal operation. When visible, indicator shall light when sensor detects an intruder. Locate test enabling switch under sensor housing cover.

2.7 DURESS-ALARM SWITCHES

A. Available Manufacturers:
1. ADEMCO Group; Pittway Corporation.
2. ADT
3. GE Interlogix; General Electric Company.
4. NAPCO Security Systems, Inc.
5. Visonic Inc.

B. Description: A switch with a shroud over the activating lever that allows an individual to covertly send a duress signal to central-station control unit over supervised wiring, with no visible or audible indication when activated. Switch shall lock in activated position until reset with a key.
1. Minimum Switch Rating: 50,000 operations.
2. Push Button: Finger activated, suitable for mounting on horizontal or vertical surface.

2.8 CAPACITANCE ALARM SWITCH

A. Available Manufacturers
1. ADEMCO
2. Monaco Enterprises

B. Description: Switch device senses a change in electrical capacitance between the protected safe and ground caused by the proximity or contact of an intruder, sending an alarm signal to the control unit.
1. Self-contained standby battery power source, rechargeable
2. Filtered and shielded against interference from RF sources or changes of temperature or humidity
3. Adjustable sensitivity
4. Insulator blocks for safe

2.9 SECURITY SYSTEM CONTROL PANEL

A. Manufacturers: ICIDS III

B. Description: Panel shall provide supervision of sensors and detection subsystems and their connecting communication links, status control (secure or access) of sensors and detector subsystems, activation of alarms and supervisory and trouble signals, and other indicated functions.

C. Construction: Modular, with separate and independent alarm and supervisory system modules. Alarm-initiating protected zone boards shall be plug-in cards. Arrangements that require removal of field wiring for module replacement are not acceptable.

D. Comply with UL 1076.

1. Alarm Indication: Audible signal sounds and a plain-language identification of protected zone originating the alarm appears on LED, LCD, or cathode-ray-tube display at central-station control unit. Annunciator panel alarm light and audible tone identify protected zone signaling an alarm..

E. Operator Controls: Manual switches and push-to-test buttons that do not require a key to operate. Include the following:
1. Acknowledge alarm.
2. Silence alarm.
3. System reset.
4. LED test.

F. Resetting Controls: Prevent resetting of alarm, supervisory, or trouble signals while alarm or trouble condition persists.

G. Alphanumeric Display and System Controls: Arranged for interface between operator and addressable system components, including annunciation and supervision. Display alarm, supervisory, component status messages, and programming and control menu.
1. Display: LCD, 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

H. Protected Zones: Quantity of alarm and supervisory zones as indicated, with capacity for expanding number of protected zones by a minimum of 25 percent.

I. Power Supply Circuits: Central-station control units shall provide power for remote power-consuming detection devices. Circuit capacity shall be adequate for at least a 25 percent increase in load.

J. Emergency Power Supply: Provide standby rechargeable batteries complete with built-in charger for direct power supply to the system, or provide an UPS unit. UPS units shall comply with Division 16 Section "Static Uninterruptible Power Supply." The standby emergency power shall be sized to provide a minimum of six hours of central-station control-unit operation.

K. Cabinet: Lockable, steel enclosure arranged so operations required for testing, normal operation, and maintenance are performed from front of enclosure. If more than a single cabinet is required to form a complete control unit, provide exactly matching modular enclosures. Accommodate all components and allow ample gutter space for field wiring. Identify each enclosure by an engraved, laminated, phenolic-resin nameplate. Lettering on enclosure nameplate shall not be less than 1 inch high. Identify, with permanent labels, individual components and modules within cabinets.

2.10 SECURITY FASTENERS

A. Operable only by tools produced for use on specific type of fastener by fastener manufacturer or other licensed fabricator. Drive system type, head style, material, and protective coating as required for assembly, installation, and strength.

B. Available Manufacturers:
1. Camcar Textron Inc.
2. Holo-Krome; a Danaher Corporation.
3. Safety Socket Screw Corporation.
4. Tamper-Pruf Screws, Inc.
5. Drive System Types: Pinned Torx-Plus, Pinned Torx, or pinned hex (Allen).

C. Socket Flat Countersunk Head Fasteners:
1. Heat-treated alloy steel, ASTM F 835.
2. Stainless steel, ASTM F 879, Group 1 CW.

D. Socket Button Head Fasteners:
1. Heat-treated alloy steel, ASTM F 835.
2. Stainless steel, ASTM F 879), Group 1 CW.

E. Socket Head Cap Fasteners:
1. Heat-treated alloy steel, ASTM A 574.
2. Stainless steel, ASTM F 837, Group 1 CW.

F. Protective Coatings for Heat-Treated Alloy Steel:

1. Zinc chromate, ASTM F 1135, Grade 3 or 4; for exterior applications and interior applications where indicated.
2. Zinc phosphate with oil, ASTM F 1137, Grade I, or black oxide, 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 and other conditions affecting performance of intrusion detection.
   1. Examine roughing-in for embedded and built-in anchors to verify actual locations of intrusion detection connections before intrusion detection installation.
   2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of intrusion detection.

B. Inspect built-in and cast-in anchor installations, before installing intrusion detection, to verify that anchor installations comply with requirements. Prepare inspection reports.
   1. Remove and replace anchors where inspections indicate that they do not comply with requirements. Reinspect after repairs or replacements are made.
   2. Perform additional inspections to determine compliance of replaced or additional anchor installations. Prepare inspection reports.

C. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.

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

3.2 SYSTEM INSTALLATION

A. Comply with UL 681.

B. Security Fasteners: Where accessible to unauthorized persons, install intrusion detection components using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials except that a maximum of two different sets of tools shall be required to operate security fasteners for Project. Provide stainless-steel security fasteners in stainless-steel materials.

3.3 WIRING INSTALLATION

A. Wiring Method: Install wiring in metal raceways according to Division 16 Section "Raceways and Boxes." Conceal raceway except in unfinished spaces and as indicated. Minimum conduit size shall be 1/2 inch. Control and data transmission wiring shall not share conduit with other building wiring systems.

B. Wiring Method: Cable in metal raceways, concealed in accessible ceilings, walls, and floors when possible.

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Wires and Cables:
   1. Conductors: Size as recommended in writing by system manufacturer, unless otherwise indicated.
   2. 120-V Power Wiring: Install according to Division 16 Section "Conductors and Cables," unless otherwise indicated.
   3. Control and Signal Transmission Conductors: Install unshielded, twisted-pair cable, unless otherwise indicated or if manufacturer recommends shielded cable, according to Division 16 Section "Voice and Data Communication Cabling."
   4. Computer and Data-Processing Cables: Install according to Division 16 Section "Voice and Data Communication Cabling."

E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

F. Install power supplies and other auxiliary components for detection devices at controllers, unless otherwise indicated or required by manufacturer. Do not install such items near devices they serve.

G. Identify components with engraved, laminated-plastic or metal nameplate for central-station control unit and each terminal cabinet, mounted with corrosion-resistant screws. Nameplates and label products are specified in Division 16 Section "Electrical Identification."

3.4 GROUNDING

A. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

B. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding. Provide 5-ohm ground. Measure, record, and report ground resistance.

C. Install grounding electrodes of type, size, location, and quantity indicated. Comply with installation requirements in Division 16 Section "Grounding and Bonding."

3.5 FIELD QUALITY CONTROL

A. Pretesting: After installation, align, adjust, and balance system and perform complete pretesting to determine compliance of system with requirements in the Contract Documents. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.

1. Report of Pretesting: After pretesting is complete, provide a letter certifying that installation is complete and fully operable; include names and titles of witnesses to preliminary tests.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

C. Perform the following field tests and inspections and prepare reports:

1. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
2. Operational Tests: Schedule tests after pretesting has been successfully completed. Test all modes of system operation and intrusion detection at each detection device. Test for detection of intrusion and for false alarms in each protected zone. Test for false alarms by simulating activities outside indicated detection patterns.
3. Electrical Tests: Comply with NFPA 72, Section A-7. Minimum required tests are as follows:
   a. Verify the absence of unwanted voltages between circuit conductors and ground.
   b. Test all conductors for short circuits using an insulation-testing device.
   c. With each circuit pair, short circuit at the far end of circuit and measure circuit resistance with an ohmmeter. Record circuit resistance of each circuit on Record Drawings.
   d. Verify that each controller is in normal condition as detailed in manufacturer's operation and maintenance manual.
   e. Test signal and data transmission circuits complying with requirements in Division 16 Section "Voice and Data Communication Cabling" for proper signal transmission under open-circuit conditions. One connection each should be opened at not less than 10 percent of initiating and indicating devices. Observe proper signal transmission according to class of wiring used.
   f. Verify that transient surge-protection devices are installed according to manufacturer's written instructions.
   g. Test each initiating and indicating device for alarm operation and proper response at central-station control unit.
   h. Test both primary and secondary power. Verify, by test, that UPS is capable of operating the system for period and in manner specified.

D. Report of Tests and Inspections: Prepare a written record of tests, inspections, and detailed test results in the form of a test log.

E. Tag all equipment, stations, and other components for which tests have been satisfactorily completed.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain intrusion detection. Refer to Division 1 Section "Demonstration and Training."

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose. Visits for this purpose shall be in addition to any required by warranty.

END OF SECTION

SECTION 13851 - FIRE ALARM

PART 1. GENERAL

1.1 SUMMARY

A. Fire protection systems are life-safety systems and will therefore be designed, installed, tested, and expected to perform as such.

B. This Section includes fire alarm systems.

C. Related Sections include the following:
   1. Division 13 Section “Mass Notification System”.

1.2 DEFINITIONS

A. FACP: Fire alarm control panel.

B. MNCP: Mass notification control panel.

C. LED: Light-emitting diode.

D. NICET: National Institute for Certification in Engineering Technologies.

E. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

F. AHJ: Authority Having Jurisdiction is an individual responsible for review, inspection, and/or approval of a system and shall include the building official, fire marshal, engineer, Contracting Officer, or Owners insurance representative. For this project, the AHJ shall be Fort Meade fire chief.

1.3 REFERENCES

A. All references shall be of the latest edition.

B. Factory Mutual (FM):
   1. FM AG Approval Guide.

C. National Fire Protection Association (NFPA):
   1. NFPA 13 Standard For The Installation of Sprinkler Systems
   2. NFPA 70 National Electrical Code, 2008 Edition
   3. NFPA 72 National Fire Alarm Code
   4. NFPA 90A Standard For The Installation of Air Conditioning And Ventilating Systems
   5. NFPA 101 Life Safety Code

D. Underwriters' Laboratories, Inc. (UL): Appropriate UL equipment standards:
   1. UL 864 Control Panels.
   2. UL 268 Smoke Detectors.
   3. UL 268A Smoke Detectors (HVAC).
   4. UL 38 Manually Actuated Signaling Boxes.
   5. UL 346 Water flow Indicators for Fire Protection Signaling.
   6. UL 1971, Standard for Visual Signaling Appliances.

E. Building Codes:
   1. International Building Code
   2. International Fire Code

F. ADA, and/or State and local equivalency standards as adopted by The Authority Having Jurisdiction.

G. Military Unified Facilities Criteria:
   1. UFC 3-600-1
   2. UFC 3-600-02
   3. UFC 4-021-01

1.4 SYSTEM DESCRIPTION

A. Noncoded, analog-addressable system; automatic sensitivity control of certain smoke detectors; and multiplexed signal transmission.

B. All equipment furnished shall be new and the latest state of the art products of a single manufacturer, engaged in the manufacturing and sale of analog fire detection devices for over ten years.

C. The system as specified shall be reviewed, fully tested and approved by each of the Authorities Having Jurisdiction, and turned over to the owner in an operational condition.

D. In the interest of job coordination and responsibilities the installing contractor shall contract with a single supplier for fire alarm equipment, engineering, programming, inspection and testing.

E. The contractor shall provide a representative as requested for project meetings such as to assist in coordination of crafts.

1.5 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 72.

B. Fire alarm signal initiation shall be by one or more of the following devices:
   1. Manual stations.
   2. Smoke or heat detectors.
   3. Automatic sprinkler system water flow.
   4. Fire extinguishing system operation.

C. Fire alarm signal shall initiate the following actions:
   1. Sound evacuation signals or voice messages and display a custom screen/message defining the building/zone/room in alarm and the specific alarm point initiating the alarm.
   2. Log to the system history archives all activity pertaining to the alarm condition.
   3. Activate visual strobe signals throughout the facility.
   4. Audible evacuation signals or messages shall be silenced from the fire alarm control panel by an alarm silence switch. Visual signals shall be programmable to flash until system reset or additional alarm silencing, as required.
   5. A signal dedicated to sprinkler system water flow alarm shall not be silenced while the sprinkler system is flowing at a rate of flow equal to a single head.

D. Supervisory signal initiation shall be by one or more of the following devices or actions:
   1. Signal from the Mass Notification Control Panel.
   2. Display the origin of the supervisory condition report at the local fire alarm control panel.
   3. Activate supervisory audible and dedicated visual signal.
   4. A means for silencing a supervisory signal shall be permitted only if it is key-operated, located in a locked enclosure, or arranged to provide equivalent protection against unauthorized use. Such a means shall be permitted only if it transfers the supervisory indication to a lamp or other visible indicator and subsequent supervisory signals in other zones cause the supervisory notification appliance(s) to re-sound.
   5. Record within system history the initiating device and time of occurrence of the event.
   6. Transmit the signal to the monitoring station.
   7. Emergency stop of HVAC equipment.

E. System trouble signal initiation shall be by one or more of the following devices or actions:
   1. Signal from the Mass Notification Panel.
   2. Display at the local fire alarm control panel the origin of the trouble condition report.
   3. Activate trouble audible and visual signals at the control panel and as indicated on the drawings.
   4. Silence audible signals from the fire alarm control panel via a trouble acknowledge switch.
   5. Trouble reports for primary system power failure to the master control shall be optionally delayed for a period of time not greater than 200 seconds. Trouble conditions that have been restored to normal shall be automatically removed from the trouble display queue and not require operator intervention. This feature shall be software selectable and shall not preclude the logging of trouble events to the historical file.
   6. Record within system history, the occurrence of the event, the time of occurrence and the device initiating the event.
   7. Transmit the signal to the monitoring station.
   8. Emergency stop of HVAC equipment.

F. System Trouble and Supervisory Signal Actions: Ring trouble alarm and annunciate at the FACP and remote annunciators.

G. Power and Voltage Limitations:
   1. Battery capacity calculations. Battery size shall be a minimum of 125% of the calculated requirement.

2. Power supplies shall be sized to furnish the total connected load in a worst-case condition plus 25% spare capacity. (i.e. 4A supply x .25 spare = 1A reserve.)
3. Voltage drop calculations for wiring runs demonstrating worst-case condition. Unless otherwise approved by the engineer, voltage drop calculations shall be performed using the Lump-Sum approach using device nominal rating voltage. Calculations must include and clearly indicate wire length out and back to panel. Calculations shall be provided for strobe and speaker circuits.
4. Device current values for voltage calculations shall be based on the lowest nameplate voltage. (i.e. current values at a voltage of 20 volts shall be used when available rather than current values for 24 volts.)
5. Notification Appliance Circuit (NAC) design shall incorporate a 25% spare capacity for future expansion.
6. End-of-line voltage reading will be required for each circuit and must have a 25% spare capacity. (i.e. 24V circuit – 21V nameplate = 3 volt drop x 0.25 spare = 0.75 volt safety factor required.)
7. In no case shall indicating/evacuation circuits be designed or measured to have an end-of-line voltage below 20 volts or the manufacturers nameplate voltage, whichever is higher.

1.6 SUBMITTALS

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

B. Shop Drawings: All submittals shall be submitted to the Contracting Officer for review. The contractor shall include the following information in submittals.
   1. Shop Drawings shall be prepared and signed by persons with the following qualifications:
      a. Registered Fire Protection Engineer.
      b. Trained and certified by manufacturer in fire alarm system design.
      c. Fire alarm certified by NICET, minimum Level III.
   2. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
   3. Device Address List: Coordinate with final system programming with Owner and Base Fire Department.
   4. System riser diagram with device addresses, conduit sizes, and cable and wire types and sizes.
   5. Wiring Diagrams: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.
   6. Batteries: Size calculations.
   7. Duct Smoke Detectors: Performance parameters and installation details for each detector, verifying that each detector is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating. Coordinating the installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, the detector housing, and remote status and alarm indicators. Locate detectors according to manufacturers written recommendations.
   8. Elevation Details: Details shall be provided showing mounting of wall and ceiling devices. Where exposed or pocketed ceilings are involved, specific dimensioned details of detector and notification devices shall be provided.
   9. Device Mounting Details: Details of device back-box requirements shall be provided.
   10. Floor Plans: Indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits. CADD files for floor plans may be obtained through General Contractor from the Architect/Engineer.

C. Cut Sheets, Calculations, and other Design Documents: Each set of shop drawings shall be accompanied with supportive submittal documentation. This documentation shall be quality bound and shall be organized and numerically tabbed into the following sections.
   1. Fire Alarm Control Panels, Power Supplies and Annunciators
   2. Detection Devices
   3. Audio/Visual Devices
   4. System Components, Modules and Relays
   5. Battery Calculations and cut sheets (summary of results shall also be on plans)
   6. Voltage Calculations (summary of results shall also be on plans)
   7. Compatibility Listings (matrix, table, or info showing device compatibility)
   8. Operating Instructions for entire System *(This will include a copy of what will be posted adjacent to FACP)*

9. Manufacturers Inspection instructions and other maintenance criteria from NFPA 72 and UFC 3-600-02
10. Designer and installer certificates (documents prepared by a PE do not require certificate, but are required to be sealed.)

D. Qualification Data: Copies of certificates for installers and documenting approved manufacture representation shall be provided.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For fire alarm system to include in emergency, operation, and maintenance manuals. Comply with NFPA 72, Appendix A, recommendations for Owner's manual. Include abbreviated operating instructions for mounting at the FACP.

G. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals specified in Division 1 Section "Submittals," make an identical submittal to authorities having jurisdiction. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to Contracting Officer for review.

H. Documentation:
1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner and authorities having jurisdiction.
2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Owner. Format of the written sequence of operation shall be the optional input/output matrix.
(a) Hard copies on paper to Owner.

I. A copy of these fire alarm specifications shall be included with all submittal packages including those to the engineer, owner, and local AHJ's.

J. Incomplete submittals shall be returned without review, unless previously approved by the Contracting Officer.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Qualifications:
1. The contractor shall submit copies of all required Licenses and Bonds as required in the State having jurisdiction to the Contracting Officer upon award of contract, and engineer upon request.
2. The contractor shall employ on staff a minimum of one NICET level III Fire Alarm Technician, a registered Fire Protection Engineer, a professional engineer registered in the State of the installation, or a Certified Safety Professional with proven experience in fire alarm systems. This individual shall make regular site visits as necessary to oversee the system installation. This individual will be held accountable for system oversight, code compliance, and quality of installation. This requirement shall apply to the fire alarm contractor and any other contractor installing portions of the system such as wiring and/or devices by an electrical contractor. Qualified individual shall immediately provide evidence of qualification upon request.
3. At least one NICET Level II Fire Alarm Technician shall be present and have oversight anytime fire alarm equipment and/or wiring is being installed. This requirement shall apply to the fire alarm contractor and any other contractor installing portions of the system such as wiring and/or devices by an electrical contractor. Technician shall immediately provide evidence of qualification upon request.
4. Fire alarm shop drawings shall be prepared and signed by a Registered Fire Protection Engineer with proven and documented experience/training in fire alarm system design and codes. Plans not prepared by the Professional Engineer or under the direct supervision (same employment) of the Professional Engineer shall not be approved. Design documents shall bear a seal of the engineer.
5. The Contracting Officer may accept a testing or qualification body other than NICET, if submitted and approved prior to bidding the project,. Evidence of qualification and means for verification shall be provided in writing to the Contracting Officer with sufficient time for evaluating such request prior to awarding of contract. However, such qualifications shall be specifically focused towards fire alarm system design, installation, and codes. Qualifications for other low voltage systems such as security, access control, telephone, etc. shall not be approved.
6. The State approved or licensed fire alarm contractor whose name appears on the system and who is responsible for system warranty and service shall have sole authority to establish installation

responsibilities. Thus, if any portion is to be wired or installed by a separate contractor (such as an electrical contractor), then the fire alarm contractor will by contract select and warrant such contractor. An electrical or other contractor not licensed by the state and/or not meeting qualification requirements of this specification shall not dictate installation conditions for this system.

1.8 REGULATORY REQUIREMENTS

A. Factory Mutual (FM).
   1. FM AG Approval Guide.

PART 2. PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. FACP and Equipment:
      a. Edwards Systems Technology Inc. – a G.E. Company.
      b. Fire Control Instruments, Inc.; a Honeywell Company.
      c. Monaco.
      d. Notifier; a Honeywell Company.
      e. Siemens Building Technologies, Inc.; a Cerberus Division.
      f. SimplexGrinnell LP; a Tyco International Company.
      g. Silent Knight “Farenheight Series”.
   2. Wire and Cable:
      a. Comtran Corporation.
      b. Helix/HiTemp Cables, Inc.; a Draka USA Company.
      c. Rockbestos-Suprenant Cable Corporation; a Marmon Group Company.
      d. West Penn Wire/CDT; a division of Cable Design Technologies.
   3. Audible and Visual Signals:
      a. Gentex Corporation.
      b. System Sensor; a GE-Honeywell Company.
      c. Wheelock, Inc.

2.2 FIRE ALARM CONTROL PANEL FACP

A. General Description:
   1. Modular, power-limited design with electronic modules, UL 864 listed.
   2. Addressable initiation devices that communicate device identity and status.
      a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at the FACP.
      b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.
   3. Addressable control circuits for operation of mechanical equipment.
   4. Interface with the Mass Notification Control Panel. (Refer to Division 13 Section “Mass Notification System”.)

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at the FACP and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
   1. Annunciator and Display: Liquid-crystal type, three line(s) of 160 characters, minimum.
   2. Keypad: Arranged to permit entry and execution of programming, display, and control commands; and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

C. Circuits:
   1. Signaling Line Circuits: NFPA 72, Class A, Style 6.
   2. Notification-Appliance Circuits: NFPA 72, Class A, Style Z.
   3. Actuation of alarm notification appliances, emergency voice communications, annunciation, elevator recall, and actuation of suppression systems shall occur within 10 seconds after the activation of an initiating device.

4. Electrical monitoring for the integrity of wiring external to the FACP for mechanical equipment shutdown is not required, provided a break in the circuit will cause food preparation equipment shutdown, and other peripheral functions equipment to shut down.

D. Smoke-Alarm Verification:
1. Initiate audible and visible indication of an "alarm verification" signal at the FACP.
2. Activate a listed and approved "alarm verification" sequence at the FACP and the detector.
3. Record events by the system printer.
4. Sound general alarm.
5. Cancel FACP indication and system reset if the alarm is not verified.

E. Audible Notification: Evacuation speakers shall be capable of sounding temporal pattern 3, complying with ANSI S3.41.

F. Power Supply for Supervision Equipment: Supply for audible and visual equipment for supervision of the ac power shall be from a dedicated dc power supply, and power for the dc component shall be from the ac supply.

G. Alarm Silencing, Trouble, and Supervisory Alarm Reset: Manual reset at the FACP and remote annunciators, after initiating devices are restored to normal.
1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.
3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset.

H. Walk Test: A test mode to allow one person to test alarm and supervisory features of initiating devices. Enabling of this mode shall require the entry of a password. The FACP and annunciators shall display a test indication while the test is underway. If testing ceases while in walk-test mode, after a preset delay, the system shall automatically return to normal.

I. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and control of changes in those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and make a print-out of the final adjusted values on the system printer.

J. Transmission to Remote Alarm Receiving Station: Provide automatic transmission alarm, trouble, and supervisory signals to a remote alarm station by means of a Monaco BTX FM signal transceiver.

K. Service Modem: Ports shall be RS-232 for system printer and for connection to a dial-in terminal unit.
1. The dial-in port shall allow remote access to the FACP for programming changes and system diagnostic routines. Access by a remote terminal shall be by encrypted password algorithm.

L. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory signal, and supervisory and digital alarm communicator transmitter shall be powered by the 24-V dc source.
1. The alarm current draw of the entire fire alarm system shall not exceed 80 percent of the power-supply module rating.
2. Power supply shall have a dedicated branch circuit. Provide handle lock at branch circuit breakers. Apply red paint to branch circuit breakers per NPFA 72.

M. Secondary Power: 24-V dc supply system with batteries and automatic battery charger and an automatic transfer switch.
1. Batteries: Sealed lead calcium.
2. Battery and Charger Capacity: Comply with NFPA 72. Provide minimum of 24 hours standby and 10 minutes of alarm backup power.

N. Surge Protection:
1. Provide surge protectors recommended by FACP manufacturer. Provide on all system wiring external to the building housing the FACP. This shall include power, telephone, and radio transmitter wiring.

O. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.3 MANUAL FIRE ALARM BOXES

A. Description: UL 38 listed; finished in red with molded, raised-letter operating instructions in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box; if indicated as surface mounted, provide manufacturer's surface back box.
   1. Single-action mechanism requiring one action to initiate an alarm, pull-lever type. With integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.
   2. Station Reset: Key-operated switch. Device shall be keyed same as fire alarm control panel and other fire alarm equipment cabinets.
   3. Indoor Protective Shield: Factory-fabricated clear polycarbonate plastic enclosure, hinged at the top to permit lifting for access to initiate fire alarm. STI or equal.

2.4 SYSTEM SMOKE DETECTORS

A. General Description:
   1. UL 268 listed, operating at 24-V dc, nominal.
   2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
   3. Multipurpose type, containing the following:
      a. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
      b. Heat sensor, combination rate-of-rise and fixed temperature.
   4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection of building wiring.
   5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
   6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.
   7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.
      a. Rate-of-rise temperature characteristic shall be selectable at the FACP for 15 or 20 deg F per minute.
      b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at the FACP to operate at 135 or 155 deg F.
      c. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors:
   1. Sensor: LED or infrared light source with matching silicon-cell receiver.
   2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.

C. Duct Smoke Detectors:
   1. Photoelectric Smoke Detectors:
      a. Sensor: LED or infrared light source with matching silicon-cell receiver.
      b. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.
   2. UL 268A listed, operating at 24-V dc, nominal.
   3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
   4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. The fixed base shall be designed for mounting directly to the air duct. Provide terminals in the fixed base for connection to building wiring.
      a. Weatherproof Duct Housing Enclosure: UL listed for use with the supplied detector. The enclosure shall comply with NEMA 250 requirements for Type 4X.
   5. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
   6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.
   7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.

8. Each sensor shall have multiple levels of detection sensitivity.
9. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied.
10. Relay for Equipment Shutdown: Rated to interrupt fan control or power circuit.
11. Combination remote status LED and magnetic test switch mounted flush in ceiling directly below device. In exposed ceiling areas, remote mount status LED adjacent to nearest exterior exit next to manual pull station. Label devices to match HVAC schedule.

2.5 THERMAL SENSORS

A. Thermal sensors shall be combination rate-of-rise/fixed temperature sensing. The alarm condition shall be determined by comparing sensor valve with the stored values.

B. A moving average of the sensor's heat sensing value to automatically compensate for conditions that could affect detection operations. System shall automatically maintain a constant heat sensing sensitivity from each sensor by compensating for environmental factors.

C. Automatic self-test routines shall be performed on each sensor which will functionally check sensor sensitivity electronics and ensure the accuracy of the value being transmitted. Any sensor that fails this test shall indicate a trouble condition with the sensor location at the control panel.

D. An operator at the control panel, having the proper access level, shall have the capability to manually access the following information for each heat sensor:
   1. Primary status.
   2. Device type.
   3. Present average value.
   4. Sensor range 135 degrees.

E. An operator at the control panel, having the proper access level, shall have the capability to manually control the following information for each heat sensor:
   1. Alarm detection sensitivity values.
   2. Enable or disable the point/device.
   3. Control sensor's relay driver output.

F. In high heat areas such as kitchens and mechanical rooms install 190 degree F. conventional detectors connected to addressable modules (AID) outside of the high heat area.

2.6 NOTIFICATION APPLIANCES

A. Description: Equipped for mounting as indicated and with screw terminals for system connections. Color shall be white.
   1. Evacuation Speakers: Common speakers for both fire alarm and mass notification. See Section 13853, Mass Notification System.
   2. Visible Alarm Devices. Unless otherwise noted, provide separate Xenon strobes for fire alarm and mass notification in a single mounting assembly. See Section 13853, Mass Notification System.

B. Bells: Electric-vibrating, 24-V dc, under-dome type; with provision for housing the operating mechanism behind the bell. Bells shall produce a sound-pressure level of 94 dBA, measured 10 feet from the bell. 10-inch size, unless otherwise indicated. Bells shall be weatherproof. Color: Red. Label bells "SPRINKLER WATER FLOW".

2.7 REMOTE INDICATORS

A. Remote status and alarm indicator and magnetic test stations, with LED indicating lights. Light is connected to flash when the associated device is in an alarm or trouble mode. Lamp is flush mounted in a single-gang wall plate. A red, laminated, phenolic-resin identification plate at the indicating light identifies, in engraved white letters, device initiating the signal and room where the duct smoke detector, smoke detector, or valve is located. For water-flow switches, the identification plate also designates protected spaces downstream from the water-flow switch.

2.8 REMOTE ANNUNCIATOR

A. Description: Duplicate annunciator functions of the FACP for alarm, supervisory, and trouble indications. Also duplicate manual switching functions of the FACP, including acknowledging, silencing, resetting, and testing
   1. Mounting: Flush cabinet, NEMA 250, Class 1.

B. Display Type and Functional Performance: Alphanumeric display same as the FACP. Controls with associated LEDs permit acknowledging, silencing, resetting, and testing functions for alarm, supervisory, and trouble signals identical to those in the FACP.

2.9 ADDRESSABLE INTERFACE DEVICE

A. Monitor module listed for use in providing a system address for listed alarm-initiating devices for wired applications with normally open contacts.

B. Control module shall have double throw form C contracts with minimum rating of 125VAC, 1 ampere inductive. Module shall receive control signal from signaling line circuit (SLC) and shall require no other external power for operation.
   1. Control module shall be capable of providing a direct signal to the elevator controller to initiate elevator recall.

2.10 GUARDS FOR PHYSICAL PROTECTION

A. Description: Welded wire mesh or polycarbonate of size and shape for the manual station, smoke detector, strobe, or other device requiring protection. Any device located in Receiving/Staging area shall be protected as such.

B. Manual pull stations in areas accessible to the public shall have tamper proof cover equivalent to Edward Systems Stopper II without sounder.

2.11 WIRE AND CABLE

A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.

B. Signaling Line Circuits: Plenum rated twisted, shielded pair, No. 14 AWG.
   1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70 Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.

C. Non-Power-Limited Circuits: Plenum rated solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
   1. Low-Voltage Circuits: No. 16 AWG, minimum.
   2. Line-Voltage Circuits: No. 12 AWG, minimum.

2.12 FIRE ALARM MONITORING

A. The contractor shall connect the system to base-wide Fire Reporting System.

B. Provide a Monaco BTXM Radio-frequency transmitter and antenna to match the base-wide fire reporting system. Provide input/output interface in FACP to allow specific alarm and trouble signals to be transmitted. Provide a wall mounted antenna, mast, lightning arrestor, and all required accessories. Trim antenna to base operating frequency. Coordinate frequency selection with base fire department prior to trimming.

C. This equipment shall be a listed component of the fire alarm panel and shall be installed inside the fire alarm control panel per manufacturers criteria.

D. This equipment shall be capable of transmitting to the monitoring equipment the device address that is in alarm, supervisory, and trouble conditions.

E. Water-flow signals shall be specifically received by the monitoring service as water flow alarms.

2.13 REMOTE POWER SUPPLIES

A. Provide remote power supply for alarm indicating devices and peripheral functions. Power supply shall have NEMA 1 enclosure and shall provide four 24VDC, 2A Class II circuits. Power supplies shall have sealed batteries and a two rate charger. Battery capacity shall be 10 minutes of alarm and 24 hours of supervision plus minimum 25% spare capacity.

PART 3. EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Connecting to Existing Equipment: Verify that new fire alarm system is operational before making changes or connections to existing fire alarm system.

B. Smoke or Heat Detector Spacing:
   1. Smooth ceiling spacing shall not exceed 30 feet.
   2. Spacing of heat detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas, shall be determined according to Appendix A in NFPA 72.
   3. Spacing of heat detectors shall be determined based on guidelines and recommendations in NFPA 72.

C. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.

D. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of the duct. Provide 36" square access hatch with operable door and latch per architectural specifications for all devices located above inaccessible ceilings.

E. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position. Label device to match HVAC schedule.

F. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling, but not higher than 8 feet unless otherwise noted.

G. Device Location-Indicating Lights: Locate in public space near the device they monitor.

H. FACP: Surface mount with tops of cabinets not more than 72 inches above the finished floor.

I. Annunciator: Install with top of panel not more than 72 inches above the finished floor.

J. Antenna for Radio Alarm Transmitter: Mount per manufacturers recommendations to building structure where indicated. Use mounting arrangement and substrate connection that will resist 100-mph wind load with a 1.3 gust factor without damage.

K. No portion of a fire alarm system shall be installed prior to having plans on site that have been approved and stamped by the Contracting Officer and the local AHJ. This includes wiring. Approved stamped plans shall be on site at all times while the system is in the installation stage.
   1. Smoke detectors shall not be installed until the construction cleanup of all trades is complete per NFPA 72. Any smoke detector that has been installed prior to the construction cleanup of all trades and without prior written approval of the engineer and local AHJ shall be marked in a permanent manner that will identify it from re-use and shall be replaced prior to commissioning of the system and/or turning over to the owner. Such detectors shall be replaced at the sole expense of the installing contractor. Subject to approval of the engineer and local AHJ this may exclude services, which do not create air-born particles such as telephone/network services, and modular furniture installation.
   2. Orange shipping covers, rubber gloves, tape, or other devices shall not be used to bypass these basic requirements.

3.2 BACK BOXES

A. Speakers are shall be installed in a 4-square deep box with extension ring to limit potential damage to wiring.

B. Manual pull stations shall be located on walls such that tamper resistant covers can be installed as required, or in the future. Therefore, a 3-inch clearance from other switches, window openings, door frames, etc. shall be provided on each side of a manual pull station and 4 inches clear area above and below the manual pull station.

3.3 WIRING INSTALLATION

A. Install wiring according to the following:
   1. NECA 1.
   2. TIA/EIA 568-A.

B. Wiring Method:
   1. Fire alarm/mass notification circuits and equipment control wiring associated with the fire alarm system shall be installed in a metal raceway system.
   2. Devices shall be included on the circuits as indicated on the approved plans and calculations. Changes must be evaluated by the designer. Changes in wire routing may require new calculations.
   3. Raceway system shall be minimum 3/4" EMT Type.
   4. Paint all fire alarm conduit and boxes red.

C. Unless noted otherwise on the plans, power booster panels shall not be fed from a separate notification power booster panel (daisy chained).

D. Each circuit entering or exiting the building shall be protected with surge protection. This includes 24vdc, 120vac, and telephone circuits serving the fire alarm system.

E. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

F. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

G. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

H. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the FACP and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Electrical Identification".

B. Each conductor shall be identified as shown on the drawings at each end and at terminal points with wire markers. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.

C. Install instructions frame in a location visible from the FACP.

3.5 GROUNDING

A. Ground the FACP and associated circuits; comply with IEEE 1100.

3.6 FIELD QUALITY CONTROL

A. Contractor Pre-Testing and Record of Completion Testing:
   1. This section covers contractor pre-testing and documentation by the installing contractor that shall be conducted before any commissioning inspection or AHJ testing is scheduled.
   2. Wiring runs shall be tested for continuity, short circuits and grounds before any system devices are installed or energized.
   3. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72.

4. Duct smoke detectors shall not be installed or in-place when the HVAC systems are first turned on. All HVAC systems shall be run sufficiently to remove loose dust and debris. Failure to protect detectors may result in detector replacement per this specification.
5. Audibility testing shall not be conducted until all doors, windows, walls, ceilings, and carpeting are in place.
6. All Alarm Initiating Devices shall be observed and logged for correct zone and sensitivity. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the initials of the installing technician and date.
7. Computer/labeler generated labels with the address number only may be installed on the exterior of the device as long as the background is clear and installed in a quality manner. This will assist in the inspection, testing, maintenance, and trouble-shooting of the system.
8. All Smoke detectors shall be commissioned using canned smoke or a method that will functionally test the smoke chamber. The use of Magnets for commission testing of smoke detectors is Strictly Prohibited.
9. A systematic record shall be maintained of all readings using schedules or charts of tests and measurements. Areas shall be provided on the logging form for readings, dates and witnesses.
10. Air velocity readings shall be taken and recorded for each HVAC related smoke detector.
11. The installing contractor shall make instruments, tools and labor required to conduct the system tests available.
12. The following equipment shall be a minimum for conducting the tests:
    a. Ladders, scaffolds, or lifts as required to access all installed equipment.
    b. Multimeter for reading voltage, current and resistance.
    c. Two way radios, flashlights, screwdrivers, measuring tapes.
    d. A manufacturer recommended device for measuring airflow through air duct smoke detector sampling assemblies.
    e. Calibrated decibel meter.

B. At minimum the following tests shall be conducted and documented.
1. Turn each sprinkler system flow valve two full turns and verify proper supervisory alarm at the FACP.
2. Verify activation of all flow switches under approved flowing conditions.
3. Open initiating device circuits and verify that the trouble signal actuates.
4. Open and short signaling line circuits and verify that the trouble signal actuates.
5. Open and short Notification Appliance Circuits and verify that trouble signal actuates.
6. Ground all circuits and verify response of trouble signals.
7. Check presence and audibility of tone throughout building spaces. This includes measuring dBA levels.
8. Check installation, supervision, and operation of all intelligent smoke detectors using the Walk Test feature.
9. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
10. Each notification circuit shall be tested under standby/battery power. Voltage readings shall be taken at the booster panel for Class “A” circuits. Any circuit that measures less than 20 volts dc or the nameplate voltage, whichever is higher, shall be considered as failing the design. Note: Some systems incorporating synchronizing modules can impair results. If the module cannot be bypassed for voltage readings, the manufacturer should be contacted for guidance.
11. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.7 ACCEPTANCE TESTING

A. This section details criteria for commissioning inspections by AHJ’s and the owner. Testing shall be scheduled with all parties minimum 10 working days in advance.
1. This stage of testing shall not be scheduled or conducted until all pre-testing has been completed and is in compliance with applicable requirements.
2. A signed Record of Completion shall be provided to the inspector prior to starting this testing.

3. The contractor is responsible for testing all components in accordance with the manufacturers required and suggested procedures and in accordance with NFPA 72. If this specification incorporates a detailed Acceptance Test Procedure (ATP) prepared by the engineer than it shall also be followed.
4. A program matrix shall be provided by the installing contractor referencing each alarm input to every output function affected as a result of an alarm condition on that input.
5. The commissioning inspector shall use the system record drawings and other documents specified under this specification during the testing procedure to verify operation as programmed. In conducting the commissioning test, the inspector shall request demonstration of any or all input and output functions.
6. All Smoke detectors shall be commissioned using canned smoke or a method that will functionally test the smoke chamber. The use of magnets for commission testing of smoke detectors is strictly prohibited
7. New detectors that show to be dirty through system sensitivity testing shall be replaced.
8. The items tested shall include but not be limited to the following:
   a. System wiring shall be tested to show the following results and the systems subsequence operation:
      1) Open, Shorted or Grounded Circuits.
      2) Primary and Battery power disconnected.
      3) End-of-line voltage readings on notification circuits.
   b. System notification circuits and appliances operate as programmed. Audibility and visual levels meet required standards.
   c. A minimum of 15 dBA above ambient shall be obtained in every occupiable space (throughout) per NFPA 72. This includes storage rooms, electrical rooms, telephone rooms, and any other occupiable space.
   d. System shall demonstrate the correct messages at the FACP and any remote annunciator.
   e. System off-site reporting shall be verified for alarm, supervisory, trouble, correct address, facility name, contact phone number, and contact name.
   f. System shall be tested for stand-by battery backup as outlined in this specification.

3.8 FINAL DOCUMENTATION

A. System documentation shall be supplied to the owner and shall include but not be limited to the following:
   1. System record (as-built) drawings and wiring details including one set of reproducible drawings, and a CD ROM with copies of the record drawings in AUTOCAD .dwg format, or .dxf format for use in a CAD drafting program.
   2. System Operating, Installation and Maintenance Manuals.
   3. System matrix showing input signals to output commands.
   4. Provide a copy of the FACP system programming on a CD-ROM.

B. A copy of all above materials and documentation shall be provided in O & M package.

C. The installation contractor shall provide the owner with account information, phone numbers, passwords, and terms/conditions of the monitoring company.

3.9 FINAL SYSTEM TRAINING

A. The installation contractor shall familiarize the owner and/or owner representative with location of all fire alarm panels, modules, devices, wire routing, and plan cabinet contents.

B. The installation contractor shall furnish training as follows:
   1. A simplified training manual on system operation unique to the system shall be prepared and presented to the owner. This manual shall cover key items and day-to-day operation. Such manual shall be presented in a professional and legible format such as that provided through use of a Microsoft PowerPoint, or Microsoft Word.
   2. The owner shall be provided with at least 3 hard-copies and an electronic PDF format that can be edited through commonly available software.
   3. The training program shall be presented such that the owner can readily train new staff over the life of the system.

4. Training in the receipt, handling and acknowledgment of alarms. This shall include emphasis that alarms shall not be silenced until after a complete and thorough investigation has been conducted. If there is a hazard, then only the fire department is authorized to silence an alarm.
5. Sequence of operation for all interconnected systems.
6. Training in the system operation including manual control of output functions from the system control panel.
7. The total training requirement shall be a minimum of 8 hours, but shall be sufficient to cover all items specified. The contractor shall provide two such training sessions.

3.10 ADJUSTING AND FOLLOW-UP

A. Occupancy Adjustments: When requested within 12 months of date of beneficial occupancy, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to project outside normal occupancy hours for this purpose.

B. Annual Test and Inspection: Eleven months after date of Substantial Completion, test the fire alarm system complying with the testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for monthly, quarterly, semiannual, and annual periods. Use forms developed for initial tests and inspections. The owner should be encouraged to participate in these services as reinforcement of system operability.

END OF SECTION

SECTION 13853 - MASS NOTIFICATION SYSTEM

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.

B. The design of this Mass Notification system incorporates specific components beyond that required for a fire alarm system, but is directly interfaced through hardware with the fire alarm system.

C. Shall be in accordance with Military document UFC 4-021-01.

1.2 SUMMARY

A. The United States Military has developed provisions for Mass Notification of personnel in the event of threats other than fire. Threats could vary from land attacks, sea attacks, chemical attacks, radiological attacks, and others.

B. The system components, supervision, and basic installation practices shall comply with criteria outlined in NFPA 72 and the Americans with Disabilities Act.

1.3 DEFINITIONS

A. FACP: Fire alarm control panel.

B. MNCP: Mass Notification Control Panel.

C. UFC: Unified Facilities Criteria.

D. LED: Light-emitting diode.

E. NICET: National Institute for Certification in Engineering Technologies.

F. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

G. AHJ: Authority Having Jurisdiction is an individual responsible for review, inspection, and/or approval of a system and shall include the building official, fire marshal, engineer, architect, or owner's insurance representative. For this project, the AHJ shall be Fort Meade fire chief.

1.4 REFERENCES

A. Military Documents:
   1. UFC 3-600-01 Fire Protection Engineering For Facilities
   2. UFC 3-600-02 Inspection, Testing, and Maintenance of Fire Protection Systems
   3. UFC 4-021-01 Mass Notification Systems For Facilities

B. National Fire Protection Association (NFPA):
   1. NFPA 70 National Electrical Code, 2008 Edition.
   2. NFPA 72 National Fire Alarm Code

C. Underwriters' Laboratories, Inc. (UL): Appropriate UL equipment standards:
   1. UL 864, Ninth Edition, Control Panels.
   2. UL 38 Manually Actuated Signaling Boxes.
   3. UL 1971, Standard for Visual Signaling Appliances.

D. State and Local Building Codes as adopted and/or amended by The Authority Having Jurisdiction (AHJ).

E. ADA, and/or State and local equivalency standards as adopted by The Authority Having Jurisdiction.

1.5 SYSTEM DESCRIPTION

A. Mass notification is the capability to provide real-time information to all building occupants or personnel in the immediate vicinity of a building during emergency situations. To reduce the risk of mass casualties, there must be a timely means to notify building occupants of threats and what should

be done in response to those threats. Pre-recorded and live voice emergency messages are required to provide this capability.

B. Failure of either the mass notification control panel or the fire alarm control panel shall still provide for a minimum means of occupant notification by the remaining system.

C. All equipment furnished shall be new and the latest state of the art products by manufacturers, engaged in the manufacturing and sale of analog fire detection and/or UL listed communication devices for over five years.

D. The system as specified is subject to review, full testing, and approval by each of the Authorities Having Jurisdiction, and shall be turned over to the owner in an operational condition.

E. The contractor shall provide a representative as requested for project meetings such as to assist in coordination of crafts.

1.6 PERFORMANCE REQUIREMENTS

A. Comply with all referenced documents.

B. Mass Notification initiation shall be by one or more of the following devices:
   1. Manual stations
   2. Switches located with the main panel and any remote microphones

C. Mass Notification activation shall initiate the following actions:
   1. Display action initiated on the mass notification control panel.
   2. Initiate the appropriate alert tone and pre-recorded message for the respective alert switch activated.
   3. Activate the mass notification strobes throughout the building.
   4. Mass notification shall have alert priority over fire alarm system. Thus, if fire alarm is also in alarm state, the fire alarm audible alarms shall stop during the mass notification messages. Fire alarm strobes may continue to flash and shall be synchronized with mass notification strobes.
   5. Mass notification signals shall not be displayed as alarm conditions. Text descriptions shall clearly indicate appropriate condition.
   6. Transmit the signal to the monitoring station.

D. Supervisory signal initiation shall be by one or more of the following devices or actions:
   1. Display the origin of the supervisory condition report at the local fire alarm control panel and/or mass notification panel.
   2. Activate supervisory audible and dedicated visual signals.
   3. Provide a means for silencing a supervisory signal shall be permitted only if it is key-operated, located in a locked enclosure, or arranged to provide equivalent protection against unauthorized use. Such a means shall be permitted only if it transfers the supervisory indication to a lamp or other visible indicator and subsequent supervisory signals in other zones cause the supervisory notification appliance(s) to re-sound.
   4. Record within system history the initiating device and time of occurrence of the event.
   5. Transmit the signal to the monitoring station.

E. System trouble signal initiation shall be by one or more of the following devices or actions:
   1. Display at the local fire alarm control panel and or mass notification panel the origin of the trouble condition report.
   2. Activate trouble audible and visual signals at the control panels and as indicated on the drawings.
   3. Silence audible signals via a trouble acknowledge switch.
   4. Trouble reports for primary system power failure to the master control shall be optionally delayed for a period of time not greater than 200 seconds. Trouble conditions that have been restored to normal shall be automatically removed from the trouble display queue and not require operator intervention. This feature shall be software selectable and shall not preclude the logging of trouble events to the historical file.
   5. Record within system history, the occurrence of the event, the time of occurrence and the device initiating the event.
   6. Transmit the signal to the monitoring station.

F. System Trouble and Supervisory Signal Actions: Initiate audible and visual signals at the main panels and remote annunciators.

G. Power and Voltage Limitations:
   1. Power supplies shall be sized to furnish the total connected load in a worst-case condition plus 25% spare capacity. (i.e. 4A supply x .25 spare = 1A reserve.)
   2. Voltage drop calculations for wiring runs demonstrating worst-case condition. Unless otherwise approved by the engineer, voltage drop calculations shall be performed using the Lump-Sum approach. Calculations must include and clearly indicate wire length out and back to panel. Calculations shall be provided for horn, strobe, and speaker circuits.
   3. Device current values for voltage calculations shall be based on the lowest nameplate voltage. (i.e. current values at a voltage of 20 volts shall be used when available rather than current values for 24 volts.)
   4. Notification Appliance Circuit (NAC) design shall incorporate a 25% spare capacity for future expansion.
   5. End-of-line voltage reading will be required for each circuit and must have a 25% spare capacity. (i.e. 24V circuit – 21V nameplate = 3 volt drop x 0.25 spare = 0.75 volt safety factor required.)
   6. In no case shall indicating/evacuation circuits be designed or measured to have an end-of-line voltage below 20 volts or the manufactures nameplate voltage, whichever is higher.

H. Notification zones and circuits shall be defined and configured such that organizational zones within a building can be isolated for zone evacuation, and/or isolation during testing conditions.

1.7 SUBMITTALS

A. Comply with submittal requirements in Section 13851, Fire Alarm System.

1.8 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Qualifications: See Section 13851, Fire Alarm System, for qualification requirements.

1.9 PROJECT CONDITIONS

A. See Section 13851, Fire Alarm System, for criteria.

1.10 SEQUENCING AND SCHEDULING

A. See Section 13851, Fire Alarm System, for criteria.

PART 2. PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Mass notification control panels
      a. Cooper Wheelock, Inc. (Voice Evacuation Panel)
      b. Madahcom (Wireless Transceiver/Basewide Communications)
      c. Monaco Enterprises Inc. (Wireless transceiver/Basewide Communications)
   2. Wire and Cable:
      a. Comtran Corporation.
      b. Helix/HiTemp Cables, Inc.; a Draka USA Company.
      c. Rockbestos-Suprenant Cable Corporation; a Marmon Group Company.
      d. West Penn Wire/CDT; a division of Cable Design Technologies.
   3. Audible and Visual Signals:
      a. Strobes, Horns, Speakers and Speaker Strobes as specified in Section 2.04.

2.2 MASS NOTIFICATION COMPONENTS (Model numbers indicated are from Cooper Wheelock and meant to establish equipment requirements. At contractor's option provide Madalcom or Monaco equals)

A. Cooper Wheelock SP40S Multi-Function Mass Notification Control Panel (MNCP)
   1. The system shall be a Single channel voice evacuation system incorporating user selectability of 8 distinct sounds for tone signaling, and the incorporation of a digital voice module for prerecorded

messaging. The system shall incorporate microphone override. The system shall have the capability of utilizing a remote microphone station with redundant controls of the evacuation system control panel.

2. A hand held microphone shall be provided and, upon activation, shall take priority over any tone signal, recorded message or remote microphone operation in progress, while maintaining the strobe **NAC** Circuits activation.
3. The system shall be capable of interconnection with a larger base wide notification system that includes operation from a central communication center and an outdoor public notification system provided by the same manufacturer.
4. Specific Cooper Wheelock Components to include:

- Model SP40-S Safepath Multifunction Control Panel for Fire/Mass Notification, Telephone Paging, Messaging and Background Music.
- Model SPB-80, 160, or 320 Watt Audio Boosters, Red
- Model PS-24-8MC Strobe Power Supply - 8 Amp w/Sync Con/Man Pwr
- Model STH-15SR 15 Watt Supervised Horn
- Model RSS-24MCW-FW Remote Strobe/Multi-Candela, Red Wall
- Model RSS-24MCC or RSS-24MCCH ceiling strobes. White with clear lens and red lettering “FIRE” for fire alarm strobes. White with amber lens for mass notification. Factory mount on speaker where indicated.
- Model RSS-24MCW-NW Remote Strobe, Multi Candela, White Wall
- Model S8-70/25 Ceiling 8” UL Speaker
- Model SP-SVC Supervised UL Listed Speaker Volume Control
- Appropriate consoles, batteries, modules, kits, and mounting accessories

B. Circuits:

1. Signaling Line Circuits: NFPA 72, Class A, Style 6.
2. Notification-Appliance Circuits: NFPA 72, Class B for speakers, Class A for strobes.
3. Actuation of alarm notification appliances including emergency voice communications shall occur within 10 seconds after the activation of an initiating device.
4. Electrical monitoring for the integrity of wiring external to the mass notification panel.
5. Power Supply for Supervision Equipment: Supply for audible and visual equipment for supervision of the ac power shall be from a dedicated dc power supply, and power for the dc component shall be from the ac supply.
6. Alarm Silencing, Trouble, and Supervisory Alarm Reset: Manual reset at the mass notification panel and remote annunciators, after initiating devices are restored to normal.
7. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
8. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.
9. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset.

C. Walk Test: A test mode to allow one person to test alarm and supervisory features of initiating devices. If testing ceases while in walk-test mode, after a preset delay, the system shall automatically return to normal.

D. Remote Microphone:

1. System shall be capable of adding up to three (3) remote microphones.
2. The Remote Microphone station shall be compatible with the Supervised Audio, Fire and Emergency Evacuation System.
3. The unit shall incorporate a Push-To-Talk (PTT) microphone, redundant controls and system status indicators of/for the system.
4. The unit shall incorporate microphone override of any tone generation or prerecorded messages.
5. The unit shall be fully supervised from the control panel.
6. The unit shall be made of steel and be flush mounted to a standard 4-gang electrical box.
7. The unit shall be equipped with a keyed lock that, when activated allows the use of the unit. The locking arrangement shall be identical to the control unit. The unit shall be painted red. The unit shall have a weight of 1 Lb., 8 oz. and its’ dimensions shall be 5"H x 9"W x .5"D. The unit shall have a 3 YEAR WARRANTY.
8. The approvals for this unit shall include: UL Standard 864, Ninth Edition, and FCC Part 15.

E. Function of Amplifier:
   1. Automatic transmission of different pre-recorded announcements to the facility, or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall be UL 1711 listed.
   2. Allow the application of and evacuation signal to indicated number of zones.
   3. Programmable tone and message sequence selection. Provide separate tone/message sequence for fire alarm and mass notification alarms.
   4. Digitally recorded messages for "Evacuation" and "All Clear." All messages to be reviewed and approved by AHJ.
   5. Generate tones to be sequenced with audio messages of the type recommended by NFPA 72 and that are compatible with tone patterns of the notification-appliance circuits of the FACP.
   6. Status Annunciator: Indicate the status of various voice/alarm speaker zones.
   7. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory signal, and supervisory and digital alarm communicator transmitter shall be powered by the 24-V dc source.
   8. The alarm current draw of the mass notification system shall not exceed 80 percent of each respective power-supply module ratings.
   9. Power supply shall have a dedicated circuit breaker with handle lock for this connection. Provide a red label at circuit breakers and identify it with "FIRE ALARM/MASS NOTIFICATION SYSTEM."

F. Primary Power: 24V dc obtained from 120V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory signal, and supervisory digital alarm communicator transmitter shall be powered by the 24V dc source.

G. Secondary Power: 24-V dc supply system with batteries and automatic battery charger and an automatic transfer switch.
   1. Batteries: Sealed lead calcium.
   2. Battery and Charger Capacity: Comply with NFPA 72.
   3. Provide minimum 24 hours standby and 10 minutes alarm back-up power.

H. Surge Protection:
   1. Install surge protection on normal ac power for the control panel, each power supply, and all accessories. Comply with Division 16 Section "Transient Voltage Suppression" for auxiliary panel suppressors.
   2. Install surge protectors recommended by control panel manufacturer. Install on all system wiring external to the building housing the control panel. This shall include power, telephone, and radio transmitter wiring.

I. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.3 MANUAL ACTIVATION STATIONS

A. Description: UL 38 listed; Color shall be white, operating instructions and label in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box.
   1. Single action mechanism requiring one action to initiate an alarm, pull-lever type, with integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the MNCP.
   2. Station Reset: Key-operated switch.

2.4 NOTIFICATION APPLIANCES

A. Description: Equipped for mounting as indicated and with screw terminals for system connections.

B. Visible Alarm Devices: Combination fire/mass notification Xenon strobe lights listed under UL 1638 and 1971. Mass notification strobe shall be amber translucent lens. There shall be no wording on this strobe. Fire alarm strobe shall be clear polycarbonate with “FIRE” engraved in 1” high letters on lens. Provide a white aluminum trim.

   1. Rated Light Output: As indicated on the Drawings

C. Manufacturer shall provide wall mount devices and/or ceiling mount devices as indicated on drawings. Provide special backbox for surface mounting of dual system indicating devices. Wheelock #SBL2-W or equal.

D. Evacuation Speakers:
   1. UL 1480 listed, as specified in Section 2.2-5 above
   2. Range Units: Rated .1/8, 1/4, 1/2, 1, 2 watts at 70-volts, unless otherwise noted on the plans.
   3. Mounting: Flush mount in areas with suspended accoustical tile or gypsumboard ceilings. Surface mount in areas with exposed structure. Provide minimum 60 degree symmetrical dispension.
   4. Matching Transformers: Tap range matched to the acoustical environment of the speaker location.
   5. Device shall be capable of multiple alert tones as indicated on plans or as required by the respective military facility.
   6. Provide steel back box suitable for surface or recess mounting as required. Provide perforated aluminum grille factory painted white.

2.5 REMOTE ANNUNCIATOR

A. Trouble and supervisory conditions with the mass notification circuits shall be indicated on the fire alarm control panel and remote annunciators.

2.6 TELEPHONE ACCESS

A. System shall be capable of activation and voice messaging through a telephone connection and shall be listed for such use.

2.7 REMOTE COMMUNICATIONS

A. Mass notification panel shall be capable of integration with a site-wide wireless communication system UL listed for emergency notification.

B. Provide a Monaco transceiver compatible with basewide mass notification communication system. This transceiver shall be separate from the transceiver described in Section 13851 – Fire Alarm.

2.8 WIRE AND CABLE

A. Wire and cable for mass notification systems shall be UL listed and labeled as complying with NFPA 70, Article 760 and shall be in accordance with requirement of Section 13851, Fire Alarm System.

PART 3. EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Notification equipment shall be installed and mounted in accordance with design documents and specific mounting details.

B. Control panels shall be mounted in a neat, orderly, and space-limiting manner. Details in drawings shall be used as a guide and represent allotted space.

C. No portion of a mass notification system shall be installed prior to having plans on site that have been reviewed, approved, and stamped by the appropriate reviewing agency and/or AHJ. This includes wiring. Approved stamped plans shall be on site at all times while the system is in the installation stage.

3.2 BACK BOXES

A. All speakers are to be installed in at least a 4-inch square deep box with extension ring to limit potential damage to wiring.

B. 5" Square Boxes 2-7/8" x 5" (67 cubic inch) deep metal box with a 5" extension ring shall be allowed. If used, careful consideration in the centering of finished devices is required due to larger box size when mounted to studs.

C. Manual push/pull stations shall be located on walls such that tamper resistant covers can be installed as may be indicated, or in the future. Therefore, a 3-inch clearance from other switches, window openings,

door frames, etc. shall be provided on each side of a manual pull station and 4 inches clear area above and below the manual pull station.

D. Provide special backbox for surface mounting of dual system indicating devices. Wheelock #SBL2-W or equal.

3.3 WIRING INSTALLATION

A. Wiring shall be installed in accordance with Section 13851, Fire Alarm System,

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Electrical Identification."

B. Each conductor shall be identified as shown on the drawings at each end and at terminal points with wire markers. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.

3.5 GROUNDING

A. Ground the MNCP and associated circuits; comply with IEEE 1100.

3.6 FIELD QUALITY CONTROL

A. Contractor Pre-Testing and Record of Completion Testing shall be conducted prior to scheduling commission testing and shall comply with criteria in Section 13851

3.7 ACCEPTANCE TESTING

A. System commission testing shall be conducted per criteria in Section 13851.

B. Testing shall include the initial activation of the fire alarm system and then a subsequent and sequential activation of the mass notification system. This sequence shall be reversed. System function shall comply with criteria of this Section.

C. System commission testing shall verify that the criteria outlined in this specification are complied with.

D. Contractor shall conduct speaker intellibility walk thru with fire department representative. Speakers shall be activated and taps adjusted as needed on a room by room basis to ensure message intellibilty.

3.8 FINAL DOCUMENTATION

A. Final documentation shall be submitted following the criteria in Section 13851, Fire Alarm System.

3.9 FINAL SYSTEM TRAINING

A. Very detailed system training shall be provided to the owner following the criteria in Section 13851, Fire Alarm System.

3.10 ADJUSTING AND FOLLOW-UP

A. Mass notification system adjusting, inspection, and testing shall comply with the criteria in Section 13851, Fire Alarm System.

3.11 WARRANTY AND SERVICES

A. The contractor shall warranty the entire system for electrical and mechanical failures for a period of one year. The warranty shall begin with the completion of the commissioning testing or when beneficial use to the owner is determined and so documented.

B. The mass notification control panel shall have a 3-year manufacturer warranty.

END OF SECTION

SECTION 13915 – WET PIPE SPRINKLER SYSTEM

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 fire-suppression piping and equipment for the following building systems:

1. Wet-pipe, fire-suppression sprinklers, including piping, valves, specialties, and automatic sprinklers.

B. Related Sections include the following:

1. Division 13 Section "Fire Alarm Systems" for alarm devices not in this Section.

1.3 DEFINITIONS

A. Working Plans: Documents, including drawings, calculations, and material specifications prepared according to NFPA 13 for obtaining approval from authorities having jurisdiction.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Design sprinklers and obtain approval from authorities having jurisdiction.

B. Design sprinkler piping according to the following and obtain approval from authorities having jurisdiction:

1. Include 10% margin of safety for available water flow and pressure.
2. Include losses through water-service piping, valves, and backflow preventers.
3. Sprinkler Occupancy Hazard Classifications: As follows:
   a. Building Areas: Ordinary Hazard, Group 2.
4. Minimum Density for Automatic-Sprinkler Piping Design: As follows:
   a. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 3000- sq. ft. area.
5. Maximum Protection Area per Sprinkler: As follows:
   a. All Areas: 130 sq. ft.
6. Hose Stream: 500 gpm.

C. Components and Installation: Capable of producing piping systems with 175-psig minimum working-pressure rating, unless otherwise indicated.

1.5 SUBMITTALS

A. Provide sufficient copies of product data and shop drawings for review by the Post Fire Department, AAFES Headquarters and Contracting Officer. Six 6) Copies are required for the review plus however many are required by the contractor.

B. Product Data: For the following:

1. Pipe and fitting materials and methods of joining for sprinkler piping.
2. Pipe hangers and supports.
3. Piping seismic restraints.
4. Valves, including specialty valves, accessories, and devices.
5. Alarm devices. Include electrical data.
6. Fire department connections. Include type; number, size, and arrangement of inlets; caps and chains; size and direction of outlet; escutcheon and marking; and finish.
7. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.

C. Fire-Hydrant Flow Test Report: As specified in "Preparation" Article.

D. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction. Include hydraulic calculations.

E. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13 and UFC 3-600-01. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."

F. Maintenance Data: For each type of and sprinkler specialty to include in maintenance manuals specified in Division 1.

G. Operating and Maintenance Data: Include NFPA No. 25, “Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection System, 1999”.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced licensed State of New York sprinkler contractor who has designed and installed fire-suppression piping similar to that indicated for this project in New York and obtained design approval and inspection approval from authorities having jurisdiction.

B. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified registered professional fire protection engineer. Base calculations on results of fire-hydrant flow test.

C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated with a minimum of 5 years experience dedicated to fire protection engineering. Engineering services are defined as those performed for installations of fire-suppression piping that are similar to those indicated for this Project in material, design, and extent.

D. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.

E. Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

G. NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the following:
   1. NFPA 13, "Installation of Sprinkler Systems."

H. Military Standards: Equipment, specialties, accessories, installation, and testing complying with the following:
   1. Unified Facilities Criteria UFC-3-600-01, Design: Fire Protection Engineering for Facilities.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Sprinkler Cabinets: Finished, wall-mounting steel cabinet and hinged cover, with space for a minimum of six spare sprinklers plus sprinkler wrench. Include the number of sprinklers required by NFPA 13 and wrench for sprinklers. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Specialty Valves and Devices:
      a. Badger Fire Protection, Inc.
      b. Central Sprinkler Corp.

c. Firematic Sprinkler Devices, Inc.
d. Globe Fire Sprinkler Corp.
e. Grinnell Corp.
f. Reliable Automatic Sprinkler Co., Inc.
g. Star Sprinkler Corp.
h. Viking Corp.

2. Water-Flow Indicators and Supervisory Switches:
   a. Gamewell Co.
   b. Grinnell Corp.
   c. Pittway Corp.; System Sensor Div.
   d. Potter Electric Signal Co.
   e. Reliable Automatic Sprinkler Co., Inc.
   f. Viking Corp.
   g. Watts Industries, Inc.; Water Products Div.
3. Sprinkler, Drain and Alarm Test Fittings:
   a. Central Sprinkler Corp.
   b. Fire-End and Croker Corp.
   c. Grinnell Corp.
   d. Victaulic Co. of America.
4. Sprinkler, Branch-Line Test Fittings:
   a. Elkhart Brass Mfg. Co., Inc.
   b. Fire-End and Croker Corp.
   c. Smith Industries, Inc.; Potter-Roemer Div.
5. Sprinkler, Inspector's Test Fittings:
   a. Fire-End and Croker Corp.
   b. G/J Innovations, Inc.
   c. Triple R Specialty of Ajax, Inc.
6. Fire Department Connections:
   a. Badger Fire Protection, Inc.
   b. Elkhart Brass Mfg. Co., Inc.
   c. Fire-End and Croker Corp.
   d. Firematic Sprinkler Devices, Inc.
   e. Grinnell Corp.
   f. Guardian Fire Equipment, Inc.
   g. Reliable Automatic Sprinkler Co., Inc.
   h. Smith Industries, Inc.; Potter-Roemer Div.
7. Sprinklers:
   a. Badger Fire Protection, Inc.
   b. Central Sprinkler Corp.
   c. Firematic Sprinkler Devices, Inc.
   d. Globe Fire Sprinkler Corp.
   e. Grinnell Corp.
   f. Reliable Automatic Sprinkler Co., Inc.
   g. Star Sprinkler Corp.
   h. Viking Corp.
8. Indicator Valves:
   a. Central Sprink, Inc.
   b. Grinnell Corp.
   c. McWane, Inc.; Kennedy Valve Div.
   d. Milwaukee Valve Co., Inc.
   e. Nibco, Inc.
   f. Victaulic Co. of America.
9. Fire-Protection-Service Valves:
   a. Central Sprink, Inc.
   b. Central Sprinkler Corp.
   c. Grinnell Corp.
   d. McWane, Inc.; Kennedy Valve Div.
   e. Nibco, Inc.
   f. Stockham Valves & Fittings, Inc.
   g. Victaulic Co. of America.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 PIPES AND TUBES

A. Standard-Weight Steel Pipe: ASTM A 53, ASTM A 135, or ASTM A 795; Schedule 40 in NPS 2 and smaller.

B. Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 in NPS 2-1/2 and larger and NFPA 13 specified wall thickness in NPS 6 to NPS 10.

2.4 PIPE AND TUBE FITTINGS

A. Cast-Iron Threaded Flanges: ASME B16.1.

B. Cast-Iron Threaded Fittings: ASME B16.4.

C. Malleable-Iron Threaded Fittings: ASME B16.3.

D. Steel, Threaded Couplings: ASTM A 865.

E. Steel Welding Fittings: ASTM A 234/A 234M, ASME B16.9, or ASME B16.11.

F. Steel Flanges and Flanged Fittings: ASME B16.5.

G. Steel, Grooved-End Fittings: UL-listed and FM-approved, ASTM A 47, malleable iron or ASTM A 536, ductile iron; with dimensions matching steel pipe and ends factory grooved according to AWWA C606.

2.5 JOINING MATERIALS

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for pipe-flange gasket materials and welding filler metals.

2.6 GENERAL-DUTY VALVES

A. Refer to Division 15 Section "Valves" for gate, ball, butterfly, globe, and check valves not required to be UL listed and FM approved.

2.7 FIRE-PROTECTION-SERVICE VALVES

A. General: UL listed and FM approved, with minimum 175-psig nonshock working-pressure rating. Valves for grooved-end piping may be furnished with grooved ends instead of type of ends specified.

B. Gate Valves, NPS 2 and Smaller: UL 262; cast-bronze, threaded ends; solid wedge; OS&Y; and rising stem.

C. Indicating Valves, NPS 2-1/2 and Smaller: UL 1091; butterfly or ball-type, bronze body with threaded ends; and integral indicating device.
   1. Indicator: Electrical 115-V ac, prewired, two-circuit, supervisory switch.

D. Gate Valves, NPS 2-1/2 and Larger: UL 262, iron body, bronze mounted, taper wedge, OS&Y, and rising stem. Include replaceable, bronze, wedge facing rings and flanged ends.

E. Indicator Posts: UL 789, horizontal, wall type, cast-iron body, with windows for target plates that indicate valve position, extension rod and coupling, locking device, and red enamel finish.
   1. Operation: Operating wrench.

F. Swing Check Valves, NPS 2 and Smaller: UL 312 or MSS SP-80, Class 150; bronze body with bronze disc and threaded ends.

G. Swing Check Valves, NPS 2-1/2 and Larger: UL 312, cast-iron body and bolted cap, with bronze disc or cast-iron disc with bronze-disc ring and flanged ends.

H. Split-Clapper Check Valves, NPS 4 and Larger: UL 312, cast-iron body with rubber seal, bronze-alloy discs, and stainless-steel spring and hinge pin.

2.8 SPECIALTY VALVES

A. Sprinkler System Control Valves: UL listed or FMG approved, cast or ductile iron body with flanged or grooved ends, and 175 psig minimum pressure rating. Control valves shall have 250 psig minimum pressure rating if valves are components of high pressure piping system.
   1. Alarm Check Valves: UL 193, designed for horizontal or vertical installation, with bronze grooved seat with O-ring seals, single hinge pin, and latch design. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill line attachment with strainer.
      a. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.

B. Ball Drip Valves: UL 1726, automatic drain valve, NPS 3/4, ball check device with threaded ends.

2.9 SPRINKLERS

A. Automatic Sprinklers: With heat-responsive element complying with the following:
   1. UL 199, for applications except residential.
   2. UL 1767, for early suppression, fast-response applications.

B. Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
   1. Open Sprinklers: UL 199, without heat-responsive element.
      a. Orifice: 17/32 inch, with discharge coefficient K between 7.4 and 8.2.

C. Sprinkler types, features, and options include the following:
   1. Pendent sprinklers.
   2. Pendent and sidewall, dry-type sprinklers.
   3. Recessed sprinklers, including escutcheon.
   4. Sidewall sprinklers.
   5. Upright sprinklers.

D. Sprinkler Finishes: Chrome-plated, bronze, and painted.

E. Special Coatings: Wax, lead, and corrosion-resistant paint.

F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
   1. Ceiling Mounting: Painted white steel, two piece, with 1-inch vertical adjustment.
   2. Sidewall Mounting: Painted white steel , white finish, one piece, flat.

G. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

2.10 SPECIALTY SPRINKLER FITTINGS

A. Specialty Fittings: UL listed and FM approved; made of steel, ductile iron, or other materials compatible with piping.

B. Sprinkler, Drain and Alarm Test Fittings: UL-listed, cast- or ductile-iron body; with threaded inlet and outlet, test valve, and orifice and sight glass.

C. Sprinkler, Branch-Line Test Fittings: UL-listed, brass body; with threaded inlet and capped drain outlet and threaded outlet for sprinkler.

D. Sprinkler, Inspector's Test Fittings: UL-listed, cast- or ductile-iron housing; with threaded inlet and drain outlet and sight glass.

2.11 FIRE DEPARTMENT CONNECTION

A. Exposed, Wall-Type, Fire Department Connection: UL 405, 175 psig minimum pressure rating; with corrosion-resistant-metal body with, brass inlets with threads according to NFPA 1963 and matching local fire department sizes and threads, brass wall escutcheon plate, brass lugged caps with gaskets and brass chains, brass lugged swivel connections. Include inlets brass lugged swivel connection and drop clapper for each hose-connection. Include brass escutcheon plate with marking "AUTO SPKR."
   1. Finish Including Sleeve: Polished chrome-plated.

2.12 ALARM DEVICES

A. General: Types matching piping and equipment connections.

B. Water-Flow Indicator: UL 346, electrical-supervision, paddle-operated-type, water-flow detector with 250-psig pressure rating and designed for horizontal or vertical installation. Include two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
   1. Manufacturers:
      a. Grinnell Fire Protection.
      b. ITT McDonnell & Miller.
      c. Potter Electric Signal Company.
      d. System Sensor.
      e. Viking Corp.
      f. Watts Industries, Inc.; Water Products Div.

C. Valve Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally open contacts. Include design that signals controlled valve is in other than fully open position.

D. Indicator-Post Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally open contacts. Include design that signals controlled indicator-post valve is in other than fully open position.

2.13 PRESSURE GAGES

A. Pressure Gages: UL 393, 3-1/2- to 4-1/2-inch diameter dial with dial range of 0 to 250 psig.

2.14 IN-BUILDING WATER SUPPLY RISER

A. In-building water supply riser shall be composed of single extended 90 degree fitting of fabricated 304 stainless steel tubing with 200PSI maximum working pressure. Dimensions shall be 6'-6" horizontal leg x 48" vertical leg.

B. Riser shall be UL listed and Fm global approved. Riser shall be designed to allow installation in accordance with NFPA 24.

C. Horizontal end shall meet with AWWA C151 ductile iron pipe or AWWA C900 PVC water pipe. Vertical end shall meet AWWA C-207 Class D for pipe flanges.

D. All welds shall be factory leak tested.

E. Manufacturers:
   1. Ames Fire and Water Works.

2.15 DOUBLE-CHECK BACKFLOW-PREVENTER ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Ames Co.
   2. Conbraco Industries, Inc.
   3. Watts Industries, Inc.; Water Products Div.
   4. Zurn Plumbing Products Group; Wilkins Div.

B. Standard: ASSE 1015.

C. Operation: Continuous-pressure applications, unless otherwise indicated.

D. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.

E. Body: Bronze for NPS 2 and smaller, cast iron with interior lining complying with AWWA C550 or that is FDA approved, stainless steel for NPS 2-1/2 and larger.

F. End Connection: Flanged for NPS 2-1/2 and larger.

G. Configuration: Designed for horizontal, straight through flow.

H. Flow rate, pressure drop, size shall be as indicated on drawings.

I. Accessories:
   1. Valves: Outside screw and yoke FM global approved gate-type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article in Part 1 of this Section.

B. Report test results promptly and in writing.

3.2 PIPING APPLICATIONS

A. Do not use welded joints with galvanized steel pipe.

B. Flanges, unions, and transition and special fittings with pressure ratings the same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.

C. Piping between Fire Department Connections and Check Valves: Use galvanized, standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.

D. Wet-Pipe Sprinklers: Use the following:
   1. NPS 2 and Smaller: Standard-weight steel pipe with threaded ends, cast- or malleable-iron threaded fittings, and threaded joints.
   2. NPS 2-1/2 and Larger: Schedule 10 steel pipe with roll-grooved ends; steel, grooved-end fittings; and grooved joints.

3.3 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
   1. Fire-Protection-Service Valves: UL listed and FM approved for applications where required by NFPA 13.
      a. Shutoff Duty: Use gate valves.
   2. General-Duty Valves: For applications where UL-listed and FM-approved valves are not required by NFPA 13.
      a. Shutoff Duty: Use gate, ball, or butterfly valves.
      b. Throttling Duty: Use globe, ball, or butterfly valves.

3.4 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Steel-Piping, Grooved Joints: Use Schedule 10 steel pipe with roll-grooved ends; steel, grooved-end fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.

C. Dissimilar-Piping-Material Joints: Construct joints using adapters or couplings compatible with both piping materials. Use dielectric fittings if both piping materials are metal. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for dielectric fittings.

3.5 SERVICE-ENTRANCE PIPING

A. Install in-building water supply riser and double check assembly.

B. Connect sprinkler piping to outlet of backflow preventer.

3.6 PIPING INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
   1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

C. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

D. Install unions adjacent to each valve in pipes NPS 2 and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.

E. Install flanges or flange adapters on valves, apparatus, and equipment having NPS 2-1/2 and larger connections.

F. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.

G. Install sprinkler piping with drains for complete system drainage.

H. Install sprinkler zone control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

I. Install drain valves on standpipes.

J. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.

K. Install alarm devices in piping systems.

L. Hangers and Supports: Comply with NFPA 13 for hanger materials. Install according to NFPA 13 for sprinkler piping.

M. Earthquake Protection: Install piping according to NFPA 13 to protect from earthquake damage.

N. Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated.

O. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

3.7 SPECIALTY SPRINKLER FITTING INSTALLATION

A. Install specialty sprinkler fittings according to manufacturer's written instructions.

3.8 VALVE INSTALLATION

A. Refer to Division 15 Section "Valves" for installing general-duty valves. Install fire-protection specialty valves, trim, fittings, controls, and specialties according to NFPA 13, manufacturer's written instructions, and authorities having jurisdiction.

B. Gate Valves: Install fire-protection-service valves supervised-open, located to control sources of water supply except from fire department connections. Provide permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water supply sources.

D. Alarm Check Valves: Install valves in vertical position for proper direction of flow, including bypass check valve and retard chamber drain-line connection.

3.9 SPRINKLER APPLICATIONS

A. General: Use sprinklers according to the following applications:
1. Rooms without Ceilings: Upright and pendent sprinklers, as indicated.
2. Rooms with Suspended Ceilings: Pendent, recessed, sprinklers, as indicated.
3. Wall Mounting: Sidewall sprinklers.
4. Spaces Subject to Freezing: Upright; pendent, dry-type; and sidewall, dry-type sprinklers.
5. Sprinkler Finishes: Use sprinklers with the following finishes:
   a. Upright, Pendent, and Sidewall Sprinklers: Chrome-plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.
   b. Recessed Sprinklers: Factory applied white with painted white escutcheon.

3.10 SPRINKLER INSTALLATION

A. Install sprinklers in patterns indicated.

B. Install sprinklers in suspended ceilings in center of acoustical panels and tiles., if possible

C. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical panels.

D. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.

3.11 CONNECTIONS

A. Connect water supplies to sprinklers. Include backflow preventers.

B. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.

C. Connect piping to specialty valves, specialties, fire department connections, and accessories.

D. Electrical Connections: Power wiring is specified in Division 16.

E. Connect alarm devices to fire alarm.

3.12 LABELING AND IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and in Division 15 Section "Mechanical Identification."

3.13 CLEANING

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers having paint other than factory finish.

3.14 PROTECTION

A. Protect sprinklers from damage until Substantial Completion.

3.15 COMMISSIONING

A. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.

B. Verify that specified tests of piping are complete.

C. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.

D. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.

E. Verify that potable-water supplies have correct types of backflow preventers.

F. Verify that fire department connections have threads compatible with local fire department equipment.

G. Fill wet-pipe sprinkler piping with water.

H. Energize circuits to electrical equipment and devices.

I. Adjust operating controls and pressure settings.

J. Coordinate with fire alarm tests. Operate as required.

3.16 FIELD QUALITY CONTROL

A. Preliminary Tests:
   1. Flush, hydrostatically test, and inspect sprinkler piping according to NFPA 13, "System Acceptance" Chapter.
   2. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
   3. Report test results promptly and in writing to Architect and authorities having jurisdiction.

B. Formal Test and Inspection:
   1. Do not submit a request for formal test and inspection until the preliminary test and corrections are completed and approved. Submit a written request for formal inspection at least 7 days prior to inspection date. An experienced technician regularly employed by the system installer shall be present during the inspection. At this inspection, repeat any or all of the required tests as directed. Correct defects in work provided by the Contractor, and make additional tests until the systems comply with contract requirements. Furnish appliances, equipment, electricity, instruments, connecting devices, and personnel for the tests. (The Government will furnish water for the test.) Installation fire chief and inspectors will witness formal tests and approved systems before they are accepted.

3.17 DEMONSTRATION

A. Conduct training course for post DPW operating and maintenance personnel of fire suppression sprinkler systems. Provide training course for both fire shifts. Instruction shall include all items contained in the operating and maintenance manuals. Training course shall occur after system are operationally complete and before final acceptance.

B. Include rooster of base O & M personnel attending training in final O & M manuals.

END OF SECTION

SECTION 15010 - GENERAL PROVISIONS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. General Provisions of the contract, including the following, shall apply to Division 15 Specification Sections: Solicitation Documents and Division 1.

B. The Work to be performed under this Division shall include all labor, materials, equipment, transportation, construction plant, and facilities necessary to provide a complete and satisfactory system ready to use. Wherever the words "the Contractor" or "this Contractor" appears in this Division, they refer to the Contractor for the work specified in that Section. This Contractor shall examine all Drawings and all Sections of the Specifications and shall be responsible for ascertaining to what extent other Drawings and Sections affect the Work herein specified.

1.2 CODES, REGULATIONS, AND STANDARDS

A. All work must be performed in accordance with the requirements of local, county, state and national codes and regulations including the requirements of the following:
1. International Building Code.
2. National Electrical Code.
3. International Plumbing Code.
4. International Mechanical Code.
5. Occupational Safety and Health Act. of 1970
6. Air Force Regulations.
7. Life Safety Code, N.F.P.A. No. 101.
8. For work not specifically listed above, use standards and codes of the National Fire Protection Association.

B. All equipment, apparatus and systems shall be rated, tested, fabricated and/or installed in accordance with the applicable industry standard mentioned. The following list will serve to clarify abbreviations that appear in other sections of this specification:

1.	AABC	Associated Air Balance Council
2.	ADC	Air Diffusion Council
3.	AGA	American Gas Association.
4.	AMCA	Air Moving and Conditioning Association
5.	ARI	Air Conditioning and Refrigeration Institute
6.	ANSI	American National Standards Institute
7.	ASE	Association of Safety Engineers
8.	ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineer
9.	ASME	American Society of Mechanical Engineers
10.	AWWA	American Water Works Association
11.	EPA	Environmental Protection Agency
12.	FS	Federal Specifications
13.	IBR	Institute of Boiler and Radiator Manufacturers
14.	IEEE	Institute of Electrical and Electronics Engineers
15.	MCAA	Mechanical Contractors' Association of American
16.	NEMA	National Electrical Manufacturers Association
17.	NSC	National Safety Council
18.	NSF	National Sanitation Foundation
19.	SBI	Steel Boiler Institute Industry
20.	SMACNA	Sheet Metal and Air Conditioning Contractors National Association
21.	UL	Underwriters Laboratories
22.	ASTM	American Society for Testing and Materials.
23.	NEBB	National Environmental Balancing Bureau.
24.	NEC	National Electric Code (NFPA 70).

1.3 DEFINITIONS

A. FURNISH: The term furnish means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation and similar operations.

B. INSTALL: The term install describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.

C. PROVIDE: The term provides means to furnish and install, complete and ready for intended use.

1.4 SHOP DRAWINGS AND SUBMITTALS

A. See Section 01310 for requirements for shop drawings and product data.

B. Asbestos-Free Material/Product: Prior to approval of the material/product to be used, the manufacturer/supplier shall furnish the Contracting Officer with written certification that the material/product contains no asbestos. This certificate is mandatory before approval will be issued. Submittals furnished without the asbestos-free certification will be returned to the Contractor with no action taken until such certification is provided.

C. See applicable sections to this Division for items requiring shop drawings.

1.5 MATERIALS AND WORKMANSHIP

A. Materials, the style, make or quality of which is specifically designated, shall be as specified.

B. Contractor shall furnish necessary materials in ample quantities and as frequently as required to avoid delay in the progress of the Work, and shall so store them as to prevent interference with other work.

1.6 DEFECTIVE WORK AND MATERIAL

A. All materials or work found to be defective or not in strict conformity with the drawings or different from requirements of the drawings and specifications or defaced or injured through negligence of Contractor or his employees, or through action of fire or weather will be rejected and shall be immediately removed from premises by Contractor and satisfactory materials and work substituted without delay.

B. All defective work or imperfect work shall be corrected immediately on notice from Contracting Officer. No previous inspection or certificate on account shall be held to relieve Contractor from his obligation to furnish sound materials and to perform good and satisfactory work.

1.7 COOPERATION AND COORDINATION

A. Contractor shall confer with other contractors at the site before installing his work to avoid interferences so that maximum head room and clearances may be maintained. In event that interferences develop between work of various contractors, Contracting Officer's decision will be final and no additional compensation will be allowed for changes required.

B. Particular attention shall be paid to situations where recessed equipment, pipes and lights occur, or where the work of several trades occurs together above suspended ceilings, in pipe shafts or in areas where space is limited.

C. All fixtures, equipment, devices, switches, outlets, pumps, etc., shall be positioned to avoid all interferences with and to assure proper coordination with work of all other trades, cases, partitions, wall, floor and ceiling patterns, architectural features, etc. All recessed devices, fixtures, etc., shall be coordinated with all wall, floor and ceiling patterns. Contracting Officer will reconcile conflicts and adjustments where such adjustments are warranted.

1.8 PROTECTION OF EQUIPMENT AND SYSTEMS

A. Contractor shall keep all his respective pipe openings closed by means of plugs or caps to prevent entrance of foreign matter during construction and cover all fixtures, equipment, and apparatus as required to protect them against dirt, water, chemical or mechanical damage both before and after installation. Any such fixtures, equipment or apparatus damaged prior to final acceptance of the Work shall be restored to its original condition or replaced by Contractor at no cost to Owner.

1.9 CONTRACT DRAWINGS

A. The layout shown on the Contract Drawings is necessarily diagrammatic but shall be followed as closely as actual construction and as other work will allow. The dimensions of work as shown on the Contract Drawings are not as-built dimensions. No measurements shall be scaled from the drawings and used as definite dimensions for laying out or fitting work in place.

B. The layout of manufactured equipment as shown on the drawings shall be checked and the exact location shall be determined from the dimensions of equipment shop drawings approved by the Contracting Officer.

1.10 MAINTENANCE MANUAL AND OPERATING INSTRUCTIONS

A. Upon completion of the Work, Contractors shall provide the Contracting Officer with three copies of maintenance manual for all equipment furnished and installed under his Work. Manuals shall be in substantial 3-ring binders with project name and number inscribed on face and hinged back. Manual shall include roster of all AAFES and Installation training session attendees. The manual shall, however, first be approved by the Contracting Officer.

B. The manual shall include manufacturer's lubricating and operating instructions and parts list and serial numbers for all operating machinery, including drive information, and motor horsepower, amperage, and voltage readings on all phases, valve chart, sequence of operation, index following the order listed in the specifications, warranties in the name of the Installation, and a list of manufacturers, service firms and subcontractors names and telephone numbers.

C. Training attendance rosters for each training session shall be included in manuals. Roster will identify training subject, date, attendees name, job title, office symbol, grade/rank, and telephone number.

D. All switches, controls, and safety devices shall be clearly and permanently marked with embossed or printed plates as to purpose and as to operation and shall be tested in the presence of the Owner designated representative to ensure that he understands their function and purpose.

E. Upon completion of the Work, Contractors shall put the systems into service. Contractors shall be entirely responsible for the equipment during all testing operations including the lubricating and turning on and off of such apparatus.

1.11 SUBSTITUTION OF EQUIPMENT

A. The contractor may offer to substitute equipment other than those specified for approval of the Contracting Officer. The request for substitution of equipment shall be submitted by the Contractor to the Contracting Officer within ten (10) calendar days prior to solicitation due date. Per Section 00404, no product substitutions after contract award. It is incumbent on the Contractor to submit technical data that will fully establish the equality of the proposed substitute equipment with that specified and evidence to substantiate the availability of the required repair and maintenance service. Each request for substitution shall be accompanied by the following information for each piece of equipment:

1. Statement indicating that this substituted equipment will not increase the contract cost nor extend the completion date.
2. Manufacturer's name and model number.
3. Catalog cuts, diagrams and other data published by the manufacturer with the particular model identified and the pertinent design data for that model highlighted or underlined for easy reference.
4. Parts lists and recommended spare parts required for preventive maintenance and minor field repairs.
5. Each request for substitution shall also include the following information relating to service maintenance and repair:
   a. Name, address and telephone number of nearest factory authorized technical representative.
   b. Name, address and telephone number of firm(s) qualified to perform preventive maintenance, minor or major repairs in the locale of the project.
   c. Name, address and telephone number of firm(s) from whom spare parts and major components are available.
   d. Building name and address, and the name, address and telephone number of its owner's representative where equipment of the same manufacturer as that requested for substitution has been installed and in operation for two or more years. Two or more such installations shall be listed and the location should be in the vicinity of the proposed project.

B. In the event of Contracting Officer's approval of a substitution of equipment, the Contractor will be notified by telephonic message by the Contracting Officer (or authorized representative), followed by the issuance of an amendment to the contract incorporating the equipment by name and model number.

1.12 PROJECT RECORD AND CLOSEOUT DOCUMENTS

A. See Section 01760 for red lining of all documents during construction to reflect "as-built" conditions.

END OF SECTION

SECTION 15013 - CLEANING, TESTING, AND ADJUSTING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This section of the specifications includes the cleaning and the testing and the adjusting of all various plumbing, heating and air conditioning systems and equipment for mechanical strength, leakage and performance.

B. AAFES will contract and pay for testing and balancing of the HVAC air distribution systems per section 15990. All other testing and inspections will be by the Contractor. The Contractor shall cooperate with the Test and Balancing agency and shall provide sufficient time before final completion of his work so that testing and balancing can be accomplished. The Contractor shall provide all labor and tools to make any corrections to the system when required to balance the system without undue delay to the Testing and Balancing Agency. The Contractor shall put all equipment into full operation and continue its operation during each working day of testing and balancing. No testing and balancing work shall start until all HVAC equipment is operable, all of the air handling equipment has new filters installed and any coils which are dirty have been cleaned. The Testing and Balancing Agency shall be advised of any major changes made to the HVAC system. Provide Testing and Balancing Agency one (1) set of shop drawings on all equipment which he will be required to work on when balancing the HVAC system.

C. Upon completion of the work, the Contractor shall make such tests as are hereinafter specified or as may be required by the Contracting Officer.

D. All tests shall be conducted in the presence of the Contracting Officer or his authorized representative.

E. The entire cost of all tests, inspections, permits, etc., shall be borne by the Contractor at no additional cost to the Government, unless otherwise directed in writing with the exception of the testing and balancing of HVAC systems.

F. Certificates, where such are required, shall be executed and turned over to the Contracting Officer.

1.2 GENERAL REQUIREMENTS

A. The Contractor shall provide all apparatus, temporary piping, connections or any other requirements necessary and shall take all due precautions to prevent damage to the building and its contents as may be incurred during tests. The Contractor shall repair or make good at his own expense any damage to the building and/or its contents resulting from tests.

B. Elements of the various systems, equipment, etc, which might be damaged during testing shall be removed (or otherwise protected) for the period of the test and replaced thereafter.

C. Any leaks, defects, or deficiencies discovered as a result of the tests shall be immediately repaired or made good, and tests shall be repeated until test requirements are fully complied with. Defective materials shall be replaced. Caulking, puttying, painting or rusting to correct leaks in pipe or pipe joints will not be permitted.

1.3 PERFORMANCE TESTS

A. Operating tests to determine performance shall be conducted of each completed system and its associated equipment.

B. Where major items of Government-furnished equipment are included in a system, it is the Contracting Officer's responsibility to have a factory representative available when required.

C. The Contractor shall be responsible for notifying the Contracting Officer in writing of the test data sufficiently in advance to allow the timely request for the representative. In the event that testing cannot proceed immediately upon the arrival of the factory representative, and if the delay incurred is due to incompleted work or improper preparation of the work by the Contractor, the Contractor shall bear all costs of the factory representative for the period of the delay.

D. Performance tests shall be conducted in a manner that will demonstrate satisfactorily the ability of the systems and equipment to perform as specified under design conditions.

1.4 MECHANICAL STRENGTH AND LEAKAGE TESTS

A. All tests hereinafter specified shall be conducted before backfilling, insulating, or other form of concealment is completed.

B. It is desirable that each system be tested in its entirety but the various systems may be tested in sections as may be required to expedite the work of other trades.

1.5 CLEANING EQUIPMENT AND SYSTEM

A. All equipment, piping systems and duct systems shall be thoroughly cleaned internally and externally before being placed in service.

B. The Contractor is charged with the responsibility for maintaining all systems and equipment clean and free of foreign matter during the processes of assembly and erection.

C. Pipe strainers and air filters shall be cleaned and serviced immediately prior to final inspection.

D. When flushing systems, all control, thermal and other elements subject to blocking by foreign matter shall be removed.

E. When piping systems are flushed with fluids other than that normally contained, the Contractor shall take adequate precautions to insure that the normal contents of the piping will not be contaminated when placed in service.

END OF SECTION

SECTION 15050 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Provide all material as specified in this Section.

1.2 SUBMITTALS

A. Submit shop drawings in accordance with Section 15010 for the following devices:
   1. Pipe hangers and supports.
   2. Valves.
   3. Pressure gauges.
   4. Thermometers.
   5. Access panels and doors.

B. Submit certificates of compliance for pipe, fittings and valves specified under this section. All material shall be manufactured in the United States.

C. LEED Documentation Submittals:
   1. Credit MR 4.1 and 4.2: Product Data and certification letter indicated percentages by weight of post-consumer and pre-consumer recycled content and costs for each product having recycled content. Contractor is responsible for providing all calculation details verifying that the project incorporates the required percentage of recycled content materials.
   2. Credit MR 5.1 and 5.2: Product Data and certification letter indicating location of manufacturer for regionally manufactured materials.
      a. Include statement indicating cost for each regionally manufactured material.
      b. Include statement indicating location of extraction, harvest, or recovery for each raw material used in regionally manufactured materials.
   3. Contractor is responsible for providing the LEED Letter Template and all calculation details verifying the percentage of local / regional materials.
   4. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement for VOC contract.

1.3 QUALITY ASSURANCE

A. Each major component of equipment shall have the manufacturer's name, address, model number and rating on a plate securely affixed in a conspicuous place.

B. Code ratings, labels or other data which are die-stamped or otherwise affixed to the surface of the equipment shall be in easily visible location.

1.4 PRODUCT DELIVERY STORAGE AND HANDLING

A. Follow manufacturer's directions in delivery, storage, protection and handling of all equipment and materials.

B. Deliver and store equipment and materials to the site in original containers, suitably sheltered from the elements and mechanical injury, but readily accessible for inspection until installed.

C. Items subject to moisture damage shall be stored in dry, heated spaces.

D. Ascertain, from examination of architectural drawings, whether any special temporary access openings in the building(s) will be required for admission of apparatus furnished under this Division, and notify General Contractor accordingly.

E. In event of failure to give sufficient notice in time to arrange for access openings during construction, assume all costs of providing such openings thereafter.

F. Heavy machinery, equipment and heavy parts thereof shall be brought into building or onto premise by a machinery moving concern acceptable to Contracting Officer.

G. Machinery movers shall not rig, tie to, or rest weight upon any building member of any part of building premises or make use of any stairway until specific permission is obtained from Contracting Officer.

H. Permission to rig to or in any way make use of any part of building premises shall not relieve Installer of responsibility for any damage resulting from, or because of said rigging or use.

I. No holes shall be cut in any wall, roof or floor for introduction of machinery except when absolutely necessary and approved by Contracting Officer.

J. Approved holes will be cut and repaired by the proper trades at the expense of the trade requesting them.

1.5 PROTECTION

A. Keep pipe openings closed by means of plugs or caps to prevent entrance of foreign matter, and cover all fixtures, equipment and apparatus as required to protect them against dirt, water, chemical or mechanical damage both before and after installation.

B. Fixtures, equipment or apparatus damaged prior to final acceptance of work shall be restored to original condition or replaced by Installer.

C. Equipment shall be inherently safe and moving parts shall be covered with guards which meet OSHA requirements.

D. Provide protective guards for devices such as or similar to thermostats, valves, switches and sprinkler heads which are so located as to be readily subject to tampering, accidental damage, or vandalism.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. All piping and fittings shall be manufactured in the United States. Each length of pipe and each fitting shall be marked with the manufacturer's name or trademark and the specification code to which it conforms.

B. Underground and above ground sanitary soil, waste and vent and storm water piping systems: Contractor provide one or a combination of the following:

1. Service weight cast iron hub and spigot pipe with drainage pattern cast iron fittings conforming to ASTM A74. Joints shall be push on type utilizing neoprene molded rubber tight sealing gasket conforming to ASTM C564.
2. Hubless cast iron pipe with drainage pattern cast iron fittings conforming to Cast Iron Soil Pipe Institute Standards 301-67T. Joints shall be made with neoprene sealing steel and stainless steel clamp and shield assembly.
3. Solid-Wall PVC pipe: ASTM D 1784, ASTM D 1785 and ASTM D 2665, drain, waste, and vent.
4. PVC Socket Fittings: ASTM D 1784, ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
5. Adhesive primer: ASTM F 656.
   a. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   b. Adhesive primer shall comply with the testing and product requirements of California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
6. Solvent Cement: ASTM D 2564
   a. PVC solvent cement shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   b. Solvent cement shall comply with the testing and product requirements of California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Above ground domestic cold and hot water piping systems:
1. Type L or K hard drawn copper tubing conforming to ASTM B88 with wrought copper or cast brass solder fittings conforming to ANSI B16.22. All joints shall be made with lead free solder and water soluble binder flux.

D. Above ground gas piping: Schedule 40 black steel pipe with welded fittings 2-1/2" and over and screwed black malleable iron fittings 2" and under. All piping, fittings and valves on roof shall be wrapped for corrosion protection with polyethylene protective coating. All visible from grade exposed piping except piping on roof shall be painted with dark brown corrosion resistant paint.

2.2 PIPE SPECIALTIES

A. Unions in copper pipe 2 in. and smaller shall be Mueller, Anaconda or Chase Brass, brass solder joint unions constructed for 150 psi working pressure.

B. Unions in steel pipe 2 inch and smaller shall be screwed, malleable iron, brass to steel type (F.S. WW-U-531c Class 1) for 150 psi working pressure.

C. Unions 2-1/2 in. in size and larger shall be companion flanges. (ANSI B16.1). Flanged unions shall be Van Stone, Grinnell or Cranelap flanges over welding nipples welded into pipelines.

D. Flanges shall be forged steel flanges (ANSI B16.5) constructed for 150 psi. working pressure. Bolts for flanged joints shall be made of bolt steel and shall have clean cut threads with upset square heads and semi-flush hexagonal cold pressed nuts (F.S. WW-F406b).

E. Flange connections shall be made up with high pressure special type graphited 1/16 in. sheet packing, Garlock No. 900 or Cranite (ANSI B16.21); or rubber, for temperature up to 200F (F.S. HH-G-156 class A).

F. Gaskets shall fit inside of bolt holes for all lines not under vacuum.

G. Length of bolts shall allow full thread on nut but eliminate exposed threads wherever practical.

H. Dielectric unions or brass adapters suitable for dielectric service shall be provided at pipe connections between steel or cast iron piping and copper tubing and at gas meter.

2.3 HANGERS, SUPPORTS AND INSERTS

A. Hangers and supports shall conform to the recommendations of Standard Practice SP.58 of the Manufacturers' Standardization Society of the Valve and Fitting Industry.

B. Hangers shall be as follows:

		Grinnell	Elcen
1.	Insulated piping:	300	12X
2.	Non-insulated piping:	260	12
3.	Copper tubing: Non-insulated	CT-65	312

C. Riser clamps shall be as follows:

		Grinnell	Crawford
1.	Piping all sizes:	261	36

2. Copper tubing riser clamps shall be copper plated.

D. Where several pipes occur at the same elevation, trapeze type hangers may be used. Trapeze hangers shall be made of 2 inch x 2 inch structural steel channels with legs down and steel blocking of varying thickness welded to channel under each pipe to obtain proper pitch. All copper tubing supports shall be copper plated or insulated from dissimilar materials.

E. Hanger rods shall conform to the following:

Pipe Size	Rod Diameter
Up to 2"	3/8"
2-1/2" to 3"	1/2"
4" to 5"	5/8"
6" to 8"	3/4"

Trapeze hanger rods shall be of sufficient size to carry weight of Trapeze channel, piping and contents, insulation supports and an additional 200 lb. load.

F. Wire or perforated strap iron hangers, expansion anchors, and power actuated fasteners will not be permitted.

2.4 SLEEVES

A. Provide pipe sleeves for all penetrations of piping through floors and walls.

B. Floor sleeves shall be standard weight galvanized steel pipe with bottom set flush with surface below and top extending 1" above finished floor (3" in mechanical equipment rooms). Seal around pipe and pipe sleeve with fire resistant waterproofing caulking materials.

C. Wall sleeves for exterior foundation walls shall be cast iron fabricated sleeves flush with wall inside and outside. Caulk with weatherproof sealant or otherwise adequately waterproof opening between pipe and sleeve.

D. Wall sleeves for masonry walls shall be standard weight galvanized steel pipe flush with all surfaces.

E. Wall sleeves for interior partitions and ceilings shall be 20 gauge galvanized steel with lock joints.

F. Sleeves for piping that is to be insulated shall be large enough to allow insulation to pass through the sleeve. Refer to Section 15250 "Insulation" for specific thicknesses of insulation.

G. Pack the space between the interior surface of all sleeves and pipes or pipe insulation with fire resistant, sound and waterproofing caulking materials.

2.5 ESCUTCHEONS

A. Provide set-screw chrome plated escutcheons (not friction-dependant) on all exposed pipe or pipe insulation passing through or into finished walls, partitions, ceiling and floors. Escutcheons at insulated pipes shall be large enough to encircle insulation without penetrating vapor barrier or jacket.

2.6 VALVES

A. Other sections having specific valve requirements take precedence over this Section. In general, gate valves shall be provided at each of the locations listed below, whether indicated on the drawings or not:
   1. At each branch take-off from a main to radiation and equipment.
   2. At each take-off from each riser.
   3. On the suction and discharge side of each pump.
   4. At each supply sub-main take-off or riser take-off from a main.

B. Gate and globe valves shall be of types permitting repacking while valve is under pressure.

C. A "run-out" shall be defined as a line feeding one single piece of equipment and a branch shall be defined as a line feeding more than one piece of equipment.

D. Shut-off square head balancing cocks and gate valves shall be located in such a position that they will be accessible through access panels when installed on concealed piping. Brass compression hose and drain valves shall be provided as required at all low points in the hot, cold water system.

E. All valves shall have the name, trademark or initials of the manufacturer cast thereon and shall be identified by catalog number. All screwed ends of valves shall have threads conforming to the American Standard for Pipe Threads. Unless otherwise specified, valves 2" and smaller shall be all brass or bronze construction with screwed ends and valves 2-1/2" and larger shall be iron bodied with brass or bronze trim.

F. Flanged ends of valves shall conform to standard dimensions and drillings of the ASA Specifications for their respective pressure class with bolt holes straddling the centerline unless otherwise specified. All screwed ends of valves shall have threads conforming to the American Standard for Pipe Threads.

G. Throttling valves shall have a means of indicating valve position.

H. Gate valves, globe valves and strainers shall be a minimum of the pipe size marked on the drawings.

I. Pipe size reductions, where necessary because of equipment connection sizes or automatic valve sizes, shall be made with the proper eccentric reducing fittings immediately adjacent to the inlet and outlet of the equipment or automatic valve. Provide concentric increasers on pump discharge piping.

J. By-pass globe valves for automatic valves shall be the same size as the automatic valve. K.
   Each main branch valve installed in a mechanical room over 7 feet above the floor shall be equipped with the appropriate size adjustable sprocket rim with chain guide and continuous chain. Valves shall be installed with the wheel in a vertical plane. The continuous chain shall reach within 4 feet of the floor.

L. Ball, Gate, Globe, and Check Valves:
   1. For domestic cold and hot water copper piping (100 psig or less):

	NIBCO-SCOTT	HAMMOND	CRANE
a. Gate Valves:			
1. 2" and smaller	S-113	IB645	1324
2. 2-1/2" and larger	F-617-0	IR1140	465-1/2
b. Globe Valves:			

1. 2" and smaller	S-211-Y	IB440	1
2. 2-1/2" and larger	F718-B	IR116	351
	HAMMOND	CRANE	NIBCO-SCOTT

c. Check Valves:

1. 2" and smaller	IB940	37	S-413-W
2. 2-1/2" and larger	IR1124	373	F-918-B
	APOLLO	CRANE	NIBCO-SCOTT

d. Ball Valves:

1. 2" and smaller	70-200	2182	T-580

2. For valves in copper piping, equivalent solder end valves shall be used.

M. Shut-off valves: Provide shut-off valves and unions or flanges at each branch or in supply and return to each item of equipment such as pumps, tanks, converters, coils, traps, automatic valves, etc. Valves and unions or flanges shall be suitably located to isolate each unit, branch circuit or section of piping to facilitate maintenance and/or removal of all equipment and apparatus.

N. Lubricated plug cocks: Provide lubricated plug cocks as shown on the drawings. Lubricated plug cocks shall be full pipe area.

O. Gas Cocks:
1. Gas cocks shall be plug type of brass construction. Stop shall have female threaded connections and lever operator. Rating shall be for natural gas at 15 PSIG. McDonald Model No. 10558, Mueller Model No. 11023 or Crane Model No. 254.

P. Reduced-Pressure-Principle Backflow Preventer:
1. Manufacturers; Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Ames Fire & Waterworks
   b. Conbraco Industries, Inc.
   c. Watts Regulator Company
   d. Zurn Industries, LLC.
2. Standard: ASSE 1013
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle third of flow range.
5. Size: 2-1/2”
6. Design Flow Rate: 75 gpm
7. Pressure Loss at Design Flow Rate: 10 psi
8. Body: Stainless Steel
9. Configuration: Designed for horizontal, straight-through
10. Accessories:
    a. Valves 2-1/2 and Larger: non-rising stem, resilient-seated gate valves.
    b. Air-Gap Fitting: ASME A112.1.1, matching backflow-preventer connection.

2.7 INDUSTRIAL TYPE THERMOMETERS

A. Industrial type thermometers shall be the adjustable angle type with 9" case and a minimum stem length of 6" insertion in piping and 15" in ductwork.

B. Casing shall be cast aluminum with double strength glass, white face with dark graduations.

C. Element shall be a red-reading mercury tube and brass stem.

D. Provide separable brass sockets for all thermometers in piping systems and pipe floor flange or special duct flange for all thermometers in duct systems. Provide extension sockets when installed in insulated piping.

E. Thermometers for the following equipment shall have ranges as listed below:

	Ranges
1. Hot Water.	0 to 200 F.

F. Manufacturers for Industrial type thermometers:
1. Trerice Co.
2. Palmer Instruments Inc.
3. Weksler Instruments Corp.

2.8 PRESSURE GAUGES

A. Ranges of gauges shall be two times indicated operating pressure or 5 PSIG above relief valve setting. Verify ranges on shop drawings.

B. Gauges shall be 4-1/2" dial gauges encased in an aluminum diecast housing with a threaded access cover and glass crystal. The gauge body shall be water and dust tight with back flange and 3/8" npt. connection.

C. Movements shall be rotary geared stainless steel with Grade "A" phosphor bronze Bourdon tube rated from 30" vacuum to 1000 PSIG maximum. Accuracy shall be within 1/2% of the scale range.

D. Dial shall be white laminated phenol with black gradations and a micrometer recalibration type pointer.

E. Provide needle valves and pulsation dampers on all gauges. Steam gauges shall be mounted on siphons.

F. Manufacturers for gauges:
   1. Marsh.
   2. Ashcroft.
   3. Marshalltown.

2.9 MOTORS

A. For each item of equipment requiring electric drive, provide a motor having starting and running characteristics consistent with torque and speed requirements of the driven machinery.

B. Motors shall be of ample size to operate continuously at their proper load and speed without causing noise, vibration or temperature rise in excess of their rating.

C. Motors shall be of sufficient size as to be non-overloading throughout entire capacity range of the driven equipment.

D. Motors 3/4 HP and smaller shall be designed for 120 volts, single phase, 60 hertz operation, and be capacitor start and run, 40 C. continuous rise, open-drip-proof type and shall be equipped with permanently lubricated sealed bearing.

E. Motors 1 HP and larger shall be suitable for voltage as specified under Division 16; 3 phase, 60 hertz operation, shall be squirrel cage type NEMA design B, low current in-rush and normal starting torque, quiet operating, 40 C. continuous rise and shall be equipped with permanently lubricated sealed bearing, unless otherwise specified.

F. Efficiency: All motors as available shall to be "Energy Efficient", provide motors with higher efficiency than "average standard industry motors", in accordance with IEEE Standard 112, test method B.

2.10 STARTERS

A. Each trade providing equipment with a motor starter integral or factory installed, shall furnish motor starter.

B. Unless otherwise noted, motor starters will be provided under Division 16.

C. Where possible, provide motor starters of the same manufacturer as specified under Division 16.

D. Starter heater coil sizes shall be determined by motor nameplate.

E. Motor starter control circuits and devices shall be 120 volt, 60 hertz characteristic regardless of power circuit voltage serving motor.

F. Contactors shall be similar to starters.

G. Automatically started equipment shall have starter with hand-off-auto switch; manually operated electrical equipment shall have start-stop buttons, unless otherwise indicated on drawings.

H. Coordinate with work under Division 16 to insure proper motor starting and circuit protection is provided in compliance with code requirements.

I. Assume responsibility for compliance with code requirements where groups of motors require circuit protection as per NEC, Article 430.

J. Provide auxiliary contacts where required for interlocking, intermittant starting, pilot control, remote control, motor shut-down and safety features. 2.11 AUXILIARY DEVICES

A. Each trade providing equipment requiring automatic control or remote control shall provide all proper pilot devices to perform the particular duty specified for the driven equipment. In no case shall safety devices be bypassed.

B. Automatic control and signal devices such as for temperature control, pump control, fire alarm, etc., all wiring for same, and all interlock wiring, shall be provided by the trade furnishing said equipment, unless specifically indicated otherwise under other Sections of Division 15 and 16.

C. Coordinate automatic control work and the work of Division 16.

2.12 CONDUIT AND WIRING

A. Wiring systems provided under Division 15 shall be as specified in Division 16.

B. All electrical terminals shall be labeled.

C. Provide wiring diagrams inside each cabinet.

D. Conduit shall provide a continuous ground and shall be heavy wall galvanized in slabs and where subject to damage and EMT where protected or out of the way.

E. Final connections to equipment shall be flexible.

2.13 BELT AND COUPLING GUARDS

A. Guards shall be provided for all belt-driven units and at chains, gears, couplings, keys projecting set screws, and other rotating or moving parts. Belt guards shall be made to enclose both pulleys and belts on exposed sides, and shall be constructed of galvanized steel top and bottom with expanded metal front. Entire assembly shall be rigidly supported with all necessary supplementary steel, and shall be provided for greasing, oiling, adjusting, checking of equipment, etc. Provide coupling guards on direct connected units. Guards shall be readily accessible and designed for easy removal for service and shall comply with Underwriters' Safety Requirements.

2.14 ACCESS PANELS

A. Contractor shall so arrange piping that all concealed valves and/or concealed equipment can be operated and/or properly maintained through access panels. Contractor shall be responsible for so informing and cooperating with Contracting Officer in locating panels so that they will be the least obtrusive and will work best in the architectural treatment of respective rooms.

B. Contractor shall furnish proper number of access panels required for his Work and give them to Contractor designated to install same. Access panels shall be of sufficient size to adequately maintain valves and equipment. Panels shall be of type listed as follows:
   1. Style K - plastered surfaces. Frame will be clearly visible.
   2. Style M - masonry and tile.

C. Provide "B" label panels where located in fire walls.

D. Manufacturers for access panels:
   1. Babcock-Davis Associates, Inc.
   2. Bilco Company.
   3. Milcor: Inland-Ryerson Const. Products.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILLING

A. This Contractor shall do all excavation and backfilling and rock excavation required for installation of all of the work requiring excavation, and shall provide all necessary sheeting and bracing required to properly protect his workmen and facilitate the work.

B. Pipe trenches shall be excavated to lines and grades as shown on drawings or as approved by the Contracting Officer. Bell holes shall be excavated to insure firm support for the pipe on undisturbed earth for the full length of the pipe except the necessary clearance at joints for construction and inspection. Over excavated or unfirm ground shall be brought up to the proper level with sand, or with pit run gravel, thoroughly compacted in place. Width of trench shall be such as to readily permit making of joints.

C. As piping is laid in the trench, sand shall be backfilled along each side of the pipe and carefully compacted so as to securely hold the pipe in place, leaving the top half of the pipe exposed for its entire length, and the joints all around completely exposed for inspection by the Contracting Officer. No additional backfilling shall be placed until the inspection has been completed and tests herein specified have been made and approved. This contractor shall backfill all trenches as rapidly as testing and acceptance will permit.

D. Backfill for a depth of 1 ft. above the top of the pipe shall be sand, free from rocks or other foreign materials, and shall be placed and hand tamped uniformly so as to avoid damaging or disturbing the alignment of the pipe. Completely backfill top of trench with compacted sand or pit run gravel.

E. All excess excavated material resulting from this Work shall be deposited by the Contractor in location directed by the Contracting Officer.

F. This Contractor shall establish and maintain all elevations and lines required for the installation of sewers and water lines.

G. All elevations, grades and lines shall be set with the aid of transit and level by this Contractor, and he shall be responsible for their protection while being used.

H. Sheet and brace trenches and remove water as necessary to fully protect workmen and permit proper installation of the work. Comply with local regulations or, in the absence thereof, with the provisions of the "Manual of Accident Prevention on Construction," of the Associated General Contractors of America, Inc. Under no circumstances lay pipe or install appurtenances in water; keep the trench free from water until pipe joints have been completed. The presence of ground water in the soil or the necessity of sheeting or bracing trenches shall not constitute a condition for which an increase may be made in the Contract Price; except that when sheeting is left in place, on the written order of the Contracting Officer, the Contract Price shall be adjusted. Sheeting left in place shall be cut off not less than 2 ft. below finished grade. Sheeting shall not be removed until the trench is substantially backfilled.

3.2 JOINTING OF PIPING

A. Threads shall be full and clean cut, and ends of pipe shall be reamed. When screwed joints are assembled, the male thread shall be thoroughly coated with Teflon paste or an aerobic curing thread sealant to serve as a joint sealer. Paint all the exposed threads. (Teflon tape may be used at contractor's option.) Care shall be taken to keep the paint and all other foreign matter from entering the interior of the piping. Each section of pipe and all fittings shall be carefully inspected for dirt, grease, or other foreign matter on the inside and where necessary they shall be properly cleaned before assembly. It shall be the Contractor's responsibility to thoroughly clean the piping systems after completion to the satisfaction of the Contracting Officer in cases where proper cleaning was not done at time of installation.

B. Soldered or brazed joints made with fittings having pre-inserted rings of solder or brazing alloy shall have the tube and fittings cleaned bright and fluxed. The joint shall be heated sufficiently to make a tight connection. Tubes and fittings without such rings, shall be cleaned bright, fluxed and heated until the solder is drawn into the joint by capillarity and the connection is tight. Flux shall be water soluble binder flux. All solder and flux shall be lead free.

3.3 EXPANSION AND CONTRACTION

A. Provisions shall be made for expansion and contraction in all piping. Piping shall be installed in a manner such that joints will not develop leaks. All expansion shall be taken up by swing-connections, and this Contractor shall be responsible for the installation of these connections whether or not they are shown on the Drawings with specific means for relieving expansion and contraction. Slip-type expansion joints shall not be used. Particular care must be exercised at branches on underground piping to allow free movement at branch connection to main.

3.4 INSTALLATION OF PIPING

A. Piping shall be installed on long continuous lengths, with a minimum number of joints. Joints, where necessary shall be carefully made to insure against leakage.

B. All piping shall be firmly supported using hangers, brackets and braces to prevent sagging and/or lateral movement. All hangers, brackets, and other supports shall be securely fastened to the construction as may be required and in a manner acceptable to the Contracting Officer. All piping shall be install to maintain maximum head room. Nothing shall be suspended from the roof deck.

C. Arrangement of all piping shall be as shown on plans. It is especially necessary that all mains be installed with view to accessibility in case of repair and location of pipe lines and spacing between same shall be so made that there will be no conflict between pipe lines by the several trades.

D. Contractor shall give careful consideration to clearances and locations of lines and type of fittings used to obtain these clearances. Provide maximum headroom in all cases. Piping shall be installed parallel to building walls and at a height so as not to obstruct any portion of a window, light fixture, doorway, pipe tunnel or passageway. Ascertain from the drawings heights of all suspended ceilings, size of all pipe shafts in which piping is to be concealed, and location and size of structural members in and adjacent to all pipe shafts.

E. Where interferences develop in the field, Contractor shall offset or reroute piping as required to clear such interferences. In all cases consult architectural drawings for exact location of pipe spaces, ceiling heights, or other architectural details before installing piping.

F. At the low point in piping, and elsewhere as shown on the drawings, install a dirt pocket at least 6 in. deep with a cap at bottom constructed of pipe fittings not less than 3 in. for connections 3 in. and larger and of the full diameter of the connection served where smaller than 3 in.

G. Under no circumstances shall the size of piping shown on the drawings be changed without written approval of the Contracting Officer.

H. Provide eccentric reducers where required for proper drainage or venting of horizontal pipe lines. Reducing fittings shall be used for all changes of pipe size and bushings shall not, under any circumstances, be used.

I. Unions or flanges are to be installed on the equipment side of all valves in pipe connections from mains to equipment, to enable equipment to be drained and disconnected without necessitating the draining of mains.

J. Valves must be arranged for easy access and be within easy reach and the piping shall be arranged to accomplish this.

3.5 WELDING

A. When welding is to be performed, precautionary measures must be taken to prevent fire. Provide two (2) 10 pound ABC fire extinguishers in close proximity to welding work. All piping shall be shop-fabricated to the greatest extent practicable. Notify Base Fire Department and obtain welding permits as required.

B. Welded joints shall be made by the oxy-acetylene or electric process in accordance with Code for Pressure Piping ANSI B31.l.

C. Filler metal for the oxy-acetylene welding process shall conform to the American Society for Testing and Materials Specification for Iron and Steel Gas-Welding Rods, ASTM Designation A251-46T, Classification GA60. Filler metals for the metallic arc welding process shall conform to the American Society for Testing and Materials Specification for Mild Steel Arc-Welding Electrodes, ASTM Designation A233-58T. Classification of electrodes shall be one of the following: E6010, E6015, E7016, E7018.

D. Welds shall be of the single vee butt type for which the pipe shall be mill leveled to 45 degrees to within 1/16 in. of the inside wall surface.

E. The abutting ends of the joints shall be separated before welding to permit complete fusion to the bottom without overlapping, tacked in two or more points to maintain alignment, and welded. All welding shall be continuous around the pipe.

F. Welds shall be of sound weld metal, thoroughly fused into the ends of the pipe and to the bottom of the vee, and shall be built up in excess of the pipe wall to give a reinforcement of one-quarter (1/4) the pipe wall thickness and in such a manner that one weld metal will present a gradual increase in thickness from the surface of the pipe to the center of the weld. The minimum width of the weld shall be 2-1/2 times the pipe wall thickness.

G. The fillet welds for flanges of fittings shall be fused into the pipe and plate for a minimum distance of 1-1/2 times the pipe wall thickness and shall be built up to present a minimum throat thickness of depth of weld of 1-1/4 times the pipe wall thickness.

H. Branch connections shall be fabricated by welding; and welding fittings shall be carefully welded into the pipe system. All welding fittings shall have carefully matched intersections.

I. Welding ells shall be used at all turns in welded pipe lines; no mitered ells will be approved.

J. Where welded mains are 3 in. in size or larger and branches are 2 in. in size and smaller, branch connections shall be made up with "Thread-O-Lets" as manufactured by Bonney Forge, Tube Turns or Tube Line, Inc. Welding tees or Weld-O-Lets shall be used for all other branch connection, unless specifically agreed otherwise with the Contracting Officer for a specific case.

K. Openings cut into pipe for welded connections shall be accurately made to give carefully matched intersections.

L. Welded piping shall be subject to a hydrostatic test of not less than 100 psi, or of 1-1/2 times the working pressure whichever is the greater at which pressure all welded joints shall be hammered with a three pound hammer, the blows being struck with a sufficient force to jar the pipe and joint, but not so hard as to injure the piping. All welds must pass this test without showing leaks or any defects.

M. Pipes shall be cut short and cold sprung into place before welding or fabricating to compensate for expansion of lines when hot.

N. Welds in piping shall be annealed after welding to remove the welding strains. The temperature need not exceed that causing a dull red, and shall be uniform around the pipe. Welds made in place shall be annealed, but the pipe shall be free to expand and shall be properly supported so as to avoid stresses. Annealing shall always be followed by slow cooling.

O. Welding shall be done with good quality modern welding equipment by competent operators, and in a thorough, first class, workmanlike manner. Preparation, fabrication welding and installation shall be in accordance with ANSI B31.3 - 1962.

P. The Contractor shall be required to furnish proof of the competency of each welding operator, and shall at the request of the Contracting Officer, have all or any of such welding operators pass a standard qualification test such as A.S.M.E., A.W.S. or Hartford Insurance Company procedure and tests.

3.6 PIPE SLEEVES

A. Pipe sleeves shall be securely bedded in the building construction. Sleeves shall finish flush with finished wall and ceiling lines. Note that where covering is provided, it shall extend continuously through sleeves.

B. Sleeves installed in vertical positions shall be perfectly plumb and sleeves in horizontal positions shall be level. They shall be located, set, and maintained in position by this Contractor while surrounding construction work be being installed so that the center of each pipe shall be accurately installed in the center of its sleeve. The space between the pipe or the insulation and the sleeve shall be caulked to prevent light or air transfer. Where vertical sleeves occur, such as in floors or ceilings, special collars secured to the pipes or to the ceiling construction shall be provided to prevent the packing from falling out. The standard floor and ceiling plates herein specified for finished areas may be used for this purpose provided they are firmly secured to the pipes.

3.7 HANGERS, SUPPORTS AND INSERTS

A. Provide all hangers, supports, bracing, inserts, beams, anchors, guides, sleeves and miscellaneous steel for the proper support, alignment, expansion and contraction of piping and equipment.

B. Hanger supports shall be securely fastened to structural members by approved beam clamps and clips, concrete inserts, anchors, or other appropriate methods agreed upon with the Contracting Officer.

C. Maximum spacing of hangers and supports for steel piping shall be as follows:

Pipe Size	Spacing
1/2" and 3/4"	Not over 6'-0"
1" and 1-1/4"	Not over 8'-0"
1-1/2" thru 3"	Not over 10'-0"
4" and 6"	Not over 12'-0"

D. Hanger and support spacing for copper piping shall not exceed 8 ft. on centers.

E. Cast iron or bell and spigot piping shall be supported at every joint.

F. Additional hangers and supports shall be provided to minimize undesirable stress on valve bodies, other fittings and equipment.

G. Provide all supplemental angles, channels and plates of adequate sizes where bracing or supports are required for piping between structural members.

3.8 OPENINGS IN CONSTRUCTION

A. Openings required in new construction will be provided by the Contractor at the request of, and in accordance with, information furnished by this Contractor. If this Contractor fails to request or furnish information to the Contractor for the placement of holes in new construction or fails to furnish sleeves at the time the General Contractor is ready to place such construction, such holes shall be cut after the construction is in place by this Contractor in accordance with the paragraph below.

B. All cutting required that may be necessary for the installation of this Work shall be done by this Contractor, and all patching and repairing shall be done by workmen competent in the trade required at the expense of this Contractor. The Contractor shall be responsible for arranging the work so that minimum cutting will be required. All rubbish and excess material involved in such cutting shall be promptly removed from the building and disposed of by this Contractor. Cutting through the floor or roof system shall be done only with approval of the Contracting Officer so as to avoid cutting beams or the structural system. Approval must be obtained from the Contracting Officer before cutting operations begin to avoid damage to the structure. All cutting must be carefully and neatly accomplished so as to minimize noise and dusting or staining of surrounding finishes.

3.9 CONCRETE EQUIPMENT PADS

A. The Contractor shall supply all concrete pads and machine bases required for his equipment unless specifically shown on the architectural drawings as by the General Contractor.

B. Concrete supplied for machine bases shall be as specified under CONCRETE. Pads for fans shall be dowelled to slab floors with one (1) 1/4 in. steel rod per sq. ft. of pad. Dowels shall project a minimum of 2 in. into the slab and 2 in. into the pad. All other pads shall be of 4 inch high, 2 inch high, or other dimensions as indicated. Pads shall have chamferred edges and equipment anchors.

3.10 VALVES

A. Install double disc gate valves with the stem above body in accessible position.

B. The necessary valves shall be installed within the systems to provide required shut-off and flow control service and to allow isolation for inspection, maintenance and repair of each piece of equipment, fixture and each main and branch service loop.

C. Each valve shall be installed so that it is easily accessible for operation, visual inspection and preventative maintenance.

3.11 MOTORS

A. Unattached electric motors (motors furnished loose with equipment) furnished under Division 15 shall be set by responsible Contractor under applicable section of Division 15, Mechanical. Motors shall be leveled and aligned on bases and foundation pads in strict accordance with the manufacturer's instructions and their recommended tolerances before any electrical connections are made. After all connections have been made and just prior to placing each motor in operation, levels and alignment shall be re-checked. All necessary adjustments shall be made to assure that the thrust is balanced, that shaft rotates freely when turned by hand. All final connections to motor shall be made under Division 16.

3.12 THERMOMETERS AND GAUGES

A. Thermometers and Gauges: Install thermometers and gauges in piping systems and duct systems as shown. Thermometers and gauges for each major equipment item shall be readily readable from one position while standing on floor or through the ceiling access panel. Gauges shall not be installed until systems are cleaned.

3.13 CLEANING THE PIPING SYSTEMS

A. Before pipe covering is applied and final tests are made, flush the water piping systems thoroughly to remove grit, sand, oil, etc., for as long a time as is required to thoroughly clean the apparatus and piping. Make the required temporary connections for this purpose.

B. Care must be taken not to get dirt, grease, etc., upon the floors or walls. Any damage done shall be promptly repaired.

C. After the period of these operations, any defects or damages that may have developed in the equipment and apparatus as a result of the cleaning process or the operation of the system shall be made good, and the apparatus put in first class working order. Each step of the cleaning process shall be observed by the Contracting Officer.

END OF SECTION

SECTION 15067 - TESTING PIPING SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Provide pressure tests on plumbing, storm water, and venting piping systems.

B. Provide pressure tests on domestic cold and hot water piping systems.

C. Provide pressure tests for natural gas piping systems.

1.2 QUALITY ASSURANCE

A. Notify Contracting Officer three days prior to the tests, who will in turn notify other interested parties.

B. Piping systems where required, shall be pressure tested for leaks in accordance with the Code for Pressure Piping, ANSI B31.1.0, and as specified herein.

C. All tests shall be performed and all piping defects shall be corrected prior to insulating, inaccessible concealing or backfilling. Leaks shall be repaired, all repaired piping shall be retested. All defective pipe, materials and workmanship shall be removed and replaced and tests shall be repeated until systems are proven entirely tight.

D. The tests shall not be performed until piping systems have been flushed and cleaned.

1.3 SUBMITTALS

A. Submit three (3) copies of all testing reports to the Contracting Officer and a copy of each report shall be included in the O & M manual under test reports.

PART 2 - PRODUCTS

2.1 TESTING MATERIALS

A. All materials, pumps, compressors and equipment required for testing shall be provided by the Contractor installing the piping system.

B. Where water is used in hydrostatic testing, only potable water shall be used.

PART 3 - EXECUTION

3.1 TESTING OF PIPING SYSTEM - GENERAL

A. Devices or equipment, or parts thereof, gauges thermometers, etc., which may be damaged by test pressures shall be removed or protected during tests.

B. Fabricated piping shall not be connected to equipment until testing has been completed. Before applying test pressure, provide restraining devices as required to prevent distortion of piping system during testing.

C. Welding and screwed joints and other potential leak sources of the systems to be hydrostatically tested shall be painted with a powdered blue chalk and water mixture and allow to dry before testing begins.

D. All joints in the piping systems shall be inspected during the test period. All defective joints shall be removed, repaired and replaced. Pinning or caulking of leaks will not be permitted.

E. Where air is used for pressure testing, the air pressure shall be gradually applied. All leak sources shall be checked for leaks by applying a coating of soap suds to the source.

F. After tests have been completed and piping systems proven tight, piping and equipment shall be tested for complete drainage through unions, caps, plugs, faucets or hose valves at low points. If piping and equipment do not drain properly, piping and equipment shall be regraded and drain points added until system can be completely drained. Systems shall be left dry in freezing weather.

3.2 PLUMBING, STORM WATER, AND VENTING SYSTEMS

A. Piping systems shall be tested with water or air either in its entirety or in sections. Contractor shall

provide all equipment, material, and labor necessary for inspection and tests. Cleanouts, etc. shall be removed to ascertain if the pressure has reached all parts of the system.

B. Water test - if applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system filled with water to point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest opening of the section under test, and each section shall be filled with water, but no section shall be tested with less than a ten foot head of water. In testing successive sections, at least the upper ten feet of the next preceding section shall be tested, so that no joint or pipe in the building (except the uppermost ten feet of the system) shall have been submitted to a test of less than a ten foot head of water. The water shall be kept in the system, or in the portion under test, for at least thirty minutes before inspection starts.

C. Air test shall be made by attaching an air compressor testing apparatus to any suitable opening, and after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gage pressure of five pounds per square inch. The pressure shall be held without introduction of additional air for a period of thirty minutes before inspection starts.

D. System shall be inspected for leaks. In the event leaks are discovered they shall be repaired and tests repeated until system is proven water tight.

3.3 DOMESTIC COLD AND HOT WATER PIPING SYSTEMS

A. Domestic cold and hot water piping shall be hydrostatically tested to a pressure of 100 psig, or 1.5 times the line pressure whichever is greater, registered at ground floor level. Testing shall be considered complete when systems hold the test pressure for a minimum period of one hour without variation in pressure except that which is due to changes in temperature.

3.4 NATURAL GAS PIPING SYSTEM

A. Natural gas piping shall be tested in accordance with NFPA No. 54.

END OF SECTION

SECTION 15076 - IDENTIFICATION FOR PLUMBING AND HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Duct labels.
5. Stencils.
6. Valve tags.
7. Warning tags.

1.3 SUBMITTALS

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

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch Stainless steel, 0.025-inch Aluminum, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel self-tapping screws.

5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, [1/16 inch 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F .
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F .

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.4 DUCT LABEL

A. Material and Thickness: multilayer, multicolor, plastic labels for mechanical engraving 1/16 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: black.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by ¾ inch.

F. Minimum Letter Size: ¼ inch for name of units if viewing distance is less than 24 inches, ½ inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on drawings, duct size, and an arrow indicating flow direction.
1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.5 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping, minimum letter size of 1-1/4" for ducts, and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.

1. Stencil Material: Fiberboard or metal.
2. Stencil Paint: Exterior, gloss, alkyd enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
3. Identification Paint: Exterior, alkyd enamel in colors according to ASME A13.1 unless otherwise indicated.

2.6 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch, Stainless steel, 0.025-inch. Aluminum, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.7 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.
2. Fasteners: Reinforced grommet and wire or string.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 9 Section "Interior Painting."

B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles, complying with ASME A13.1, on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Pipe Label Color Schedule:

1. Domestic Water Piping:

a. Background Color: White.
b. Letter Color: Blue.

2. Sanitary Waste and Storm Drainage Piping:

a. Background Color: White.
b. Letter Color: Yellow.

3. Refrigerant Piping:

a. Background Color: White.
b. Letter Color: Black.

3.4 DUCT LABEL INSTALLATION

A. Install plastic-laminated duct labels with permanent adhesive on air ducts in the following color codes:
1. Blue: For cold-air supply ducts.
2. Yellow: For hot-air supply ducts.
3. Green: For exhaust, outside, relief, return, and mixed-air ducts.
4. ASME A13.1 Colors and Designs: For hazardous material exhaust.

B. Stenciled Duct Label Option: Stenciled labels, showing service and flow directions, may be provided instead of plastic-laminated duct labels, at Installer's option, if lettering larger than 1 inch high is needed for proper identification because of distance from normal location of required identification.

C. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Cold Water: 1-1/2 inches, round.
b. Hot Water: 1-1/2 inches, round.

2. Valve-Tag Color:

a. Cold Water: Natural.
b. Hot Water: Natural.
c. Low-Pressure Compressed Air: Natural.
d. High-Pressure Compressed Air: Natural.

3. Letter Color:

a. Cold Water: Black.
b. Hot Water: Black.

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

SECTION 15250 - INSULATION

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Provide all materials, equipment, apparatus, services, methods, tools, labor, transportation, etc., required to complete the insulation of the mechanical systems as shown on the drawings and as specified.

B. Cold piping requiring insulation:
1. Domestic cold water piping.
2. Waste and vent piping above ceilings.
3. Refrigerant suction piping.

C. Hot piping requiring insulation:
1. Domestic hot water, tempered hot water and hot water recirculating piping.
2. Refrigerant hot gas piping.

D. Ductwork requiring insulation:
1. Concealed supply ductwork.

E. Painting and identification will be provided under Division 9 or by the contractor providing the items to be insulated. Factory sizing on outer jacketing of insulation shall be provided under this section suitable for specified finish coat of paint or identification.

1.2 CODES AND STANDARDS

A. Where applicable, the Fire Hazard Classification of the materials herein specified shall be listed and inspected by Underwriters Laboratories, Inc. The flame spread rating, fuel contributed and smoke developed as shown in the listing shall be determined by ASTM E84 "Method of Tests for Surface Burning Characteristics of Building Materials". Each product shall bear the label of Underwriters' Laboratories. All products used on this project shall be classified as "non-combustible" in National Building Code or NFPA National Fire Code.

1.3 SUBMITTALS

A. Submit shop drawing in accordance with Section 15010 for all insulation as follows:
1. Schedule listing each type of insulation, insulation thickness, density, "K" factor, type of jacket, etc., and the service or type of work that the insulation is to apply.

B. LEED Submittal:
1. Product Data For Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.

1.4 DEFINITION

A. The term "piping" as used in this section of the specifications shall include pipe, fittings, valves, specialties, strainers, flanges, unions, runouts, final connections, etc.

1.5 PROTECTION

A. Protect insulation against dirt, water, chemical or mechanical damage before, during and after installation. Any such insulation or covering damaged prior to final acceptance of the work shall be satisfactorily repaired or replaced.

B. Provide sturdy metal guards on all duct and pipe insulation subject to damage from normal maintenance operations and personnel.

PART 2 - PRODUCT

2.1 COLD PIPING AND EQUIPMENT INSULATION (DOWN TO 0 F)

A. Minimum 3-1/2 pounds per cubic foot density, fiberglass factory molded or spun pipe insulation with a "K" factor of 0.24 at 75 F mean temperature and a factory applied fire retardant self sealing vapor barrier jacket.

B. Flexible elastomeric insulation having a "K" factor of 0.28 at 75 F mean temperature. For use only on refrigeration, condensate drain piping, and domestic hot and cold water piping in walls and chases. Insulation shall have jacket to meet 25 flame & 50 smoke spread rating.

2.2 HOT PIPING INSULATION (UP TO 500 F)

A. Minimum of 3-1/2 pounds per cubic foot density fiberglass, factory molded or spun pipe insulation with a "K" factor of 0.24 at 75 F mean temperature and a factory applied fire retardant self sealing jacket.

2.3 FLEXIBLE DUCT INSULATION (CONCEALED DUCTWORK)

A. Minimum of 3/4 pounds per cubic foot density fiberglass duct wrap with factory applied flame retardant foil reinforced Kraft facing and a "K" factor of 0.28 at 75 F mean temperature.

2.4 INSULATION MANUFACTURERS

A. Manufacturers for insulation products specified above shall be Certain-Teed/Saint Gobain Corp., Owens-Corning Fiberglass Corp., Manville Corp, or Knauf Fiberglass.

B. Manufacturers for flexible elastomeric insulation shall be Armstrong, Rubatex Corp., or Halstead Industrial Products.

2.5 ADHESIVES, LAGGING, AND SEALERS

A. Adhesives, lagging and sealers shall be as recommended by the insulation manufacturers. Where applicable, they shall include an anti-vermin and fungicidal agent and shall be non-toxic and non-flammable.

B. Manufacturers for adhesives, lagging and sealers shall be Benjamin Foster, Insul-Coustic or Chicago Mastic Co.

2.6 PREMOLDED FITTING AND VALVE COVERS

A. Premolded fitting and valve covers shall be factory made of one piece polyvinyl chloride. Covers shall overlap the adjoining pipe insulation.

B. Manufacturers for fitting and valve covers shall be Insul-Coustic Corp., Zeston, Inc., or Certain-Teed/Saint Gobain Corp.

PART 3 - EXECUTION

3.1 PREPARATION/GENERAL REQUIREMENTS

A. Clean thoroughly to remove rust, plaster, and dirt before insulation is applied. Insulation shall be applied on clean dry surfaces only. Apply duct and pipe insulation only after systems have been pressure tested and balanced.

B. Insulation work shall be installed by competent applicators regularly employed by insulating contractors or manufacturers.

C. Exposed insulated ducts and piping shall be provided with a finish of an adequate surface for a final coat of paint. Pre-sized jackets, aluminum, vinyl and other pre-finished jackets are acceptable as installed, however, canvas and similar material shall be filled and sealed or dipped if necessary to provide a good surface for painting.

D. At contractor's option, canvas jacket may be replaced by glass cloth.

E. Vapor barriers on cold surfaces and piping must be continuous through sleeves, hangers, supports, etc. Stapling of vapor barrier jackets will not be permitted.

F. Insulation is not required on vertical downspouts except at vertical piping to roof drains or short stub water connections from main line to plumbing fixtures.

G. Provide saddles, shields, metal protectors and other appurtenances necessary to prevent crushing of insulation at hangers, rollers, supports and anchors. Provide rigid insulation blocks at saddles.

3.2 COLD PIPING INSULATION

A. Insulate the following piping systems with cold piping fiberglass insulation of specified thicknesses.

Type of System or Pipe	Insulation Thickness
1. Domestic cold water piping.	1"

B. Installation of fiberglass insulation shall be as follows:
   1. Pipe: Butt all joints firmly together. Cover joints with 3" butt strips. Smoothly secure all jacket laps and joints strips with adhesive. Self-sealing laps shall be applied according to manufacturers recommendations. Ends of pipe insulation shall be sealed off with a vapor barrier coating at all fittings and valves and at intervals of 21 feet on continuous runs.
   2. Fittings and Valves: Insulate with molded fiberglass fittings, segments of pipe covering or firmly compressed foil faced fiberglass blankets. Secure in place with 20 gauge corrosion resistant wire and a smooth coat of insulating cement. Vapor seal by applying a layer of open weave glass cloth embedded between two coats of vapor barrier mastic. Lap glass cloth 2" onto adjacent pipe insulation. In lieu of glass cloth and two coats of vapor barrier mastic, premolded fitting and valve covers may be used. Covers shall overlap adjoining pipe insulation, have all edges sealed with vapor barrier mastic, and have ends of covers taped with 2" pressure sensitive vinyl tape.

C. Insulate refrigerant suction piping with ½" thick flexible elastomeric insulation with joints sealed vaportight. Install in compliance with manufacturers' instructions.

D. Insulate waste and vent piping above ceilings with ½" thick elastomeric insulation.

3.3 HOT PIPING INSULATION:

A. Insulate the following piping systems with fiberglass insulation of thicknesses as specified.

Type of Service or Pipe	Insulation Thickness
1. Domestic hot water, tempered hot water and hot water recirculating piping.	1"

B. Installation of fiberglass insulation shall be as follows:
   1. Pipe: Butt all joints firmly together. Cover joints with 3" butt strips. Smoothly secure all jacket laps and joints strips with adhesive. Self-sealing laps shall be applied according to manufacturers recommendations.
   2. Fittings and Valves: Insulate with molded fiberglass fittings, segments of pipe covering or firmly compressed foil faced fiberglass blankets. Secure in place with 20 gauge corrosion resistant wire and a smooth coat of insulating cement. Apply a layer of open weave glass cloth embedded between two coats of mastic. Lap glass cloth 2" onto adjacent pipe insulation. In lieu of glass cloth and two coats of mastic, premolded fitting and valve covers may be used.

C. Insulate refrigerant hot gas piping with ½" thick flexible elastomeric insulation.

3.4 DUCT INSULATION

A. Blanket Insulation: Install tight and smooth on concealed ductwork. Secure to ducts having long sides or diameters as follows:
   1. Smaller Than 24 Inches: Bonding adhesive applied in 6 inch wide transverse strips on 12 inch centers.
   2. 24 Inches and Larger: Anchor pins spaced 12 inches apart each way. Apply bonding adhesive to prevent sagging of the insulation.
   3. Overlap joints 3 inches.
   4. Seal joints, breaks, and punctures with vapor barrier compound.

END OF SECTION

SECTION 15400 - PLUMBING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All piping, fittings, valves, hangers and other accessories specified and shown on the drawings for complete domestic cold, hot water and hot water recirculating piping systems.

B. All piping, fittings, hangers, and other accessories specified and shown on the drawings for a complete sanitary waste and vent piping system including all necessary excavating and backfilling to 5'-0" outside building foundation.

C. All piping, fittings and valves specified and shown on the drawings for roughing in and final connection to equipment provided by AAFES.

D. All non-freeze wall hydrants, hose bibbs, and required vacuum breakers specified and shown on the drawings.

E. Testing, flushing, and cleaning, for all piping systems and chlorination of the domestic water piping system.

F. All piping, fittings, pressure regulators, hangers and other accessories specified and shown on the drawings for complete natural gas piping system.

G. All water heaters as specified and shown on the drawings.

H. All thermostatic water mixing valves as specified and shown on the drawings.

I. All backflow preventers as specified and shown on the drawings.

J. All hot water circulating pumps and controls as specified and shown on the drawings.

1.2 QUALITY ASSURANCE

A. Codes and Standards: Comply with current edition of following:
   1. Pipe and fittings shall conform to applicable ANSI, AWWA, ASTM, and USASI standards referenced for those products.

B. No plumbing fixture, special equipment, device or piping shall be installed which will provide cross connection or interconnection between distributing supply for drinking water or domestic water and polluted supply or waste so as to make possible backflow or back-siphonage of sewage or polluted water into potable water supply system.

C. Where possibility of back-siphonage exists, water supplied to fixture shall be introduced through a suitable vacuum breaker installed at code minimum distance above fixture.

1.3 SUBMITTALS

A. Submit certificates of compliance for pipe, fittings and valves specified under this section.

B. Submit shop drawings in accordance with Section 15010 for the following equipment:
   1. Floor drains.
   2. Cleanouts.
   3. Non-freeze hydrants.
   4. Hose bibbs.
   5. Thermostatic mixing valves.
   6. Water heaters.
   7. Circulating pumps.

C. Provide all identification, operating instructions, parts lists, wiring and control diagrams for all equipment installed under this section.

D. All items specified in this section shall be manufactured in the United States.

E. LEED Submittal:
   1. Product Data For Prerequisite EA 2: Documentation indicating that water heaters comply with ASHRAE 62.1-2004, Section 7.

PART 2 - PRODUCTS

2.1 DOMESTIC COLD, HOT WATER AND HOT WATER RECIRCULATING PIPING SYSTEMS

A. See Section 15050 - Basic Materials and Methods for piping materials.

B. Each supply riser and fixture supply, including hot and cold water shall have a separate water hammer arrestor of the same size as the supply pipe line to the fixture. Water hammer arrestors shall be sized per P.D.I. - WH201. Air chambers are not acceptable.

C. All supply connections to plumbing fixtures and equipment shall be copper piping up to face of wall and chromium plated brass piping and fittings for exposed connections. Supply piping shall have screwed connections on both ends for piping through wall. Each fixture shall have a shut off valve at the fixture.

D. Each water connection to a plumbing fixture or item of equipment having a submerged inlet or hose end attached shall be provided with a vacuum breaker to prevent back-siphonage of contaminated water into drinking supply, approved by local and state health authorities.

2.2 SOIL, WASTE, AND VENT PIPING SYSTEMS

A. See Section 15050 - Basic Materials and Methods for piping materials.

2.3 FLOOR DRAINS

A. Unless noted otherwise, floor drains shall conform to the following:
1. Floor drains in slab-on-grade-floors shall not be flashed, shall have black iron bodies with nickel bronze covers and strainers, and must be located to properly serve associated equipment and be accessible for cleaning as approved by the Contracting Officer. Floor drains in floors above grade shall be flashed.
2. Floor drains shall have covers and strainers securely fastened by countersunk, tamperproof, brass machine screws.
3. All floor drains shall have a 6" minimum strainer size. On floor drains larger than 2", strainer size shall be 3" or more larger than the drain size unless specifically shown otherwise on the drawings.
4. Floor drain sizes shall be as shown on the drawings.

B. All floor drains shall be by the same manufacturer. Furnish and install a "P" trap at each floor drain. See floor drain schedule for model numbers.

C. Manufacturers for floor drains shall be Zurn, JR Smith, Wade, or Josam.

2.4 CLEANOUTS

A. All cleanouts shall be by the same manufacturer.
1. Exposed piping or piping above ceiling: Cast iron body ferrule with brass raised head, straight threaded coating plug having tapered shoulder.
2. Unfinished floors: Cast iron floor cleanout, adjustable threaded housing, polished bronze round scoriated top, bronze tapered plug, vandal proof. Zurn Model No. ZB-1400-BP-VP.
3. Finished floors: Cast iron floor cleanout, adjustable threaded housing, round polished nickel bronze top, bronze taper plug, vandal proof. Zurn Model No. ZN-1400-BP-VP.
4. Walls: Cast iron ferrule, bronze plug, and vandal proof stainless steel flat access cover. Zurn Model No. Z-1441-BP-VP.
5. Carpeted floors: Cast iron floor cleanout, adjustable threaded housing, bronze taper plug, polished bronze round top (installed below carpet) with carpet marker. Zurn Model No. ZB-1400-BP-CM.

B. Manufacturers for cleanouts shall be Zurn, Wade, Josam, or JR Smith.

2.5 NON-FREEZE HYDRANTS (SINGLE TEMPERATURE)

A. Non-freeze anti-siphon wall hydrants shall be full recessed box construction with polished bronze box and hinged key-operated cover with removable operator handle furnished with each hydrant. Brass working parts and casing, renewable nylon valve seat, 3/4" IPS inlet connection and integral backflow preventer, 3/4" male thread straight hose connection. Zurn Model No. Z-1300-6.

B. Manufacturers for non-freeze hydrants shall be Wade, Josam or Zurn.

2.6 HOSE BIBBS

A. Hose bibbs shall be 3/4" size, chrome plated, with removable T handle key and vacuum breaker. Chicago Faucet Model No. 952.

B. Manufacturers for hose bibbs shall be Chicago Faucet or equal.

2.7 THERMOSTATIC WATER TEMPERATURE CONTROLLERS

A. Thermostatic water temperature controllers shall be supplied with faucet as manufactured by Sloan. Alternate manufacturers not acceptable.

2.8 HOT WATER CIRCULATING PUMPS

A. Domestic hot water circulating pumps shall be all bronze with a capacity to pump 8 GPM against a 10'-0" head. Pump shall be 1/12HP, 120 volt, 1 phase. Provide 120 volt strap-on aquastat for pump control. Pump shall be Bell & Gossett Series No. LR-15B. Other manufacturers Armstrong or Taco.

2.9 WATER HAMMER ARRESTERS

A. Water hammer arresters shall be PDI certified, with 150 PSI working pressure and a temperature range of 33 degree F. to 180 degree F. Manufacturers shall be Sioux Chief, Watts, Wade, Jay R. Smith, or Zurn.

2.10 GAS FIRED, HIGH EFFICIENCY, STORAGE TYPE WATER HEATERS

A. Water heaters shall be of the seamless glass lined steel tank construction in which the glass coating is applied to the water side surfaces of the tank after the tanks has been assembled and welded. The condensing flue coil shall be coated on the flue gas side with A.O. Smith's proprietary acid resistant glass lining designed for use in condensing heaters.

B. The heater shall be suitable for sealed combustion direct venting using a 4" diameter PVC air intake pipe and 4" diameter PVC exhaust pipe. The heater shall be factory assembled and tested. The power burner shall be of a design that requires no special calibrations on start up. The heater (s) shall be approved for 0" clearances to combustibles.

C. The control shall be an integrated solid state temperature and ignition control device with integral diagnostics, LED fault display capability and a digital display of temperature settings.

D. The tanks shall be foam insulated and equipped with a ASME rated temperature pressure relief valve. The water heater shall be UL listed and exceed the minimum efficiency requirements of ASHRAE/IES 90.1b-1992.

E. This heater shall be listed by SCAQMD Rule 1146.2 Low NOx.

F. Manufacturers for high efficiency gas water heaters shall be A.O. Smith, Lochinvar, or PVI.

PART 3 - EXECUTION

3.1 COLD AND HOT WATER PIPING SYSTEM

A. Above grade water piping:

1. Piping shall be run true, parallel with walls, centered in hangers and sleeves, securely supported by hangers or supports independently of connections and sleeves, anchored as required to control movement. Pipe and fittings arranged as called for and as required to permit free, unrestrained, noiseless expansion and contraction and freedom from strain on equipment.
2. All screwed piping shall be carefully cut, reamed, threaded and worked into place with springing, using a small amount of prepared lubricant on the outside threads. Branch connections shall have three elbow spring pieces to allow for movement due to expansion.
3. Valves and unions or flanges shall be suitable located to isolate each unit, branch circuit or section of piping to facilitate maintenance and/or removal of all equipment and apparatus.
4. All piping shall be installed so as to be free to expand without injury to equipment or building.
5. Plumbing water mains must pitch down to drain completely through fixtures or equipment below; provide accessible unions, brass plugs or hose valves at low points.

6. Plumbing water mains must pitch to vent completely through fixtures or equipment above.
7. All risers or down-feed drops shall be firmly supported and blocking done as necessary to prevent hammer due to vibration. Provide drain valves at bottom of risers.

3.2 DISINFECTION OF DOMESTIC WATER SYSTEMS WITHIN THE BUILDING

A. General:

1. Before being placed in service and after testing is completed, all potable water piping shall be disinfected as specified herein, in accordance with AWWA Standard C601-54 and as required by the local Health Department codes.
2. Chlorine may be applied by the use of chlorine gas-water mixture, direct chlorine-gas feed or a mixture of calcium hypochlorite and water. If calcium hypochlorite is used, it shall be equivalent to commercial products such as Perchloron, HTH or Maxochlor. The powder shall be mixed with water to form a paste thinned to a slurry and pumped or injected into the lines.
3. If direct chlorine-gas feed is used, it shall be fed with either a solution-feed chlorinator or by a pressure-feed chlorinator.
4. The lines and fixtures shall be flushed thoroughly after chlorination to remove all foreign matter.
5. Injection shall start only when all fixtures are connected and ready for operation.
6. A service cock or riser (3/4" to at least 1-1/4") shall be provided by the Contractor and located at the point of connection to water service. The disinfecting agent shall be injected into and through the system from this cock or riser only.
7. Chlorine, either gas or liquid, or calcium hypochlorite (liquid or powered) shall be used as a disinfecting agent as approved in federal and AWWA procedures.
8. The disinfecting agent shall be injected by a proportioning pump or device through the service cock or riser slowly and continuously at an even rate.
9. All valves shall be fully opened at least four times during injection and the residual checked with orthotolidine solution.
10. When the chlorine residual concentration indicated not less than 50 parts per million at all outlets, all fixtures and water supply valves shall be closed.
11. The residual shall then be retained for a period of not less than eight hours.
12. After retention, the residual upon checking at most outlets, shall not be less than ten parts per million. If less, the disinfection must be repeated as described above.
13. If satisfactory, all fixtures shall be flushed until residual or orthotolidine tests are not greater than the water supply.
14. Contractor shall furnish Contracting Officer or his authorized representative with sterilization report indicating potable water to be safe from contamination. A copy of the sterilization report shall be included in the O & M manuals under test reports and shall be submitted to the Base 355 AMDS/SGPB.

3.3 FLUSHING WATER PIPING

A. After the piping has been chlorinated, each run of pipe shall be thoroughly flushed out so as to remove all foreign matter from the lines. Flushing will ordinarily be done by opening drain valves along the lines.

B. Sufficient flushing water shall be introduced into the mains to produce a velocity of not less than 4 ft. per second, and this flow rate shall be continued until the discharge is clean and clear and does not show evidences of silt or foreign matter when a sample is visually inspected.

3.4 SOIL, WASTE, AND VENT PIPING SYSTEM

A. Size of soil, waste and vent stacks and branch piping shall be as indicated on the drawings, but in no case less than required by the provisions of the applicable codes.

B. Where possible, cast iron sewers and branches shall pitch down 1/4" per foot, but not less than 1%. Branches, arms and connections, shall be sloped 1/4" in 1'-0" where possible and provide with adequate hangers as specified elsewhere.

C. Interior underground, underfloor or on-ground piping, shall be continuously bedded with depressions for hubs on compacted sand or gravel to undisturbed soil for a minimum depth of 6" under pipe.

D. Connections to soil, waste and drain stacks shall be at 45 degrees; those to vent stacks may be at 45

degrees or 90 degrees except vent setbacks shall be connected to 45 degrees to soil, waste or drain stack.

E. Connections to stacks and sewers shall be arranged so that operation of any fixture will not cause fluctuation of water level in traps of other fixtures.

F. All thread joints shall be made up with pipe joint compound applied to male thread only. Threads exposed after joints are made up shall be painted to prevent rust. Teflon tape may be used at Contractor's option.

G. Junctions of screwed pipe to bell and spigot cast iron shall be made with ring or half coupling screwed to end of galvanized pipe to form spigot end.

H. Junctions in all drainage lines shall be made with "Y" branches or 1/8" bends, unless closeness of connection prevents it, in which case, where direction of flow is from horizontal to vertical, sanitary tees may be used upon the approval of the Contracting Officer's superintendent.

I. Compression joint installation for cast iron soil pipe:
   1. Fold and insert the one piece neoprene rubber gasket into the hub which has been properly cleaned.
   2. Apply gasket lubricant to the spigot and inside of the gasket.
   3. Push, draw or drive the spigot into the gasketed hub with a pulling tool or suitable device.

3.5 STACKS

A. Stacks shall impose no stress or strain on branches or connections, be plumb and straight and supported at base with 18" x 18" concrete or brick pier to undisturbed soil.

B. Unless otherwise noted, soil, waste, drain, and vent stacks shall be concealed in walls, pipe chases, pipe shafts, etc., with cleanouts extended to accessible locations.

3.6 VENTING

A. All plumbing fixtures shall be vented to prevent siphoning of traps. Venting shown on plans is minimum required and vents and vent stacks shall be increased in size and/or number and relocated as required, to prevent trap siphoning and to comply with applicable codes, ordinances, statutes, regulations of all governmental bodies, without increase in contract price.

B. A vent stack shall be run parallel to each soil or waste stack to receive branch vents from fixtures and traps. Each vent stack shall originate from a soil or waste pipe at its base. Each soil or waste stack and each vent stack shall be carried through the roof. Where possible, soil, waste, or vent stacks shall be combined before passing through the roof so as to have as few roof openings as possible. Pipes running close to walls shall be offset away from such walls before passing through the roof to permit proper flashing. All vent pipes passing through the roof shall be provided with cast iron increasers one size larger than the pipe but in no case less than 4" and shall extend at least 6" above roof.

C. All horizontal vent pipes shall grade up to meet the requirements of the local and state codes.

D. Vent risers and branches shall connect to the soil and waste risers above waste of highest fixture.

3.7 ROOF FLASHINGS

A. All plumbing piping passing through the roof membrane shall be flashed under division 07533 of the specifications.

B. Contractor shall insure all such items are properly flashed and made watertight.

3.8 CLEANOUTS

A. Cleanouts for sanitary drainage systems shall be installed not more than 50 feet apart, including the developed length of the cleanout pipe, in horizontal drainage lines of 4 inches diameter or less. Cleanouts shall be not more than 100 feet apart, including the developed length of the cleanout pipe, in horizontal drainage lines of over six inches to ten inches diameter. A cleanout shall be provided at, or no more than four feet above the base of each vertical soil or waste stack and storm water conductor. Cleanouts shall be installed at such other points as may be necessary for adequate rodding out of drainage piping systems. Cleanouts shall be set flush with floor or wall surfaces.

3.9 INSTALLATION OF WATER HEATER

A. General: Install water heater in accordance with manufacturer's installation instructions. Install unit plumb and level, firmly anchored in location indicated, and maintain manufacturer's recommended clearances.

B. Support: Orient so controls and devices needing service and maintenance have adequate access.

C. Water heaters shall be installed on concrete pad as shown on the drawings.

END OF SECTION

SECTION 15450 - PLUMBING FIXTURES AND TRIM

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Provide all plumbing fixtures, including supply and waste fittings, stops, trim, brackets, carriers, etc. specified, shown on the drawings and required for complete installation.

B. Provide all piping, fittings, valves, trim, stops, etc. specified, shown on the drawings and required for rough-in and final connection to Equipment furnished by AAFES.

1.2 QUALITY ASSURANCE

A. Codes and Standards: Comply with current edition of the following:
1. Vitreous China Fixture, NBS-CS-CS20.
2. Enameled Iron Fixtures, NBS-CS-CS77.
3. Plumbing Fixtures (land use), FS-WW-P-541.
4. Water Conservation Requirement of the Federal Energy Policy Act.

B. All items specified in this section shall be manufactured in the United States.

C. No plumbing fixture, special equipment, device or piping shall be installed which will provide cross connection or interconnection between potable water system and polluted water or sewage system so as to make possible backflow or back siphonage of sewage or polluted water into the potable water supply system.

D. Where possibility of back siphonage exists, water supplied to fixture shall in introduced through a suitable vacuum breaker installed at code minimum height.

1.3 SUBMITTALS

A. Submit shop drawings in accordance with Section 15010 for the following:

1. Plumbing fixtures and trim.

2. Chair carriers.

B. LEED Submittal:
1. Product Data For Credit WE 2,3.1, and 3.2: documentation indicating flow and water consumption requirements.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND TRIM

A. All fixtures shall be vitreous china, acid resisting enamel cast iron or stainless steel as specified complete with brass piping, fittings, supplies, stops, flush pipes, trim and brackets. Exposed brass piping and fittings shall be chrome plated.

B. Where manufacturer's numbers for a complete assembly are called for, such assembly shall be modified as specified in this section.

C. Fixtures shall have water, drain, waste, soil, vent, and other connections as called for. Each water connection to fixture shall have an air gap or vacuum breaker. Water connection sizes are minimum and must correspond to manufacturer's standards.

D. Carriers for wall hung fixtures shall be selected for the particular fixture, piping arrangement and building conditions prevailing at each location.

E. Where lavatories without legs are specified, each shall be supported on a chair type carrier with concealed arms.

F. Special sinks, where wall hung, shall have equivalent chair carriers specifically designed for the fixture.

G. Plumbing fixtures shall be according to the following schedule. The following manufacturer's model numbers have been used to establish function and quality. Other manufacturers where listed must be equal to manufacturer specified.

H. Where fixtures, faucets, etc. are specified as single source and no other manufacturer is listed, the contractor shall furnish the manufacturer specified.

I. Model numbers are representative only. Incomplete model numbers do not warrant deletion of specific features or requirements contained in the specification.

1. Water Closet Fixture "WC-1": American Standard 3351.128 “Afwall”, ADA compliant, low consumption 1.28 gallons per flush, white vitreous china, wall hung, elongated closet bowl, 1-1/2" top spud; Sloan Royal Model 111-1.28-ES-S sensor operated, 24 VAC powered, chrome plated flush valve with 1" angle screwdriver stop, vacuum breaker, and flush connection; Church No. 2155SSC, white open front elongated anti-microbial seat, less cover with self-sustaining external check hinge. Provide each fixture with floor support as manufactured by Wade, Zurn, Josam or J. R. Smith. Mounting height for water closet shall be 17" from floor to rim of bowl. Provide box mounted transformers as required by the numbers of valves. Other fixture manufacturers shall be Kohler, Eljer or Crane. Other seat manufacturer shall be Olsonite, Beneke, or Bemis.

2. Water Closet Fixture "WC-2": American Standard 3351.128 “Afwall”, low consumption 1.28 gallons per flush, white vitreous china, wall hung, elongated closet bowl, 1-1/2" top spud; Sloan Royal Model 111-1.28-ES-S sensor operated, 24 VAC powered, chrome plated flush valve with 1" angle screwdriver stop, vacuum breaker, and flush connection; Church No. 2155SSC, white open front elongated anti-microbial seat, less cover with self-sustaining external check hinge. Provide each fixture with floor support as manufactured by Wade, Zurn, Josam or J. R. Smith. Mounting height for water closet shall be 15" from floor to rim of bowl. Provide box mounted transformers as required by the numbers of valves. Other fixture manufacturers shall be Kohler, Eljer or Crane. Other seat manufacturer shall be Olsonite, Beneke, or Bemis.

3. Lavatory Fixture "L-1: American Standard Model 0476.028 “Aqualyn”, 20" x 17", ADA compliant, white vitreous china, self-rimming, countertop lavatory, 4" faucet centers; Sloan Model ETF-600-BDT sensor operated, 24 vac powered chrome plated faucet with 0.5 gpm vandal resistant aerator, vandal proof screws, and thermostatic mixing valve mounted below lavatory on wall; Provide McGuire 155WC offset tailpiece; McGuire 8902 17 gauge chrome plated cast brass "P" trap; and McGuire H2165 LK chrome plated supplies with loose key stops. Install P-trap parallel and close to wall for knee clearance below lavatory; Provide supplies, drain, and trap with insulation kit as manufactured by TrueBro, Inc. Provide 120vac/24vac box mounted transformers for number of fixtures provided. Other fixture manufacturers shall be Crane, Eljer, or Kohler. Mounting height to be 34" from floor to top of lavatory apron. Front of lavatory shall be 2” from front of 24” wide countertop.

4. Urinal Fixture "UR-1": American Standard 6550.005 “Allbrook”, low water consumption (0.5 gal. per flush) white vitreous china, wall hung, ADA compliant, siphon jet urinal, 3/4" top spud, and 2" outlet connection. Sloan Royal Model 186-0.5-ES-S sensor operated, 24 VAC power chrome plated flush valve, with vacuum breaker; 3/4” screwdriver angle stop, and flush connection. Provide fixture support carrier as manufactured by Wade, Zurn, Josam or J. R. Smith. Other fixture manufacturers shall be Kohler, Eljer or Crane. Mounting height shall be 17" from floor to rim. Provide remote box mounted 120vac/24vac transformers for number of fixtures provided.

5. Mop Service Basin Fixture "MB-1": Stern-Williams Model HL-1900-BP, 32" x 32" x 12" precast terrazzo mop service basin with drain body cast integral and stainless steel cap. Chicago Faucet No.897-CP polished chrome plated supply fitting with rigid spout, vacuum breaker, wall brace. Provide Williams #BP 12" high stainless steel back panel for three sides and #T-35 hose with wall hook. Other basin manufacturer Fiat or Acorn.

6. Countertop Sink Fixture “SK-1”: Elkay LR-2521 “Lustertone” 25” x 21-1/4” countertop, single compartment sink with 7-1/2” deep bowl, 18 gauge stainless steel, type 302, self rim; Elkay LK-99 deluxe strainer; McGuire B8912 17 ga chrome plated cast brass 1-1/2” “P” trap; McGuire H2165CCLK chrome plated supplies with loose key stops; Chicago Faucet No. 201-AHA8-317CP concealed sink faucet, 8” centers, with 8” high arch swing spout, E3-2.2 gpm aerator, 4” wristblade handles. Other sink manufacturer: Just.

7. Countertop Sink Fixture “SK-2”: Elkay LRAD1716 “Lustertone” 17” x 16” countertop, single compartment sink with 5” deep bowl, 18 gauge stainless steel, type 302, self rim; Elkay LK-99 deluxe strainer; McGuire B8912 17 ga chrome plated cast brass 1-1/2” “P” trap; McGuire H2165CCLK chrome plated supplies with loose key stops; Chicago Faucet No. 895-317RGD1CP sink faucet, 4” centers, with 3-1/2” rigid gooseneck spout, E3-2.2 gpm aerator, 4” wristblade handles. Other sink manufacturer: Just.

PART 3 - EXECUTION

3.1 PLUMBING FIXTURES AND TRIM

A. All fixtures shall be set firm and true, connected to all piping services ready for use. Fixtures shall be installed per manufacturer’s recommendations. Caulk opening between wall and plumbing fixtures with mildew-resistant, white acrylic-emulsion sealant.

3.2 AAFES FURNISHED EQUIPMENT

A. Provide rough-ins and final connections to all AAFES furnished equipment including shut off valves, piping, traps, etc. necessary to connect up equipment after it has be installed in place.

B. Install all faucets, sinks drains, tailpieces, overflows, traps, etc. furnished loose with all AAFES furnished equipment.

C. All exposed piping readily visible for AAFES furnished equipment shall be chrome plated red brass pipe and fittings. Braces for support of exposed piping shall be chrome plated.

D. Pending installation of AAFES furnished equipment, all service lines shall be suitably capped, plugged and protected. All water lines shall be valved.

E. Furnish vacuum breakers, pressure regulators solenoid valves, traps, piping, etc. as required for installation of equipment.

END OF SECTION

SECTION 15488 - FUEL GAS PIPING

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 fuel gas piping, specialties, and accessories within the building.

B. Related Sections include the following:
1. Division 15 Section “Meters and Gages” for pressure gages.

1.3 PROJECT CONDITIONS

A. Gas System Pressure: One pressure ranges 0.5 psig or less.

B. Design values of fuel gas supplied for these systems are as follows:
1. Nominal Heating Value: 1000 Btu/cu. ft.
2. Nominal Specific Gravity: 0.6.

1.4 SUBMITTALS

A. Product Data: For the following:
1. Corrugated, stainless-steel tubing systems. Include associated components.
2. Specialty valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.

B. Shop Drawings: For fuel gas piping. Include plans and attachments to other Work.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

D. Maintenance data: For gas specialties and accessories to include in maintenance manuals as specified in Division 1.

1.5 QUALITY ASSURANCE

A. Electrical Components and Devices: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ANSI Standard: Comply with ANSI Z223.1, “National Fuel Gas Code.”

C. IAS Standard: Provide components listed in IAS’s “Directory of A. G. A, and C. G. A. Certified Appliances and Accessories” if specified to be IAS listed.

D. UL Standard: Provide components listed in UL’s “Gas and Oil Equipment Directory” if specified to be UL listed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and legally dispose of liquids from drips in existing gas piping. Handle cautiously to avoid spillage and ignition. Notify the fuel gas supplier. Handle flammable liquids used by the Installer with proper precautions, and do not leave on the premises from end of one day to beginning of next day.

1.7 COORDINATION

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect’s written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Appliance Connector Valves:
a. American Valve.
b. B & K Industries, Inc.
c. Brass Craft Manufacturing Co.
d. Cimberio Valves, S.p.A.
e. Conbraco Industries, Inc.; Apollo Div.
f. E.M. Plastic and Electric Products, Ltd.; Neo Valve Div.
g. Frey; John M. Frey Co.
h. Jomar International, Ltd.
i. Key Gas Components, Inc.
j. Legend Valve and Fitting, Inc.
k. McDonald: A.Y. McDonald Mfg. Co.
l. Mueller Co.; Mueller Gas Products Div.
m. Newman Hattersley, Ltd; Specialty Valve Div.
n. Robert Manufacturing Co.
o. State Metals, Inc.
p. Watts Industries, Inc.; Water Products Div.
2. Gas Valves, NPS 2 and Smaller:
a. BMI Canada, Inc.
b. Crane Valves.
c. Dungs: Karl Dungs, Inc.
d. Flow Control Equipment, Inc.
e. Grinnell Corp.
f. Honeywell, Inc.
g. Jomar International, Ltd.
h. Kitz corp. of American
i. Legend Valve and Fitting, Inc.
j. Lyall: R. W. Lall & Co., Inc.
k. McDonald: A. Y. McDonald Mfg. Co.
l. Milwaukee Valve Co., Inc.
m. Mueller Co.; Mueller Gas Products Div.
n. Nibco, Inc.
o. Red-White Valve Corp.
p. Velan Valve Corp.
q. Watts Industries, Inc.; Water Products Div.

2.2 PIPES MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 CORRUGATED, STAINLESS-STEEL TUBING SYSTEMS

A. Description: Comply with AGA LC 1 and include the following:
1. Tubing: Corrugated stainless steel with plastic jacket or coating.
2. Fittings: Copper alloy with ends made to fit corrugated tubing. Include ends with threads according to ASME B1.20.1 if connection to threaded pipe or fittings is required.
3. Striker Plates: Steel, designed to protect tubing from penetrations.
4. Manifolds: Malleable iron or steel with protective coating. Include threaded connections according to ASME B1.20.1 for pipe inlet and corrugated tubing outlets.

2.4 PIPES, TUBES, FITTINGS, AND JOINING MATERIALS

A. Steel Pipe: ASTM A 53; Type E or S; Grade B; Schedule 40; black.
1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.
2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.
3. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
4. Steel Welding Fittings: ASME B16.9, wrought steel or ASME B16.11, forged steel.

5. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.
6. Joint Compound and Tape: Suitable for natural gas.
7. Steel Flanges and Flanged Fittings: ASME B16.5.
8. Gasket Material: Thickness, material, and type suitable for natural gas.

B. Common Joining Materials: Refer to Division 15 Section "Basic Mechanical Materials and Methods" for other joining materials.

2.5 PROTECTIVE COATING

A. Furnish pipe and fittings with factory-applied, corrosion-resistant polyethylene coating for use in corrosive atmosphere.

2.6 PIPING SPECIALTIES

A. Flexible Connectors: ANSI Z21.24 copper alloy.

B. Quick-Disconnect Devices: ANZI Z21.41, convenience outlets and matching plug connector.

2.7 SPECIALTY VALVES

A. Valves, NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

B. Appliance Connector Valves: ANSI Z21.15 and IAS listed.

C. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless steel disc and fluorocabron elastomer seal and lever handle; 2-psig minimum pressure rating.

D. Gas Valves, NPS 2 and Smaller: ASME B16.33 and IAS-listed bronze body and 125-psig pressure rating.
1. Tamperproof Feature: Include design for locking.

2.8 CONCRETE BASES

A. Description: Precast, reinforced concrete base, made of 3000-psi minimum, 28 day compressive strength concrete, and measuring 4 inches thick and 4 inches larger in each dimension than supported item, unless otherwise indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Close equipment shutoff valves before turning off fuel gas to the premises or section of piping. Perform leakage test as specified in "Field Quality Control" Article to determine that all equipment is turned off in the piping section to be affected piping section.

B. Comply with ANSI Z223.1, "Prevention of Accidental Ignition" paragraph.

3.2 SERVICE ENTRANCE PIPING

A. Extend fuel gas piping and connect to fuel gas distribution for service entrance to building.
1. Exterior fuel gas distribution system piping, service pressure regulator, and service meter will be provided by gas utility.

B. Install dielectric fitting downstream from and adjacent to each service meter unless meter is supported from service meter bar with integral dielectric fitting. Install shutoff valve downstream from and adjacent to dielectric fitting. Refer to Division 15 Section “Basic Mechanical Materials and Methods” for dielectric fittings.

3.3 CONCRETE BASE INSTALLATION

A. Locate bases at service meters and service regulators.

B. Excavate earth and make level beds to support bases. Set bases level with top surface projecting approximately 3 inches above grade.

3.4 PIPING APPLICATIONS

A. General: Flanges, unions, transition and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.

B. Fuel Gas Piping 10 psig or Less: Use the following:
   1. NPS 2 and Smaller: Steel pipe, malleable iron, threaded fittings, and threaded joints.

C. Below grade gas piping shall be steel pipe with factory applied polyethylene wrap, steel welding fittings and welded joints with field applied polyethylene wrap.

3.5 VALVE APPLICATIONS

A. Appliance Shutoff Valves for Pressure 0.5 or Less: Gas stop or gas valve.

B. Piping Line Valves, NPS 2 and Smaller: Gas valve.

3.6 PIPE INSTALLATIONS

A. Refer to Division 15 "Basic Mechanical Materials and Methods" for basic piping installation instructions.

B. Concealed Locations: Except as specified below, install concealed gas piping in an air-tight conduit constructed of Schedule 40 seamless black steel with welded joints. Vent conduit to the outside and terminate with a screened vent cap.
   1. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such space are used as plenums. Do not locate valves above ceilings.
   2. In Floors: Gas piping with welded joints and protective wrapping specified in "Protective Coating" Article in Part 2 may be installed in floors, subject to approval of authorities having jurisdiction. Surround piping cast in concrete slabs with a minimum of 1-1/2 inches of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
   3. In Floor Trench: Gas piping may be installed in floor trench, subject to approval of authorities having jurisdiction. Channels must have cover and be open to space above cover for ventilation.
   4. In Partitions: Do not install concealed piping in solid partitions. Protect tubing from physical damage when installed inside partitions or hollow walls.
      a. Exception: Tubing passing through partitions or walls.
   5. In Walls: Gas piping with welded joints and protective wrapping specified in "Protective Coating" Article in Part 2 may be installed in masonry walls, subject to approval of authorities having jurisdiction.
   6. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
      a. Exception: Accessible above ceiling space specified above.

C. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.
   1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum length nipple of 3 pipe diameters, but not less than 3 inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.

D. Install fuel gas piping at a uniform grade of 0.1 percent slope upward toward risers.

E. Use eccentric reducer fittings, to make reductions in pipe sizes. Install fittings with the level side down.

F. Connect branch piping from top or side of horizontal piping.

G. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

H. Install flanges on valves, specialties, and equipment having NPA 2-1/2 and larger connections.

I. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned down, reducing elbow fittings with corrosion resistant insect screens in large end.

3.7 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Use materials suitable for fuel gas.

3.8 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Supports and Anchors" for hanger and support devices.

B. Install hangers for horizontal steel piping with following maximum spacing and minimum rod sizes:
1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.

3.9 CONNECTIONS

A. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.

B. Install piping adjacent to appliances to allow service and maintenance.

C. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.

D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.

E. Ground equipment:
1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
2. Do not use gas pipe as grounding electrode.

3.10 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each service meter, pressure regulator, and specialty valve.
1. Text: In addition to name of identified unit, distinguish between multiple units, inform operator of operational operations, indicate safety and emergency precautions, and warn of hazards and improper operations.
2. Refer to Division 15 Section "Mechanical Identification" for nameplates and signs.

3.11 PAINTING

A. Use materials and procedures in Division 9 Section Painting, Exterior Pain Schedule Article, Ferrous Metal Paragraph, Full-Gloss, Alkyd-Enamel Finish Subparagraph.

B. Paint exterior service meters, pressure regulators, and specialty valves.
1. Color: Gray.

3.12 FIELD QUALITY CONTROL

A. Inspect, test, and purge piping according to ANSI Z223.1, Part 4 "Inspection, Testing, and Purging" and requirements of authorities having jurisdiction.

B. Repair leaks and defects with new materials, and retest system until satisfactory results are obtained.

C. Report test results promptly and in writing to the Architect and the authority having jurisdiction.

D. Verify capacities, and pressure ratings of service meters, pressure regulators, valves, and specialties.

E. Verify correct pressure settings for pressure regulators.

F. Verify that specified piping tests are complete.

3.13 ADJUSTING

A. Adjust controls and safety devices. Replace damaged and malfunctioning controls and safety devices.

END OF SECTION

SECTION 15530 - REFRIGERANT PIPING

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 refrigerant piping used for ice machines including pipes, tubing, fittings, and specialties; special-duty valves, and refrigerants.

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 7 for roof curbs, piping supports, and roof penetration boots.
2. Division 7 for materials and methods for sealing pipe penetrations through fire/smoke barriers.
3. Division 15 Section "Mechanical Identification" for labeling and identifying refrigerant piping.
4. Division 15 Section "Mechanical Insulation" for pipe insulation.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each valve type and refrigerant piping specialty specified.

C. Shop Drawings showing layout of refrigerant piping, specialties, and fittings, including pipe and tube sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and equipment.
1. Refrigerant piping indicated is schematic only. Size and design the layout and installation of the piping, including oil traps, double risers, specialties, and pipe and tube sizes, to ensure proper operation and conformance with warranties of connected equipment.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience.

E. Maintenance data for refrigerant valves and piping specialties to include in the operation and maintenance manual specified in Division 1 Sections and Division 15 Section "Basic Mechanical Requirements."

F. Technicians certificate of compliance with Federal Register 40 CFR, Part 82, Subpart f.

G. LEED Submittal:
1. Credit MR 4.1 and 4.2: Product data and certification letter indicating percentage by weight of post-consumer and pre-consumer recycled content and costs for each product having recycled content.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Qualify brazing and welding processes and operators according to ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications."

B. Regulatory Requirements: Comply with provisions of the following codes:
1. ASME B31.5, "Refrigeration Piping."
2. ASHRAE 15, "Safety Code for Mechanical Refrigeration."

C. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical"; or UL 429, "Electrically Operated Valves."

D. Listing and Labeling: Provide products specified in this Section that are UL listed and labeled.

1.5 SEQUENCING AND SCHEDULING

A. Coordinate the installation of roof curbs, equipment supports, and roof penetrations. Roof specialties are specified in Division 7 Sections.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for

storage, and are identified with labels describing contents.
1. Refrigeration Oil Test Kits: 2 each, containing everything required to conduct 1 test.
2. Refrigerant: 2 containers each, with 20 lb (9 kg) of refrigerant.
3. Filter-Dryer Cartridges: 3 of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Refrigerants:
   a. Allied Signal Inc.; Genetron Refrigerants.
   b. DuPont Company; Fluorochemicals Div.
   c. Elf Atochem North America, Inc.
   d. ICI Americas Inc.; Fluorochemicals Bus.
2. Refrigerant Valves and Specialties:
   a. Danfoss Electronics, Inc.
   b. Eaton Corporation; Industrial Control Div.
   c. Emerson Electric Company; Alco Controls Div.
   d. Henry Valve Company.
   e. Parker-Hannifin Corp.; Refrigeration & Air Conditioning Division.
   f. Sporlan Valve Company.

2.2 PIPES AND TUBES

A. Hard Copper Tube: ASTM B 280, Type ACR, drawn temper.

B. Soft Copper Tube: ASTM B 280, Type ACR, annealed temper.

2.3 PIPE AND TUBE FITTINGS

A. Copper Fittings: ASME B16.22, wrought-copper streamlined pattern.

2.4 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (Silver).

2.5 VALVES

A. Diaphragm Packless Valves: 500-psig working pressure and 275 deg F working temperature, globe or angle pattern, forged-brass or bronze body and bonnet, phosphor bronze and stainless-steel diaphragms, rising stem and handwheel, stainless-steel spring, nylon seat disc, with solder-end connections.

B. Packed-Angle Valves: 500-psig working pressure and 275 deg F working temperature, forged-brass or bronze body, forged-brass seal caps with copper gasket, back seating, rising stem and seat, molded stem packing, with solder-end connections.

C. Service Valves: 500-psig pressure rating, forged-brass body with copper stubs, brass caps, removable valve core, integral ball check valve, with solder-end connections.

D. Solenoid Valves: Conform to ARI 760; 250 deg F temperature rating, 400-psig working pressure; forged brass, with PTFE valve seat, 2-way straight-through pattern, and solder-end connections; manual operator; with NEMA 250, Type 1 solenoid enclosure with 1/2-inch conduit adapter, and 24-V normally closed holding coil.

E. Pressure Relief Valves: Straight or angle brass body and disc, neoprene seat, factory sealed and ASME labeled, for standard pressure setting.

F. Thermal Expansion Valves: Conform to ARI 750; thermostatic-adjustable, modulating type; size as required and factory set for superheat requirements; solder-end connections; with sensing bulb, distributor having side connection for hot-gas bypass line, and external equalizer line.

2.6 REFRIGERANT PIPING SPECIALTIES

A. Moisture/Liquid Indicators: 500-psig operating pressure, 200 deg F operating temperature; forged-brass body, with replaceable, polished, optical viewing window with color-coded moisture indicator, and solder-end connections.

B. Replaceable-Core Filter-Dryers: 500-psig operating pressure; steel shell, flange ring, and spring, ductile-iron cover plate with steel cap screws, and wrought-copper fittings for solder-end connections; with replaceable-core kit, including gaskets, as follows:
   1. Filter-Dryer Cartridge: Pleated media with solid-core sieve with activated alumina, ARI 730 rated for capacity.
   2. Wax Removal Cartridge: Molded, bonded core of activated charcoal and desiccant with integral gaskets.

2.7 REFRIGERANT

A. As required by AAFES furnished equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for compliance with requirements for installation tolerances and other conditions affecting performance of refrigerant piping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Aboveground, within Building: Type ACR drawn-copper tubing.

3.3 INSTALLATION

A. Install refrigerant piping according to ASHRAE 15.

B. Basic piping installation requirements are specified in Division 15 Section "Basic Mechanical Materials and Methods."

C. Install piping in short and direct arrangement, with minimum number of joints, elbows, and fittings.

D. Arrange piping to allow normal inspection and service of compressor and other equipment. Install valves and specialties in accessible locations to allow for service and inspection.

E. Install piping with adequate clearance between pipe and adjacent walls and hangers, or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.

F. Install the following in compliance with manufacturer's instructions.
   1. Ice machine and condenser.
   2. Reach-in freezer and condensing unit.

G. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.

H. Slope refrigerant piping as follows:
   1. Install horizontal hot-gas discharge piping with a uniform slope of 0.4 percent downward away from compressor.
   3. Install horizontal suction lines with a uniform slope of 0.4 percent downward to compressor.
   4. Install traps and double risers where indicated and where required to entrain oil in vertical runs.
   5. Liquid lines may be installed level.

I. Use fittings for changes in direction and branch connections.

J. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

K. Reduce pipe sizes using eccentric reducer fittings installed with level side down.

L. Provide bypass around moisture-liquid indicators in lines larger than 2-inch.

M. Install unions to allow removal of solenoid valves, pressure-regulating valves, expansion valves, and at connections to compressors and evaporators.

N. Install replaceable-core filter-dryers, with isolation valves and valved bypass in lines larger than 2 inch.

O. When brazing, remove solenoid-valve coils; remove sight glasses; and remove stems, seats, and packing of valves, and accessible internal parts of refrigerant specialties. Do not apply heat near bulb of expansion valve.

P. Provide electrical wiring for solenoid valves. Coordinate electrical requirements and connections.

Q. Charge and purge systems, after testing, and dispose of refrigerant following ASHRAE 15 procedures.

3.4 HANGERS AND SUPPORTS

A. General: Hangers, supports, and anchors are specified in Division 15 Section "Hangers and Supports." Provide according to ASME B31.5 and MSS SP-69.

B. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet in length. Clevis shall be copper plated, or otherwise dielectrically isolated from piping.

C. Spring hangers to support vertical runs.

D. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes. Tube sizes are nominal or standard tube sizes as expressed in ASTM B 88 (ASTM B 88M).
1. 1/2 Inch: Maximum span, 60 inches; minimum rod size, 1/4 inch.
2. 5/8 Inch: Maximum span, 60 inches; minimum rod size, 1/4 inch.
3. 1 Inch: Maximum span, 60 inches; minimum rod size, 1/4 inch.
4. 1-1/4 Inches: Maximum span, 72 inches; minimum rod size, 1/4 inch.
6. 1-1/2 Inches: Maximum span, 96 inches; minimum rod size, 3/8 inch.
7. 2 Inches: Maximum span, 96 inches; minimum rod size, 3/8 inch.
8. 2-1/2 Inches: Maximum span, 108 inches; minimum rod size, 3/8 inch.
9. 3 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
10. 4 Inches: Maximum span, 12 feet; minimum rod size, 1/2 inch.

E. Support vertical runs at each floor.

3.5 PIPE JOINT CONSTRUCTION

A. Basic pipe and tube joint construction is specified in Division 15 Section "Basic Mechanical Materials and Methods."

B. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide) during brazing to prevent formation of scale.

3.6 VALVE INSTALLATIONS

A. Install refrigerant valves according to manufacturer's written instructions.

B. Mount thermostatic expansion valves in any position, close to evaporator.
1. Where refrigerant distributors are used, mount directly on expansion-valve outlet.
2. Install valve so diaphragm case is warmer than bulb.
3. Secure bulb to clean, straight, horizontal section of suction line using 2 bulb straps. Do not mount bulb in a trap or at the bottom of the line.
4. Where external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

3.7 SPECIALTIES APPLICATION AND INSTALLATION

A. Install moisture-liquid indicators in liquid lines between filter-dryers and thermostatic expansion valves.

B. Install replaceable-core filter-dryers in vertical liquid line adjacent to receivers and before each solenoid valve.

C. Install solenoid valves in liquid line of systems operating with single pump-out or pump-down compressor control, in liquid line of single or multiple evaporator systems, and in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into suction line when system shuts down.

3.8 CONNECTIONS

A. Electrical: Conform to applicable requirements of Division 16 Sections for electrical connections.

3.9 FIELD QUALITY CONTROL

A. Inspect and test refrigerant piping according to ASME B31.5, Chapter VI.
1. Pressure test with nitrogen to 200 psig. Perform final tests at 27-psig vacuum and 200 psig using halide torch or electronic leak detector. Test to no leakage.

B. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

C. Repair leaks using new materials; retest.

D. Technicians to be certified in compliance with Federal Register 40 CFR, part 82, Subpart f.

3.10 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.

3.11 COMMISSIONING

A. Charge system using the following procedures:
   1. Install core in filter dryer after leak test, but before evacuation.
   2. Evacuate refrigerant system with vacuum pump until temperature of 35 degrees F is indicated on vacuum dehydration indicator.
   3. During evacuation, apply heat to pockets, elbows, and low spots in piping.
   4. Maintain vacuum on system for minimum of 5 hours after closing valve between vacuum pump and system.
   5. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
   6. Complete charging of system, using new filter-dryer core in charging line. Provide full-operating charge.

END OF SECTION

SECTION 15782 - ROOFTOP UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes rooftop heating and cooling units and associated curbs and supports.

1.2 SUBMITTALS

A. Product Data: Include manufacturer's technical data for each model indicated, including rated capacities of selected model clearly indicated; dimensions; required clearances; shipping, installed, and operating weights; furnished specialties; accessories; and installation and startup instructions.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
   1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

C. Commissioning Reports: Indicate results of startup and testing commissioning requirements. Submit copies of checklists.

D. Maintenance Data: For equipment to include in the maintenance manuals specified in Division 1.

E. Warranties: Special warranties specified in this Section.

F. LEED Submittal:
   1. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
   2. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1-2004, Section 5 – “Systems and Equipment.”

1.3 QUALITY ASSURANCE

A. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

B. Energy Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

C. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.
   1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
   2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

D. Comply with AGA Z223.1 for gas-fired furnace section.

E. Comply with NFPA 70.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver rooftop units as factory-assembled units.

B. Handle rooftop units to comply with manufacturer's written rigging and installation instructions for unloading and moving to final location.

1.5 COORDINATION

A. Coordinate installation of roof curbs, equipment supports, and roof penetrations with roof construction. Roof specialties are specified in Division 7 Sections.

1.6 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: A written warranty, executed by the manufacturer and signed by the Contractor, agreeing to

replace components that fail in materials or workmanship, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed.

1. Warranty Period, Compressors: Manufacturers standard, but not less than 5 years after date of Substantial Completion.
2. Warranty Period, Heat Exchangers: Manufacturers standard, but not less than 10 years after date of Substantial Completion.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Fan Belts: One set for each belt-drive fan.

1.8 SERVICING

A. Contractor provide following service for one year from date of final acceptance of rooftop units and control system:
   1. Monthly:
      a. Check for noise, damper positions, fan belts, and physical appearance of units.
      b. Check thermostat setpoints.
   2. Quarterly:
      a. Check refrigerant charge and pressures.
      b. Check for refrigerant leaks.
      c. Check pressure switches.
      d. Check compressor contactor wiring.
      e. Check voltage and amperage of all motors.
      f. Check and adjust fan belt tension.
      g. Check fan controls.
      h. Change air filters.
   3. Bi-Annually:
      a. Check condensate pan and drain.
      b. Lubricate motors and fan bearings.
   4. Annually:
      a. Check burners, ignition, gas valve, safety switches, etc.
      b. Check gas connections.
      c. Check economizer operation.
      d. Sample and test compressor oil.
      e. Pressure wash condenser coils.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Rooftop Units, 2 - 5 Tons:
      a. Trane.
      b. Aaon.
      c. Lennox.
      d. American Standard.

2.2 ROOFTOP UNITS

A. Description: Factory assembled and tested; designed for roof or slab installation; and consisting of compressors, condensers, evaporator coils, condenser and evaporator fans, refrigeration and temperature controls, filters, and dampers.

B. Casing: Factory assembled with corrosion-protection coating and exterior finish, access panels with neoprene gaskets for inspection and access to internal parts, minimum 1/2-inch thick thermal insulation, knockouts for electrical and piping connections, exterior condensate drain connection, and lifting lugs.

C. Evaporator Fans: Forward curved, centrifugal, belt driven with adjustable sheaves and with permanently lubricated motor bearings.

D. Condenser Fans: Propeller type, directly driven with permanently lubricated motor bearings.

E. Refrigerant Coils: Aluminum-plate fin and seamless copper tube in galvanized steel casing with equalizing-type vertical distributor.

F. Compressors: Serviceable, semihermetic, or fully hermetic compressors with integral vibration isolators and crankcase heaters.
   1. Safety Controls: Manual-reset type for low pressure, high pressure, and compressor motor overload protection.
   2. Timed-Off Control: Automatic-reset control shuts compressor off until 5 minutes after last shutdown.

G. Heat Exchangers: Manufacturer's standard construction for gas-fired heat exchangers and burners with the following controls:
   1. Redundant, dual gas valves (2-stage heating).
   2. Intermittent pilot ignition.
   3. Electronic-spark ignition system.
   4. High-limit cutout.
   5. Forced-draft proving switch.

H. Air Filters: See Section 15861.

I. Economizer Control: Return, barometric relief, and outside-air dampers, outside-air filter, fully modulating electronic-control system with return and outside air thermostats and automatic changeover.

J. Operating Controls: Provide integral electronic control system for standard thermostat operation. Input to thermostat terminals by programmable setback thermostat.

2.3 ROOF CURBS

A. Insulated with slope to match roof corrosion-protection coating, gasketing, factory-installed wood nailer, according to NRCA standards.
   1. Curb Height: Minimum 14 inches.

2.4 MOTORS

A. Refer to Division 15 Section "Motors" for general requirements for factory-installed motors.

B. Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B, premium efficiency when available.

C. Enclosure Type: Open, drip-proof for supply fan; totally enclosed for condenser fans.

2.5 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate capacity according to ARI 360, "Commercial and Industrial Unitary Air Conditioning Equipment."

2.6 TEMPERATURE CONTROL

A. Thermostats: Programmable thermostat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roof for compliance with requirements for conditions affecting installation and performance of rooftop units. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install units according to manufacturer's written instructions.

B. Install units level and plumb, maintaining manufacturer's recommended clearances.

C. Curb Support: Install roof curb on roof structure, level, according to NRCA's written installation instructions. Install and secure rooftop units on curbs and coordinate roof penetrations and flashing with roof construction. Provide miscellaneous framing required for curb.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate the general

arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping to allow service and maintenance.
2. Gas Piping: Conform to applicable requirements of Division 15 Section "Natural Gas Piping." Connect gas piping to burner, full size of gas train inlet, and provide union with sufficient clearance for burner removal and service.

B. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:

1. Install ducts to termination in roof mounting frames. Where indicated, terminate return-air duct through roof structure and insulate space between roof and bottom of unit. Provide burglar bars at each duct penetration, 1/2" bars in 6" x 12@ grid

C. Electrical: Conform to applicable requirements in Division 16 Sections.

D. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 COMMISSIONING

A. Verify that installation is as indicated and specified.

B. Complete manufacturer's installation and startup checks and perform the following:

1. Level unit and flash curbs to unit and to roof.
2. Inspect for visible damage to unit casing.
3. Inspect for visible damage to furnace combustion chamber.
4. Inspect for visible damage to compressor, air-cooled condenser coil, and fans.
5. Verify that clearances have been provided for servicing.
6. Check that labels are clearly visible.
7. Clean furnace flue and condenser and inspect for construction debris.
8. Verify that controls are connected and operable.
9. Remove shipping bolts, blocks, and tie-down straps.
10. Verify that filters are installed.
11. Adjust vibration isolators.
12. Connect and purge gas line.
13. Check that burner and controls are suitable to operate at temperatures as low as minus 40 degrees F.
14. Check acoustic insulation.
15. Check operation of barometric dampers.

C. Lubricate bearings on fan.

D. Check fan-wheel rotation for correct direction without vibration and binding.

E. Adjust fan belts to proper alignment and tension.

F. Start unit according to manufacturer's written instructions.

1. Perform starting of refrigeration in summer only.
2. Complete startup sheets and attach copy with Contractor's startup report.

G. Check and record performance of interlocks and protection devices; verify sequences.

H. Operate unit for an initial period as recommended or required by manufacturer.

I. Perform the following operations for both minimum and maximum firing, and adjust burner for peak efficiency. Adjust pilot to stable flame.

1. Measure gas pressure on manifold.
2. Measure combustion-air temperature at inlet to combustion chamber.
3. Measure flue-gas temperature at furnace discharge.
4. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
5. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
6. Check for backdraft under full operation.

J. Adjust and check high-temperature limits.

K. Check internal isolators.

L. Check outside-air damper for proper stroke and interlock with return-air dampers.

M. Check controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.

N. Start refrigeration and measure and record the following:
   1. Coil leaving-air, dry- and wet-bulb temperatures.
   2. Coil entering-air, dry- and wet-bulb temperatures.
   3. Outside-air, dry-bulb temperature.
   4. Air-cooled-condenser, discharge-air, dry-bulb temperature.

O. Check all motors and measure and record all motor amperages, and voltages. Include data in startup reports.

P. After starting and performance testing, change filters, vacuum heat exchanger and cooling and condenser coils, lubricate bearings, adjust belt tension, and check operation of power vents.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train designated maintenance personnel as specified below:
   1. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
   2. Review data in the maintenance manuals. Refer to Division 1 Section "Contract Closeout."
   3. Review data in the maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
   4. Schedule training with Owner, through Architect, with at least 7 days' advance notice.

END OF SECTION

SECTION 15815 - METAL DUCTS

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 rectangular and round metal ducts and plenums for heating, ventilating, and air-conditioning systems in pressure classes from minus 2- to plus 10-inch wg.

B. Related Sections include the following:
1. Division 7 Section "Joint Sealants" for fire-resistant sealants for use around duct penetrations and fire-damper installations in fire-rated floors, partitions, and walls.
2. Division 15 Section "Mechanical Insulation" for duct insulation.
3. Division 15 Section "Duct Accessories" for dampers, sound-control devices, duct-mounted access doors and panels, turning vanes, and flexible ducts.
4. Division 15 Section "Diffusers, Registers, and Grilles."
5. Division 15 Section "Testing, Adjusting, and Balancing" for air balancing and final adjusting of manual-volume dampers.

1.3 DEFINITIONS

A. Thermal Conductivity and Apparent Thermal Conductivity (k-Value): As defined in ASTM C 168. In this Section, these values are the result of the formula Btu x in./h x sq. ft. x degree F or W/m x K at the temperature differences specified. Values are expressed as Btu or W.
1. Example: Apparent Thermal Conductivity (k-Value): 0.26 or 0.037.

1.4 SYSTEM DESCRIPTION

A. Duct system design, as indicated, has been used to select and size air-moving and -distribution equipment and other components of air system. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.5 SUBMITTALS

A. Product Data: For duct and sealing materials.

B. Shop Drawings: Show details of the following:
1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Duct layout indicating pressure classifications and sizes on plans.
3. Fittings.
4. Reinforcement and spacing.
5. Seam and joint construction.
6. Penetrations through fire-rated and other partitions.
7. Hangers and supports, including methods for building attachment, vibration isolation, seismic restraints, and duct attachment.

C. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
1. Ceiling suspension assembly members.
2. Other systems installed in same space as ducts.
3. Ceiling- and wall-mounted access doors and panels required to provide access to dampers and other operating devices.
4. Coordination with ceiling-mounted items, including lighting fixtures, diffusers, grilles, speakers, sprinkler heads, access panels, and special moldings.

D. Welding Certificates: Copies of certificates indicating welding procedures and personnel comply with requirements in "Quality Assurance" Article.

E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

F. Record Drawings: Indicate actual routing, fitting details, reinforcement, support, and installed accessories and devices.

G. LEED Submittals:
   1. Product Data for Prerequisite EQ 1: Documentation indicating that duct systems comply with ASHRAE 62.1-2004, Section 5 – “Systems and Equipment.”
   2. Product Data for Prerequisite EA 2: Documentation indicating that duct systems comply with ASHRAE/IESNA 90.1-2004, Section 6.6.6 – “HVAC System Construction and Insulation.”
   3. Leakage Test Report for Prerequisite EA 2: Documentation of work performed for compliance with ASHRAE/IESNA 90.1-2004, section 6.4.4.2.2 – “Duct Leakage Tests.”
   4. Duct-Cleaning Test Report for Prerequisite EQ 1: Documentation of work performed for compliance with ASHRAE 62.1-2004, Section 7.2.4 – “Ventilation System Start-Up.”
   5. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.

1.6 QUALITY ASSURANCE

A. Welding Standards: Qualify welding procedures and welding personnel to perform welding processes for this Project according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports; AWS D1.2, "Structural Welding Code--Aluminum," for aluminum supporting members; and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," unless otherwise indicated.

C. Comply with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems," unless otherwise indicated.

D. Comply with NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," Chapter 3, "Duct System," for range hood ducts, unless otherwise indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver sealant and firestopping materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle sealant and firestopping materials according to manufacturer's written recommendations.

C. Deliver and store stainless-steel sheets with mill-applied adhesive protective paper maintained through fabrication and installation.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 (Z275) coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.

B. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 SEALANT MATERIALS

A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
   1. Joint and Seam Tape: 2 inches wide; glass-fiber fabric reinforced.
   2. Tape Sealing System: Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with tape to form a hard, durable, airtight seal.
   3. Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant, formulated with a minimum of 75 percent solids.
   4. Flanged Joint Mastics: One-part, acid-curing, silicone, elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

2.3 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for building materials.

B. Hanger Materials: Galvanized, sheet steel or round, threaded steel rod.
   1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rod or galvanized rods with threads painted after installation.
   2. Straps and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for sheet steel width and thickness and for steel rod diameters.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
   1. Supports for Galvanized-Steel Ducts: Galvanized steel shapes and plates.

2.4 RECTANGULAR DUCT FABRICATION

A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with galvanized, sheet steel, according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible." Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
   1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
   2. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.

B. Static-Pressure Classifications: Unless otherwise indicated, construct ducts to the following:
   1. Supply Ducts: 2-inch wg, positive pressure.
   2. Return Ducts: 2-inch wg, negative pressure.
   3. Exhaust Ducts: 2-inch wg, negative pressure.

C. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of unbraced panel area, unless ducts are lined.

2.5 ROUND DUCT FABRICATION

A. Round Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

PART 3 - EXECUTION

3.1 DUCT INSTALLATION, GENERAL

A. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts, fittings, and accessories.

B. Construct and install each duct system for the specific duct pressure classification indicated.

C. Install ducts with fewest possible joints.

D. Install fabricated fittings for changes in directions, changes in size and shape, and connections.

E. Install couplings tight to duct wall surface with a minimum of projections into duct.

F. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

I. Conceal ducts from view in finished spaces unless indicated otherwise. Do not encase horizontal runs in solid partitions, unless specifically indicated.

J. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

K. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same metal thickness as duct. Overlap opening on four sides by at least 1-1/2 inches (38 mm).

L. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire damper, sleeve, and firestopping sealant. Fire and smoke dampers are specified in Division 15 Section "Duct Accessories." Firestopping materials and installation methods are specified in Division 7 Section "Firestopping."

3.2 SEAM AND JOINT SEALING

A. General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Pressure Classification Less Than 2-Inch wg: Transverse joints.

C. Seal externally insulated ducts before insulation installation.

3.3 HANGING AND SUPPORTING

A. Install rigid round and rectangular metal duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

C. Support vertical ducts at a maximum interval of 16 feet (5 m) and at each floor.

D. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

3.4 CONNECTIONS

A. Connect equipment with flexible connectors according to Division 15 Section "Duct Accessories."

B. For branch, outlet and inlet, and terminal unit connections, comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

3.5 FIELD QUALITY CONTROL

A. Disassemble, reassemble, and seal segments of systems as required to accommodate leakage testing and as required for compliance with test requirements.

B. Conduct tests, in presence of Architect, at static pressures equal to maximum design pressure of system or section being tested. If pressure classifications are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.

C. Determine leakage from entire system or section of system by relating leakage to surface area of test section.

D. Maximum Allowable Leakage: Comply with requirements for Leakage Classification 3 for round and flat-oval ducts, Leakage Classification 12 for rectangular ducts in pressure classifications less than and equal to 2-inch wg (both positive and negative pressures), and Leakage Classification 6 for pressure classifications from 2- to 10-inch wg.

E. Remake leaking joints and retest until leakage is less than maximum allowable.

F. Leakage Test: Perform tests according to SMACNA's "HVAC Air Duct Leakage Test Manual."

3.6 ADJUSTING

A. Adjust volume-control dampers in ducts, outlets, and inlets to achieve design airflow.

B. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for detailed procedures.

3.7 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect the system. Vacuum ducts before final acceptance to remove dust and debris.

END OF SECTION

SECTION 15820 - DUCT ACCESSORIES

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. Manual-volume dampers.
2. Fire dampers.
3. Duct-mounted access doors and panels.
4. Flexible ducts.
5. Flexible connectors.
6. Duct accessory hardware.

1.3 SUBMITTALS

A. Product Data: For the following:
1. Manual-volume dampers.
2. Fire dampers.
3. Duct-mounted access doors and panels.
4. Flexible ducts.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loadings, required clearances, method of field assembly, components, location, and size of each field connection. Detail the following:
1. Special fittings and manual- and automatic-volume-damper installations.
2. Fire damper installations, including sleeves and duct-mounted access doors and panels.

B. Product Certificates: Submit certified test data on dynamic insertion loss; self-noise power levels; and airflow performance data, static-pressure loss, dimensions, and weights.

D. LEED Submittal:
1. Product Data For Prerequisite EQ1: Documentation that units comply with ASHRAE 562.1-2004, Section 5.

1.4 QUALITY ASSURANCE

A. NFPA Compliance: Comply with the following NFPA standards:
1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Galvanized, Sheet Steel: Lock-forming quality; ASTM A 653/A 653M, G90 (Z275) coating designation; mill-phosphatized finish for surfaces of ducts exposed to view.

B. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets, commercial quality, with oiled, exposed matte finish.

C. Aluminum Sheets: ASTM B 209 (ASTM B 209M), Alloy 3003, Temper H14, sheet form; with standard, one-side bright finish for ducts exposed to view and mill finish for concealed ducts.

D. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063, Temper T6.

E. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 MANUAL-VOLUME DAMPERS

A. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

B. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.

C. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.3 FIRE DAMPERS

A. General: Labeled to UL 555.

B. Fire Rating: One and one-half hours.

C. Frame: SMACNA Type B with blades out of airstream; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.

D. Mounting Sleeve: Factory- or field-installed galvanized, sheet steel.
1. Minimum Thickness: 0.052 inch or 0.138 inch thick as indicated, and length to suit application.
2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

E. Mounting Orientation: Vertical or horizontal as indicated.

F. Blades: Roll-formed, interlocking, 0.034-inch thick, galvanized, sheet steel. In place of interlocking blades, use full-length, 0.034-inch thick, galvanized steel blade connectors.

G. Horizontal Dampers: Include a blade lock and stainless-steel negator closure spring.

H. Fusible Link: Replaceable, 165 deg F rated.

2.4 TURNING VANES

A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Manufactured Turning Vanes: Fabricate of 1-1/2-inch wide, curved blades set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into side strips suitable for mounting in ducts.

2.5 DUCT-MOUNTED ACCESS DOORS AND PANELS

A. General: Fabricate doors and panels airtight and suitable for duct pressure class.

B. Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.

C. Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.

D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

E. Insulation: 1-inch thick, fibrous-glass board.

2.6 FLEXIBLE CONNECTORS

A. General: Flame-retarded or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

B. Standard Metal-Edged Connectors: Factory fabricated with a strip of fabric 3-1/2 inches wide attached to two strips of 2-3/4-inch wide, 0.028-inch thick, galvanized, sheet steel or 0.032-inch aluminum sheets. Select metal compatible with connected ducts.

C. Conventional, Indoor System Flexible Connector Fabric: Glass fabric double coated with polychloroprene.
1. Minimum Weight: 26 oz./sq. yd.
2. Tensile Strength: 480 lbf/inch in the warp, and 360 lbf/inch in the filling.

2.7 FLEXIBLE DUCTS

A. General: Comply with UL 181, Class 1.

B. Flexible Ducts, Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 1-1/2-inch thick, glass-fiber insulation around a continuous inner liner.
   1. Outer Jacket: Glass-reinforced, silver Mylar with a continuous hanging tab, integral fibrous-glass tape, and nylon hanging cord.
   2. Inner Liner: Polyethylene film.

C. Pressure Rating: 6-inch wg positive, 1/2-inch wg negative.

2.8 ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.

B. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 to 18 inches to suit duct size.

C. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and NAIMA's "Fibrous Glass Duct Construction Standards" for fibrous-glass ducts.

B. Install volume dampers in lined duct; avoid damage to and erosion of duct liner.

C. Provide test holes at fan inlet and outlet and elsewhere as indicated.

D. Install fire dampers according to manufacturer's UL-approved written instructions.
   1. Install fusible links in fire dampers.

E. Install duct access panels for access to both sides of duct coils. Install duct access panels downstream from volume dampers, fire dampers, turning vanes, and equipment.
   1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining accessories and terminal units.
   2. Install access panels on side of duct where adequate clearance is available.

F. Label access doors according to Division 15 Section "Mechanical Identification."

3.2 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Adjust fire dampers for proper action.

C. Final positioning of manual-volume dampers is specified in Division 15 Section "Testing, Adjusting, and Balancing."

END OF SECTION

SECTION 15851 - ENERGY RECOVERY VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions and other Division 1 Specification sections, apply to this section.

1.2 SUMMARY

A. Mechanical Contractor provide:
1. All materials, equipment, tools, labor, etc. required to complete the installation of the energy recovery ventilators as shown on the drawings and as specified.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of the Contract and Division 1.

B. Product data for selected models, including specialties, accessories; and the following:
1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound power ratings.
3. Motor ratings and electrical characteristics plus motor and fan accessories.
4. Materials gages and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.
6. Heat wheel performance data.

C. Shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, required clearances, components, and location and size of field connections.

D. Wiring diagrams that detail power, signal, and control wiring. Differentiate clearly between manufacturer installed wiring and field installed wiring.

E. Maintenance data for energy recovery ventilators, for inclusion in Operation and Maintenance Manual specified in Division 1.

1.4 QUALITY ASSURANCE

A. UL Compliance: Fans and components shall be UL listed and labeled.

B. Nationally Recognized Testing Laboratory and NEMA Compliance (NRTL): Fans and components shall be NRTL listed and labeled. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.

C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

D. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

1.5 DELIVERY, STORAGE AND HANDLING

A. Lift and support units with the manufacturer's designated lifting or supporting points.

B. Disassemble and reassemble units as required for movement into the final location following manufacturer's written instructions.

C. Deliver fan units as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include.

B. Centrifugal Energy Recovery Ventilators:
1. Venmar.
2. Greenheck.

3. Engineered Air.
4. Micrometl.
5. Spinnaker.

2.2 ENERGY RECOVERY VENTILATORS

A. Energy recovery ventilators shall include a light weight polymer enthalpy wheel with a permanently bonded silica gel desiccant coating. The wheel design shall consist of removable segments mounted in a stainless steel rotor and insure laminar flow.

B. Blowers shall be quiet running, forward curved type and enable independent balancing of exhaust and supply airflows by providing separate motors for exhaust and supply blowers with adjustable sheaves.

C. All internal electrical components shall be prewired for single point power connection. Disconnect and motor starter shall be supplied as standard components.

D. All blower wheels shall be statically and dynamically balanced. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Ground and polished steel fan shafts shall be mounted in permanently lubricated, sealed ball bearing pillow blocks. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speeds. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully machined cast type, keyed and securely attached to the wheel and motor shafts.

E. Units shall be U.L. listed and bear the U.L. label. Energy transfer ratings shall be in accordance with ASHRAE Standard 84. Ventilators shall bear the AMCA Certified Rating Seals for air performance.

2.3 MOTORS

A. Torque Characteristics: Sufficient to accelerate the driven loads satisfactorily.

B. Motor Sizes: Minimum sizes and electrical characteristics as indicated. If not indicated, large enough so that the driven load will not require the motor to operate in the service factor range.

C. Temperature Rating: 50 deg C maximum temperature rise at 40 deg C ambient for continuous duty at full load (Class A Insulation).

D. Service Factor: 1.15 for polyphase motors and 1.35 for single-phase motors.

E. Motor Construction: NEMA Standard MG 1, general purpose, continuous duty, Design B. Provide permanent-split capacitor classification motors for shaft-mounted energy recovery ventilators and capacitor start classification for belted energy recovery ventilators.
   1. Bases: Adjustable.
   2. Bearings: The following features are required:
      a. Ball or roller bearings with inner and outer shaft seals.
      b. Grease lubricated.
      c. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.
   3. Enclosure Type: The following features are required:
      a. Open drip-proof motors where satisfactorily housed or remotely located during operation.
      b. Guarded drip-proof motors where exposed to contact by employees or building occupants.
   4. Overload protection: Built-in, automatic reset, thermal overload protection.
   5. Noise rating: Quiet.
   6. Efficiency: Energy-efficient motors shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, Test Method B. If efficiency not specified, motors shall have a higher efficiency than "average standard industry motors" in accordance with IEEE Standard 112, Test Method B.
   7. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, and special features.

F. Starters, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 16.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances, housekeeping pads, and other conditions affecting performance of fans.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install units level and plumb, in accordance with manufacturer's written instructions.

B. Arrange installation of units to provide access space around fans for service and maintenance.

C. Install new 2" thick pleated filters upon final acceptance.

3.3 CONNECTIONS

A. Duct installations and connections are specified in other Division 15 sections. Make final duct connections with flexible connections.

B. Electrical Connections: The following requirements apply:
   1. Electrical power wiring is specified in Division 16.
   2. Grounding: Connect unit components to ground in accordance with the National Electrical Code.

3.4 ADJUSTING, CLEANING, AND PROTECTING

A. Adjust damper linkages for proper damper operation.

B. Clean unit cabinet interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheel and cabinet.

END OF SECTION

SECTION 15853 - POWER VENTILATORS

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. Centrifugal roof ventilators.

B. Products furnished under this Section include roof curbs for roof-mounted exhaust fans.

1.3 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base air ratings on sea-level conditions.

B. Operating Limits: Classify according to AMCA 99.

C. Fan Unit Schedule: The following information is described in an equipment schedule on the Drawings.
   1. Fan performance data including capacities, static pressures, motor requirements, and electrical characteristics.
   2. Fan arrangement including wheel configuration, inlet and discharge configurations, and required accessories.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data including rated capacities of each unit, weights (shipping, installed, and operating), furnished specialties, accessories, and the following:
   1. Certified fan performance curves with system operating conditions indicated.
   2. Certified fan sound power ratings.
   3. Motor ratings and electrical characteristics plus motor and electrical accessories.
   4. Material gages and finishes, including color charts.
   5. Dampers, including housings, linkages, and operators.

C. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

D. Wiring diagrams detailing wiring for power and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.

E. Maintenance data for power ventilators to include in the operation and maintenance manual specified in Division 1 and in Division 15 Section "Basic Mechanical Requirements."

1.5 QUALITY ASSURANCE

A. Electrical Component Standard: Provide components that comply with NFPA 70 and that are listed and labeled by UL where available.

B. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
   1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
   2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. AMCA Compliance: Provide products that meet performance requirements and are licensed to use the AMCA Seal.

D. NEMA Compliance: Provide components required as part of fans that comply with applicable NEMA standards.

E. UL Standard: Provide power ventilators that comply with UL 705.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements. Verify clearances.

B. Do not operate fans until ductwork is clean, filters are in place, bearings are lubricated, and fans have been commissioned.

1.7 COORDINATION AND SCHEDULING

A. Coordinate the size and location of structural steel support members.

B. Coordinate the installation of roof curbs, equipment supports, and roof penetrations.

1.8 EXTRA MATERIALS

A. Furnish one set of belts for each belt-driven fan that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Centrifugal Roof Ventilators:
   a. Acme.
   b. Cook (Loren) Co.
   c. Greenheck Fan Corp.
   d. Jenn Industries Inc.

2.2 CENTRIFUGAL ROOF VENTILATORS

A. Description: Belt-driven or direct-drive centrifugal fans, as indicated, consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

B. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.
1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.

C. Housing: Removable, extruded-aluminum, rectangular top; square, one-piece, aluminum base with venturi inlet cone.

D. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

E. Belt-Driven Drive Assembly: Resiliently mounted to the housing, with the following features:
1. Fan Shaft: Turned, ground, and polished steel drive shaft keyed to wheel hub.
2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
4. Fan and motor isolated from exhaust air stream.

F. Accessories: The following items are required where scheduled:
1. Variable-Speed Controller: Solid-state control to reduce speed from 100 percent to less than 50 percent.
2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
3. Bird Screens: Removable 1/2-inch mesh, aluminum or brass wire.
4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close

when fan stops.

5. Roof Curbs: Aluminum; mitered and welded corners; 2-inch thick, rigid, fiberglass insulation adhered to inside walls; and 2-inch wood nailer. Size as required to suit roof opening and fan base.
   a. Configuration: Built-in mounting flange.
   b. Overall Height: 12 inches.

2.3 MOTORS

A. Refer to Division 15 Section "Motors" for general requirements for factory-installed motors.

B. Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B.

C. Enclosure Type: The following features are required as indicated:
   1. Open drip proof motors where satisfactorily housed or remotely located during operation.
   2. Guarded drip proof motors where exposed to contact by employees or building occupants.

2.4 FACTORY FINISHES

A. Sheet Metal Parts: Prime coat before final assembly.

B. Exterior Surfaces: Baked-enamel finish coat after assembly.

C. Aluminum Parts: No finish required.

2.5 SOURCE QUALITY CONTROL

A. Testing Requirements: The following factory tests are required as indicated:
   1. Sound Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA Seal.
   2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements of installation tolerances and other conditions affecting performance of the power ventilators. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install power ventilators according to manufacturer's written instructions.
   1. Secure roof-mounted fans to roof curbs with stainless steel hardware.

B. Install units with clearances for service and maintenance.

C. Label units according to requirements specified in Division 15 Section "Mechanical Identification."

3.3 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.

B. Electrical: Conform to applicable requirements in Division 16 Sections.

C. Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Lubricate bearings.

3.5 CLEANING

A. After completing installation, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.

B. Clean fan interiors to remove foreign material and construction debris. Vacuum clean fan wheel and cabinet.

3.6 COMMISSIONING

A. Final Checks before Startup: Perform the following operations and checks before startup:
   1. Verify that shipping, blocking, and bracing are removed.
   2. Verify that unit is secure on mountings and supporting devices and that connections for piping, ducts, and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnects.
   3. Perform cleaning and adjusting specified in this Section.
   4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
   5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
   6. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in the fully open position.
   7. Disable automatic temperature-control operators.

B. Starting procedures for fans are as follows:
   1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.
   2. Measure and record motor voltage and amperage.

C. Shut unit down and reconnect automatic temperature-control operators.

D. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for procedures for air-handling-system testing, adjusting, and balancing.

E. Replace fan and motor pulleys as required to achieve design conditions.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

B. Review data in the operation and maintenance manuals. Refer to Division 1 Section "Contract Closeout."

C. Schedule training with Owner, through Architect, with at least 7 days' advance notice.

D. Demonstrate operation of power ventilators. Conduct walking tour of the Project. Briefly identify location and describe function, operation, and maintenance of each power ventilator.

END OF SECTION

SECTION 15855 - DIFFUSERS, REGISTERS, AND GRILLES

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 ceiling- and wall-mounted diffusers, registers, and grilles.

B. Related Sections include the following:
1. Division 15 Section "Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.
2. Division 15 Section "Testing, Adjusting, and Balancing" for balancing diffusers, registers, and grilles.

1.3 DEFINITIONS

A. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.

B. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.

C. Register: A combination grille and damper assembly over an air opening.

1.4 SUBMITTALS

A. Product Data: For each model indicated, include the following:
1. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
2. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
3. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.
4. Assembly Drawing: For each type of air outlet and inlet; indicate materials and methods of assembly of components.

B. Coordination Drawings: Reflected ceiling plans and wall elevations drawn to scale to show locations and coordination of diffusers, registers, and grilles with other items installed in ceilings and walls.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for diffusers, registers, and grilles with factory-applied color finishes.

1.5 QUALITY ASSURANCE

A. Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

B. NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Acceptable manufacturers:
1. Krueger.
2. Titus.
3. Price.

B. Diffusers, registers, and grilles are scheduled on Drawings.

2.2 SOURCE QUALITY CONTROL

A. Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.4 CLEANING

A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION

SECTION 15861 - AIR FILTERS

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 factory-fabricated air-filter devices and media used to remove particulate matter from air for HVAC applications.

1.3 SUBMITTALS

A. Product Data: Include dimensions; shipping, installed, and operating weights; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.

B. LEED Submittals:
   1. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 – “Systems and Equipment.”
   2. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.

1.4 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of air filters and are based on the specific system indicated. Other manufacturers systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

B. Comply with NFPA 90A and NFPA 90B.

C. ASHRAE Compliance: Comply with provisions of ASHRAE 52.1 for method of testing and rating air-filter units.

D. Comply with ARI 850.

E. Comply with NFPA 70 for installing electrical components.

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Provide five (5) complete set of filters for each filter bank in rooftop units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Air Filters:
      a. AAF International.
      b. Airguard Industries, Inc.
      c. Barnebey & Sutcliffe Corp.
      d. Columbus Industries, Inc.
      e. Continental Air Filter Div.; NiCon Filter Corp.
      f. Farr Co.
      g. Flanders Filters, Inc.
      h. International Air Filter, Inc.
      i. Koch Filter Corp.
      j. Research Products Corp.

2.2 EXTENDED-SURFACE, DISPOSABLE PANEL FILTERS

A. Description: Factory-fabricated, dry, extended-surface filters with holding frames.

B. Media: Fibrous material formed into deep-V-shaped pleats and held by self-supporting wire grid; 30-35%

efficiency.

C. Media and Media-Grid Frame: Nonflammable cardboard.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install filter in position to prevent passage of unfiltered air.

B. Coordinate filter installations with duct and air-handling unit installations.

3.2 CLEANING

A. After completing system installation and testing, adjusting, and balancing air-handling and air-distribution systems, clean filter housings and install new filter media.

END OF SECTION

SECTION 15990 - TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. The HVAC systems will be tested and balanced by an independent agency under separate contract directly with AAFES.

1.2 SUBMITALS

A. LEED Submittal:
   1. Air Balance Report for LEED Prerequisite EQ1: Documentation of work performed for ASHRAE 62.1-2004, Section 7.2.2, “Air Balancing.”

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.1 TESTING, ADJUSTING, AND BALANCING OF HVAC SYSTEMS

The HVAC systems will be tested and balanced by an independent agency retained by the Owner.

A. The independent air/hydronic testing and balancing agency (TAB) shall perform the balancing and testing of the HVAC in accordance with the procedures of AABC or NEBB to analyze, balance, adjust and test air and water moving equipment, air and water distribution system including kitchen exhaust hood system.

B. The HVAC Contractor shall put all heating, ventilating and air conditioning systems and equipment into operation and shall continue the operation of same during each working day of testing and balance and shall place the automatic temperature control system in satisfactory operation before the TAB agency shall begin work.

C. Prior to the final acceptance of the HVAC system by the Contracting Officer, the Contractor shall allow the TAB agency to schedule this work in cooperation with other trades involved and comply with the completion date of the project.

D. The Contractor shall make available to the TAB agency a complete copy of shop drawing submittal data on mechanical equipment including performance curves (fans and pumps, chillers, air distribution devices, etc.) necessary to test and balance the HVAC system.

E. The Contractor shall schedule the following necessary personnel:
   1. Automatic Temperature Control Manufacturer's Service Representative to set adjustments of automatic operated damper and devices to operate as specified, and/or noted, including setting of all controls for proper calibrations.
   2. Mechanics - To operate, adjust, replace or repair the HVAC equipment that is found requiring any change/replacement in the pulleys, belts, dampers, valves, etc., of Contractors furnished and installed equipment.
   3. Electrician - To assist in any problems resulting from any of the power or control wiring installation, including replacement of starters, and heater elements.

F. The Contractor shall make any changes in pulleys, belts and dampers or the addition of dampers as required for correct balance of the system as recommended by TAB agency, at no cost to Owner/Government.

G. The Contractor shall make all necessary corrections within 48 hours upon notification of TAB agency of the deficiencies requiring adjustment, (piece-meal correction is not acceptable) and within 10 working days for items that require replacement or installation.

H. The Contractor shall leave all strainers clean and all air filters replaced prior to the start of testing and balancing activity.

I. If the Contractor had scheduled the TAB agency to perform the work and the HVAC systems are not ready to be tested and balanced, any additional cost required to extend the TAB work shall be at the Contractor's expense.

END OF SECTION

SECTION 16111 - CONDUIT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal conduit.

B. Flexible metal conduit.

C. Liquidtight flexible metal conduit.

D. Electrical metallic tubing.

E. Nonmetallic conduit.

F. Flexible nonmetallic conduit.

G. Fittings and conduit bodies.

1.2 REFERENCES

A. Conduit and tubing shall meet the requirements of the latest editions of following standards:
1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
3. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
4. ANSI/NFPA 70-08 - National Electrical Code, 2008 Edition.
5. NECA "Standard of Installation."
6. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 DESIGN REQUIREMENTS

A. Conduit Size: ANSI/NFPA 70-08. Limit conductor cross sectional area to no more than 40% of conduit cross sectional area.

1.4 SUBMITTALS

A. Submit under provisions of Section 01310 – Submittals.

B. Product Data: Provide for metallic conduit, flexible metal conduit, liquid tight flexible metal conduit, metallic tubing, nonmetallic conduit, fittings, conduit bodies.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01760 – Project Record Documents.

B. Accurately record actual routing of interior conduits larger than 2 inches on project record documents and of all underground conduits regardless of size. For locations of underground conduits provide dimensions indicating locations and depth.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70-08.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept conduit on site. Inspect for damage.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

1.8 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown schematically on Drawings unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

A. Minimum Size: ¾" inch unless otherwise specified.

B. Underground Installations:
1. More than Five Feet outside Foundation Wall: Use rigid steel conduit, intermediate metal conduit, plastic coated rigid steel conduit or thickwall nonmetallic (Schedule 40 PVC) conduit.
2. Within Five Feet Inside Foundation Wall: Use rigid steel conduit, intermediate metal conduit, plastic coated rigid steel conduit or thickwall nonmetallic (Schedule 40 PVC) conduit.
3. Under Slab on Grade: Use rigid steel conduit, intermediate metal conduit, plastic coated rigid steel conduit or thickwall nonmetallic (Schedule 40 PVC) conduit.

C. Outdoor Locations, Above Grade: Use rigid steel or intermediate metal conduit.

D. Wet and Damp Interior Locations Above Floor Slab: Use rigid steel conduit, intermediate metal conduit or electrical metallic tubing. Use wet and/or damp location fittings.

E. Dry Interior Locations Above Floor Slab (Including Hollow Stud Partitions):
1. Concealed: Use rigid steel, intermediate metal conduit or electrical metallic tubing.
2. Exposed: Use rigid steel, intermediate metal conduit or electrical metallic tubing.

2.2 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. Intermediate Metal Conduit (IMC): Rigid steel.

C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit, threaded connections.

2.3 PVC COATED METAL CONDUIT

A. Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil thick.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.4 FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction.

B. Fittings: ANSI/NEMA FB 1.

2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction with PVC jacket.

B. Fittings: ANSI/NEMA FB 1.

2.6 ELECTRICAL METALLIC TUBING (EMT)

A. Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel compression type or set screw type.

2.7 NONMETALLIC CONDUIT

A. Description: NEMA TC 2; Schedule 40 PVC.

B. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install conduit in accordance with NECA "Standard of Installation" and NFPA 70-08.

B. Install nonmetallic conduit in accordance with manufacturer's instructions and NFPA 70-08.

C. Provide supports as required by NEC maximum distance between conduit support tables. Arrange supports to prevent misalignment during wiring installation.

D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers. Where possible, support conduits in ceiling cavity space at the level of structural roof joists.

E. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each rack for 25 percent additional conduits.

F. Fasten conduit supports to building structure and surfaces under provisions of Section 16190. DO NOT SUPPORT CONDUITS DIRECTLY FROM ROOF DECK.

G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

H. Do not attach conduit to ceiling support wires. Fasten individual conduits to roof joists.

I. Arrange conduit to maintain headroom and present neat appearance.

J. Route exposed conduit parallel and perpendicular to walls.

K. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

L. Route conduit under slab directly from point-to-point where possible. Avoid conduit crossovers where possible.

M. Do not install conduit in floor slab on grade or floor slab above grade.

N. Maintain minimum 6-inch clearance between conduit and piping.

O. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.

P. Cut conduit square using saw or pipe cutter; de-burr cut ends before joining.

Q. Bring conduit to shoulder of fittings; fasten securely.

R. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum. Use only an approved hotbox bender to make bends in nonmetallic conduit.

S. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

T. Install no more than equivalent of three 90-degree bends between boxes (no more than two 90-degree bends for conduits containing telephone cables, fire alarm cables, intrusions system cables, local area network (LAN) cables, etc.). Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate factory elbows for bends in metal conduit larger than 2 inch size.

U. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

V. Provide expansion/deflection couplings to accommodate expansion and deflection where conduit crosses seismic joints or expansion joints. Such couplings shall have braided copper bonding jumpers.

W. Provide suitable pull string in each empty conduit except sleeves less than 20 feet long and nipples.

X. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

Y. Ground and bond conduit under provisions of Section 16170.

Z. Identify conduit under provisions of Section 16195.

AA. Where conduits for telephone cables, cash register cables, etc. are stubbed from wall boxes or cabinets to above accessible ceilings, turn conduits out of wall approximately 12 inches above accessible ceiling. Coordinate location with other trades. Provide bushing on end of conduit to prevent signal cable contact with sharp metal. Provide tag on end of conduit indicating type and location of utilization outlet (example: TELEPHONE - BREAK ROOM).

BB. In interior locations, turn nonmetallic conduits through floor slab using rigid steel elbows. Continue raceway above floor slab using metallic conduit.

CC. Where conduits turn up into switchboard, padmount transformer or large utilization equipment, provide grounding bushings on ends of conduits, and bond to equipment grounding terminal strip or lugs using bonding jumper sized according to NFPA 70-08.

DD. Where conduits enter boxes and cabinets, provide bushings with plastic insulated throat for conduits 1 inch and larger.

EE. Seismic Bracing: provide seismic bracing for suspended conduits 2” or larger and trapeze hangers at interval of 20 feet or less. Bracing shall consists of 1-5/8" square channel both parallel and perpendicular to conduit, and fastened to roof joist at 45 degree angle relative to vertical.

FF. AC and MC cable shall not be acceptable for use on this project. Except as specified in Section 16150.

GG. Paint exposed conduit to match adjacent surface.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.

END OF SECTION

SECTION 16118 - DUCT BANK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal conduit.

B. Duct.

C. Precast concrete manholes.

D. Precast concrete handholes.

1.2 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.

B. ASTM A48 - Gray Iron Castings.

C. ASTM C857 - Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.

D ASTM C858 - Underground Precast Concrete Utility Structures.

E. ASTM C891 - Installation of Underground Precast Utility Structures.

F. ASTM C1037 - Inspection of Underground Precast Utility Structures.

G. IEEE C2 - National Electrical Safety Code.

H. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

I. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

J. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

K. NEMA TC 6 - PVC and ABS Plastic Utilities Duct for Underground Installation.

L. NEMA TC 9 - Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation.

M. NEMA TC 10 - PVC and ABS Plastic Communications Duct and Fittings for Underground Installation.

N. NEMA TC 14 - Filament-Wound Reinforced Thermosetting Resin Conduit and Fittings.

O. NFPA 70-08 - National Electrical Code, 2005 Edition.

P. UL 651A - Type EB and A PVC Conduit and HDPE Conduit.

1.3 SUBMITTALS FOR REVIEW

A. Section 01310 - Submittals: Procedures for submittals.

B. Product Data: Provide for metallic conduit, nonmetallic conduit, and warning tape.

C. Shop Drawings: Indicate dimensions, reinforcement, size and locations of opening and accessory locations for precast manholes.

1.4 SUBMITTALS FOR INFORMATION

A. Section 01310 - Submittals: Submittals for information.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.5 SUBMITTALS FOR CLOSEOUT

A. Section 01750 - Project Closeout.

B. Project Record Documents: Record actual routing and elevations of underground conduit and duct.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum

three years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08 and IEEE C2.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.8 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated.

B. Verify routing and termination locations of duct bank prior to excavation for rough-in.

C. Duct bank routing is shown in approximate locations unless dimensions are indicated. Route as required to complete duct system.

D. Verify locations of manholes prior to excavating for installation.

E. Manhole locations are shown in approximate locations unless dimensions are indicated. Locate as required to complete ductbank system.

PART 2 - PRODUCTS

2.1 RIGID STEEL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. Fittings: NEMA FB 1, steel.

2.2 PLASTIC CONDUIT

A. Rigid Plastic Conduit: NEMA TC 2, Schedule 40 PVC, with fittings and conduit bodies to NEMA TC 3.

2.3 PLASTIC DUCT

A. Plastic Utilities Duct: NEMA TC 6; PVC.

B. Plastic Utility Duct Fittings: NEMA TC 9.

C. Plastic Communications Duct and Fittings: NEMA TC 6; PVC.

2.4 PRECAST CONCRETE MANHOLES

A. Description: Precast manhole designed in accordance with ASTM C858, comprising modular, interlocking sections complete with accessories.

B. Shape: Square.

C. Nominal Inside Dimensions: 6 x 6 feet.

D. Inside Depth: 7 feet.

E. Wall Thickness: 8 inches.

F. Base Section: Include 4 inch deep x 12 inch round sump with cast sleeve, and two 1 inch ground rod openings.

G. Top Section: Include 36 inch diameter grooved opening for frame and cover.

H. Riser Casting: 12 inch, with manhole step cast into frame.

I. Frames and Covers: ASTM A48; Class 30B gray cast iron, 30 inch size, machine finished with flat bearing surfaces. Provide cover marked to indicate utility (ELECTRICAL, COMMUNICATIONS, ETC.)

J. Duct Entry Provisions: Windows with plastic duct terminators and diaphragms.

K. Duct Entry Locations: As indicated on drawings.

L. Duct Entry Size: As indicated on drawings.

M. Cable Pulling Irons: Use galvanized rod and hardware. Locate opposite each duct entry. Provide watertight seal.

N. Cable Rack Inserts: Minimum load rating of 800 pounds. Locate at 2 feet on center.

O. Cable Rack Mounting Channel: 1-1/2 x ¾ inch steel channel, 48 inch length. Provide cable rack arm mounting slots on 1-1/2 inch centers.

P. Cable Racks: Steel channel, 1-1/2 x ¾ x 14 inches, with fastener to match mounting channel.

Q. Cable Supports: Porcelain clamps and saddles.

R. Manhole Ladder: Hot dip galvanized per ASTM A-153 height as required to have slope of 60 degree. Rungs to have non-slip surface.

S. Sump Covers: ASTM A48; Class 30B gray cast iron.

2.5 PRECAST CONCRETE HANDHOLE

A. 4 inch reinforced concrete walls, top, and bottom.

B. Precast 6 inch sq. cable entrance at bottom center on each side.

C. Cast iron frame.

D. Cast iron tread type lid with cast lettering indicating “Electric” or “Telephone” as appropriate.

2.6 ACCESSORIES

A. Underground Warning Tape: 4 inch wide plastic tape, detectable type, colored yellow and suitable warning legend describing buried electrical lines per A.P.W.A.
   1. Red – Caution Buried Electric Line Below.
   2. Purple – Caution Buried Reclaimed Water Line Below.
   3. Orange – Caution Buried Fiber Optic Line Below.
   4. Orange – Caution Buried Telephone Line Below.

PART 3 - EXECUTION

3.1 DUCT BANK INSTALLATION

A. Install all duct to locate top of ductbank minimum 36 inches below finished grade.

B. Install duct with minimum slope of 4 inches per 100 feet (0.33 percent). Slope duct away from building entrances.

C. Cut duct square using saw or pipe cutter; de-burr cut ends.

D. Insert duct to shoulder of fittings; fasten securely.

E. Join nonmetallic duct using adhesive as recommended by manufacturer.

F. Wipe nonmetallic duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

G. Install no more than equivalent of three 90-degree bends between pull points.

H. Provide suitable fittings to accommodate expansion and deflection where required.

I. Stagger duct joints vertically in concrete encasement 6 inches minimum.

J. Use suitable separators and chairs installed not greater than 4 feet on centers.

K. Band ducts together before backfilling or placing concrete.

L. Securely anchor duct to prevent movement during concrete placement.

M. Place concrete under provisions of Section 03300. Use mineral pigment to color concrete red.

N. Provide minimum 3-inch concrete cover at bottom, top, and sides of secondary ductbank.

O. Provide suitable nylon pull string in each empty duct except sleeves and nipples.

P. Swab duct. Use suitable caps to protect installed duct against entrance of dirt and moisture.

Q. Backfill trenches under provisions of Section 02300.

R. Interface installation of underground warning tape with backfilling specified in Section 02300. Install tape 6 inches below finished surface.

S. Terminate duct at manhole entries using bell end.

T. Provide two #4 steel reinforcing bars in top of bank under paved area.

U. Connect to manhole wall using dowels.

V. Connect to existing concrete encasements using dowels.

3.2 PRE-CAST MANHOLE INSTALLATION

A. Section 01310: Manufacturer's instructions.

B. Excavate for manhole installation under the provisions of Section 02300.

C. Install and seal precast sections in accordance with ASTM C891.

D. Install manholes plumb.

E. Use precast neck and shaft sections to bring manhole cover to finished elevation.

F. Attach cable racks to inserts after manhole installation is complete.

G. Backfill manhole excavation under the provisions of Section 02300.

END OF SECTION

SECTION 16123 - BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Building wire and cable.

B. Wiring connectors and connections.

1.2 REFERENCES

A. NECA Standard of Installation (National Electrical Contractors Association).

B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).

C. NFPA 70-08 - National Electrical Code.

1.3 SUBMITTALS FOR REVIEW

A. Section 01310 - Submittals: Procedures for submittals.

B. Product Data: Provide for each cable type.

1.4 SUBMITTALS FOR INFORMATION

A. Section 01310 – Submittals: Procedures for submittals.

B. Test Reports: Indicate procedures and values obtained.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

A. Section 01760 – Project Record Documents.

B. Project Record Documents: Record actual locations of components and circuits.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to NFPA 70-08.

B. Furnish building wire and wiring connectors listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.8 PROJECT CONDITIONS

A. Verify that field measurements are as indicated.

B. Conductor sizes are based on copper.

C. Wire and cable routing indicated is schematic unless dimensioned.

1.9 COORDINATION

A. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation: NFPA 70-08, Type THHN-2/THWN-2.

E. Use standard color coding for phase A, phase B, phase C, neutral and ground: Insulation:
   1. 208/120 volt circuits: black, red, blue, white, green.
   2. **This color code shall be permanently posted at each panelboard and switchboard**.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that mechanical work likely to damage wire and cable has been completed.

C. Verify that raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 WIRING METHODS

A. Use wiring methods indicated.

B. All branch circuit and feeder wiring shall be installed in raceways.

3.4 INSTALLATION

A. Route wire and cable as required to meet Project Conditions.

B. Install cable in accordance with the NECA "Standard of Installation" and NFPA 70-08.

C. Use stranded conductors for power circuits.

D. Use stranded conductors for control circuits.

E. Use conductor not smaller than 12 AWG for power and lighting circuits.

F. Use conductor not smaller than 14 AWG for fused control circuits.

G. Unless a larger size is indicated on plans, use 10 AWG conductors for 20 ampere, 120 volt branch circuits with homeruns longer than 75 feet.

H. Unless a larger size is indicated on plans, use 10 AWG conductors for 20 ampere, 277 volt branch circuits with homeruns longer than 200 feet.

I. Pull all conductors into raceway at same time.

J. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

K. Neatly train and lace wiring inside boxes, equipment, and panelboards.

L. Clean conductor surfaces before installing lugs and connectors.

M. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

N. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

O. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

P. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

Q. Identify and color code wire and cable under provisions of Section 16195. Identify each conductor with its circuit number or other designation indicated.

3.5 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

3.6 INSULATION RESISTANCE TESTS

A. Perform tests after cables have been installed in raceways, but before connection to lugs. Notify Contracting Officer at least 14 days prior to cable tests.

B. Measure resistance line-to-ground using a commercial meggar tester. Apply 1000 volts DC to cables 2 AWG and larger and record DC insulation resistance for each circuit conductor. Minimum acceptable level is 50 megohms.

END OF SECTION

SECTION 16130 - BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wall and ceiling outlet boxes.

B. Floor boxes.

C. Pull and junction boxes.

1.2 REFERENCES

A. NECA - Standard of Installation.

B. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.

C. NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

D. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

F. NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS

A. Submittals under provisions of Section 01310 – Submittals.

B. Product Data: Provide dimensions, materials, and accessories.

1.4 SUBMITTALS FOR CLOSEOUT

A. Section 01750 – Project Closeout.

B. Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include male fixture studs where required.
   2. Concrete Ceiling Boxes: Concrete type.

B. Cast Boxes: NEMA FB 1, Type FD, cast feralloy. Provide gasketed cover by box manufacturer. Provide threaded hubs.

C. Wall Plates for Finished Areas: As specified in Section 16141.

D. Weatherproof exterior boxes to house receptacles: Receptacle shall be installed recessed into wall. The receptacle cover shall have ports to allow two 3/8" diameter cords to pass through and must not protrude over ½" from wall surface. Recessed enclosure must have gasket between enclosure and mounting surface and between cover and sleeve to assure that the enclosure is weathertight in use per NEC 410-57b. Taymac "Masque", Intermatic "Flexi-Guard", or equal. **Failure to provide devices will result in removal and reinstallation per specification at Contractors expense.**

E. Boxes for use with gasoline system shall be explosion-proof and rated for use in Class 1, Division 1 hazardous locations.

2.2 FLOOR BOXES

A. Floor Boxes: NEMA OS 1, fully adjustable 3.75 inches deep.

B. Material: Cast metal.

C. Shape: Rectangular or round.

D. Service Fittings: As specified in Section 16141.

2.3 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: As specified in Section 16160.

C. Surface Mounted Cast Metal Box: NEMA 250, Type 6; flat-flanged, surface mounted junction box:
1. Material: Galvanized cast iron.
2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

D. In-Ground Cast Metal Box: NEMA 250, Type 6, inside flanged, recessed cover box for flush mounting:
1. Material: Galvanized cast iron.
2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.
3. Cover Legend: "ELECTRIC" or TELEPHONE as appropriate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify locations of floor boxes and outlets in prior to rough-in. Where available, use dimensional data to locate boxes.

3.2 INSTALLATION

A. Install boxes in accordance with NECA "Standard of Installation."

B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

C. Set wall mounted boxes at elevations to accommodate mounting heights indicated.

D. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose.

E. Orient boxes to accommodate wiring devices as specified in Section 16141.

F. Maintain headroom and present neat mechanical appearance.

G. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

H. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

I. Install boxes to preserve fire resistance rating of partitions and other elements.

J. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

K. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.

L. Unless otherwise indicated on plans, align adjacent wall mounted outlet boxes for switches, manual starters, interval timers, thermostats, and similar devices. Align wall mounted boxes for receptacles, telephone jacks, local area network outlets, and the like. Where such devices are shown in close proximity on plans, locate adjacent outlets with no more than 4 inch space between adjacent boxes.

M. Use flush mounting outlet boxes in all areas except mechanical rooms, mezzanines, and electrical closets.

N. Unless otherwise indicated on plans, locate flush mounting boxes in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

O. Do not install flush mounting boxes back-to-back in walls; provide minimum 6 inches separation.

P. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness. After finished wall material is applied, provide box extensions for all boxes with setback more than 1/8 inch.

Q. Use stamped steel bridges to fasten flush mounting outlet box between studs.

R. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

S. Use adjustable steel channel fasteners for hung ceiling outlet box.

T. **DO NOT FASTEN BOXES TO CEILING SUPPORT WIRES OR DIRECTLY TO ROOF DECK.**

U. Support boxes independently of conduit.

V. Use gang box where more than one device is mounted together. Do not use sectional box. Provide metal barrier plates between gangs to separate line voltage from low voltage systems and where voltage between adjacent light switches exceeds 300 volts.

W. Use 4” square box with plaster ring for single device outlets.

X. Use cast outlet box in exterior locations exposed to the weather, interiors of walk-in refrigeration equipment, and wet locations. Provide vapor seals at conduit entrances to these boxes. Use U.L. listed sealing compound.

Y. Use cast floor boxes for installations in slab on grade.

Z. Set floor boxes level. Recheck level and elevation immediately after concrete pour and rough finish. Where floor boxes for power, telephone, and intrusion detection system occur together, insure these boxes are spaced so as to be completely covered by store fixtures.

AA. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

BB. Where fossil fuel driven vehicles, appliances, or equipment including lawn equipment in Lawn Storage Room are present, locate all boxes at least 36 inches above floor level. Feed such boxes with cable and conduit from above. Allow no electrical work to penetrate the space from floor level to 18 inches above floor.

CC. Provide pull boxes in feeder circuits as required but at least every 150 feet in straight runs.

DD. Identify all junction boxes by panel and circuit number on outside cover with legible permanent ink marker.

3.3 INTERFACE WITH OTHER PRODUCTS

A. Coordinate installation of outlet box for equipment connected to allow accessibility of box and proper operation of equipment.

3.4 ADJUSTING

A. Adjust floor box covers to be flush with finish flooring material.

B. Adjust flush-mounting outlets to make front flush with finished wall material.

C. Install knockout closures in unused box openings.

D. Seal floor boxes as recommended by manufacturer.

3.5 CLEANING

A. Section 01720 – Cleaning: Clean installed work.

B. Clean interior of boxes to remove dust, debris, and other material.

C. Clean exposed surfaces and restore finish.

D. Check boxes for the presence of drywall screws, concrete residue, and sharp other objects. Remove all sharp objects.

E. Clean floor boxes and underfloor conduit systems of water and dirt prior to installing wiring. Close boxes to prevent entry of dirt and water after installing wires. Failure to meet this requirement will result

in contractor being required to remove wiring, clean boxes and conduit systems and reinstallation of new wiring, all at no cost to AAFES.

END OF SECTION

SECTION 16141 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Device plates and decorative box covers.

D. Floor box service fittings.

1.2 REFERENCES

A. NECA - Standard of Installation.

B. NEMA WD 1 - General Requirements for Wiring Devices.

C. NEMA WD 6 - Wiring Device -- Dimensional Requirements.

D. NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS FOR REVIEW

A. Section 01310 - Submittals: Procedures for submittals.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.4 SUBMITTALS FOR INFORMATION

A. Section 01310 - Submittals: Submittals for information.

B. Submit manufacturer's installation instructions.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 WALL SWITCHES

A. Manufacturers:
1. Hubbell
2. Pass & Seymour
3. Leviton
4. G.E.

B. Description: NEMA WD 1, Heavy-Duty, AC only general-use snap switch. Provide single pole, double pole, three-way, four way, pilot light, or momentary contact type as indicated.

C. Body and Handle: Plastic with toggle handle.

D. Indicator Light: Separate pilot strap; red lens.

E. Ratings:
1. Voltage: 120 volts, AC.
2. Current: 20 amperes.

F. For control of mechanically held contactors or relays; provide three position, momentary contact switches with spring return to center off position. Momentary contact switches shall be rated 120/277 volt, 20 amperes.

G. Color: Architect shall select from manufacturers standard colors. Note: Architect may choose multiple colors throughout project.

2.2 RECEPTACLES

A. Manufacturers:
1. Hubbell
2. Pass & Seymour
3. Leviton
4. G.E.

B. Description: NEMA WD 1, heavy duty, specification grade receptacle. In barber shop and beauty shop waiting area, provide safety type receptacles which shall discourage insertion of foreign object into receptacle by small children.

C. Device Body: Nylon.

D. Configuration: NEMA WD 6, type as specified and indicated.

E. Convenience Receptacle: Type 5-20.

F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements. Devices shall utilize “Lock Out” technology to ensure outlet can not be used if ground fault protection fails. Device shall have status LED.

G. Isolated Ground Receptacle: Type 5-20. Provide with orange body and plate.

H. Color: Architect shall select from manufacturers standard colors. Note: Architect may choose multiple colors throughout project.

2.3 WALL PLATES

A. Decorative Cover Plate: Smooth nylon. Manufacturer same as device manufacturer. Color to match device.

B. Exterior Wall Receptacle Cover: Receptacles shall be installed recessed 2” into wall. The receptacle cover shall have ports to allow two 3/8” diameter cords to pass through and must not protrude over ½” from wall surface. Recessed enclosure must have gasket between the enclosure and the mounting surface, and between the cover and sleeve to assure that the enclosure is “Weather proof while in use.” The enclosure shall be UL Listed. Enclosure manufactured by TayMac Corporation, Intermatic, or equal. **Failure to provide enclosure as specified will result in demolition of incorrect work and installation of work in compliance with specifications at contractors expense.**

2.4 FLOOR MOUNTED SERVICE FITTINGS

A. Manufacturers:
1. Hubbell
2. Pass & Seymour
3. Leviton
4. G.E.

B. Flush Cover Convenience Receptacle:
1. Single NEMA 5-20R, gray receptacle.
2. Material: Brass.
3. Configuration: 2-1/8” dia screw opening.
4. Threaded screw cover.
5. Split nozzle cable protector.

C. Flush Cover Communication Outlet:
1. Material: Brass.
2. Configuration: 2-1/8 inch dia threaded opening.
3. Threaded screw cover.
4. Split nozzle cable protector.

D. Flush Cover Combination Fitting:
   1. Material: Brass.
   2. Configuration: Duplex opening with 2-1/8 inch combination threaded opening.
   3. Two threaded screw covers.
   4. Two split nozzle cable protector.

E. Protective Ring: Brass finish.

F. Split Nozzle: Brass finish.

G. Carpet Ring: Brass.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that outlet boxes are installed at proper height.

B. Verify that wall openings are neatly cut and will be completely covered by wall plates.

C. Verify that floor boxes are adjusted properly to ensure covers will be flush with floor covers.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean debris from outlet boxes.

3.3 INSTALLATION

A. Install in accordance with NECA "Standard of Installation."

B. Install devices plumb and level.

C. Install switches with OFF position down.

D. Install receptacles with grounding pole on top.

E. After connecting wires to GFCI receptacles, wrap terminals with four layers of electrician's tape.

F. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.

G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

H. Connect wiring devices by wrapping conductor around screw terminal when using solid conductors. Provide crimp on lugs for terminations when using stranded conductors.

I. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas and above accessible ceilings.

J. Install split nozzle on active flush cover service fittings.

K. Install floor box coverplates flush and level with floor covering.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 16130 to obtain mounting heights indicated on drawings.

B. Coordinate the installation of wiring devices with underfloor duct service fittings provided under Section 16113.

3.5 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

3.6 CLEANING

A. See Division 1 Sections Project Record Documents and Project Closeout.: Clean installed work.

B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 16150 - MANUFACTURED WIRING SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Prefabricated flexible cable assemblies.

B. Distribution units.

C. Cable accessories.

1.2 REFERENCES

A. ANSI/NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS

A. Submit under provisions of Section 01310 – Submittals.

B. Shop Drawings: Indicate distribution box, switch box, outlet, and cable layout and branch circuit configuration.

C. Product Data: Provide for each cable type and for each fitting and accessory.

D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

E. Provide voltage drop calculation showing wire size will support use per NEC guidelines.

F. Provide scaled drawings showing connection and cable requirements. Electronic drawing files may be obtained from engineer's office (618-242-0473). Request drawings minimum two weeks prior to need.

1.4 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01760 – Project Record Documents.

B. Record actual locations of cable assemblies and branch circuit arrangements.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1 Sections Project Record Documents and Project Closeout.

B. Maintenance Data: Include replacement parts list.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70-08.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.8 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.9 COORDINATION

A. Furnish luminaire connectors to luminaire manufacturer for factory installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. AMP Inc.

B. Hubbell Wiring Devices

C. Siemens Co.

D. Light Fixture Manufacturer.

2.2 MANUFACTURED WIRING SYSTEMS

A. Cable Assemblies: Factory assembled units with appropriate connector on each end, with lengths and circuit configurations as required.

B. Voltage: 120 volts.

C. Switching Unit Assemblies: Cable assembly with 6 inch pigtail on one end. Provide cables configured for 3-way and 4-way switches where required.

D. Luminaire Connector Assemblies: Connector suitable for mounting in luminaire body knockout. At Contractor's option, provide connector factory mounted in luminaire.

E. Accessories: Provide manufacturer's standard accessories, including cable extenders, distribution tees, and switching assemblies.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install Products in accordance with manufacturer's instructions.

B. Support cable by means of straps and clamps.

C. Support cable above suspended ceiling to avoid contact with and interference with removal of ceiling panels. Do not support from ceiling suspension system.

D. Arrange cable to avoid interference with access to other work.

E. Provide minimum 10 percent slack length in each cable such that cables are supported minimum 24" above ceiling tiles.

END OF SECTION

SECTION 16160 - CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Hinged cover enclosures.

B. Cabinets.

C. Terminal blocks.

D. Accessories.

1.2 REFERENCES

A. NECA Standard of Installation (National Electrical Contractors Association).

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

C. NEMA ICS 4 - Terminal Blocks for Industrial Control Equipment and Systems.

D. NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS FOR REVIEW

A. Section 01310 – Submittals: Procedures for submittals.

B. Product Data: Provide manufacturer's standard data for enclosures and cabinets.

1.4 SUBMITTALS FOR INFORMATION

A. Section 01310 – Submittals: Submittals for information.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Products: Listed and classified by Underwriters Laboratories, Inc.

1.6 MAINTENANCE MATERIALS

A. See Division 1 Sections Project Record Documents and Project Closeout.

B. Furnish two of each key. Cabinets and enclosures shall be keyed to same key as panel boards.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Hoffman

B. Square D

C. General Electric

2.2 HINGED COVER ENCLOSURES

A. Construction: NEMA 250, Type 1 inside, or 3R where exposed to weather or moisture, steel enclosure.

B. Covers: Continuous hinge, held closed by flush latch operable by key. Covers in damp and wet locations shall have continuous gasket.

C. Provide removable interior metal panel for mounting terminal blocks and electrical components; finish with white enamel. Provide standoff devices for separation of equipment mounting panel from enclosure.

D. Enclosure Finish: Manufacturer's standard enamel.

2.3 CABINETS

A. Boxes: Galvanized steel.

B. Backboard: Provide white enamel finished metal backboard for mounting terminal blocks or other devices.

C. Fronts: Steel, Flush type with door with concealed hinge, and flush lock keyed to match branch circuit panelboard. Finish with gray baked enamel.

D. Provide metal barriers to form separate compartments wiring of different systems and voltages.

E. Provide accessory feet for free-standing equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with NECA "Standard of Installation" and NFPA 70-08.

B. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner under the provisions of Section 16190.

C. Install cabinet fronts plumb.

3.2 CLEANING

A. Section 01720 – Cleaning: Clean installed work.

B. Clean electrical parts to remove conductive and harmful materials.

C. Remove dirt and debris from enclosure.

D. Clean finishes and touch up damage.

END OF SECTION

SECTION 16170 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

1.2 REFERENCES

A. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).

B. NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 GROUNDING SYSTEM DESCRIPTION

A. Metal underground water pipe.

B. Effectively grounded metal frame of the building.

C. Rod electrode.

D. Concrete – encased electrode.

1.4 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms maximum.

1.5 SUBMITTALS FOR REVIEW

A. Section 01310 – Submittals: Procedures for submittals.

B. Product Data: Provide for grounding electrodes and connections.

1.6 SUBMITTALS FOR INFORMATION

A. Section 01310 - Submittals: Submittals for information.

B. Test Reports: Indicate overall resistance to ground.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.7 SUBMITTALS FOR CLOSEOUT

A. See Division 1 Sections Project Record Documents and Project Closeout.: Procedures for submittals.

B. Record actual locations of components and grounding electrodes.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.9 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Products: Listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.1 ROD ELECTRODES

A. Material: Copper-clad steel.

B. Diameter: 3/4 inch.

C. Length: 10 feet.

2.2 MECHANICAL CONNECTORS

A. Manufacturers: Burndy or approved equal.

B. Material: Bronze.

2.3 EXOTHERMIC CONNECTIONS

A. Manufacturers: Cadweld or approved equal.

2.4 WIRE

A. Material: Stranded copper. Unless noted otherwise, provide with green insulation.

B. Size: As required by NEC.

2.5 GROUND BUSHING/LUG

A. Insulated metallic grounding bushings, tin-plated open-type lug dual rated for CU-AL conductors, thermoplastic liners rated 105 degree C, die cast zinc, to provide a smooth, well-rounded bearing surface for wires or cable at the end of threaded conduit or a conduit connector as required by the NEC.

2.6 ISOLATED GROUNDING CONDUCTORS

A. Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor at both ends of conductors and at any boxes or splice locations with alternating bands of green and yellow tape. Provide at least three bands of green and two bands of yellow tape.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.2 INSTALLATION

A. Install rod electrodes at exterior of building near service equipment. Install additional rod electrodes as required to achieve specified resistance to ground.

B. Provide 3/0 AWG bare copper grounding electrode conductor and connect to reinforcing steel in foundation footing. Bond steel together using tie wires so there is a minimum of 40 feet of continuous bar to which to bond grounding electrode conductor.

C. Provide bonding to meet Regulatory Requirements.

D. In addition to bonded equipment grounding conductors, provide isolated grounding conductors for circuits shown on plans. Conductors shall be 12 AWG unless noted otherwise and one per circuit.

E. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.13.

END OF SECTION

SECTION 16190 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Conduit and equipment supports.

B. Anchors and fasteners.

1.2 REFERENCES

A. NECA - National Electrical Contractors Association.

B. ANSI/NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS

A. Submit under provisions of Section 01310 – Submittals.

B. Product Data: Provide manufacturer's catalog data for fastening systems.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70-08.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

A. Materials and Finishes: Provide adequate corrosion resistance.

B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.

C. Anchors and Fasteners:
1. Concrete Structural Elements: Use precast insert system or expansion anchors and preset inserts.
2. Steel Structural Elements: Use beam clamps or welded fasteners.
3. Concrete Surfaces: Use self-drilling anchors and expansion anchors.
4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.
5. Solid Masonry Walls: Use expansion anchors and preset inserts.
6. Sheet Metal: Use sheet metal screws.
7. Wood Elements: Use wood screws.

2.2 STEEL CHANNEL

A. Manufacturer: Unistrut (P1000 unless otherwise noted) or approved equal.

B. Description: Galvanized or painted steel. (1-5/8” square)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation", NFPA 70-08 and maximum distance between conduit support tables.

C. Do not fasten supports to pipes, ducts, mechanical equipment, ceiling support wires, and conduit.

D. Do not use spring steel clips and clamps.

E. Do not use powder-actuated anchors.

F. Do not drill or cut structural members.

G. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

H. Install surface-mounted cabinets and panelboards with minimum of four anchors.

I. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.

J. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

SECTION 16195 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Nameplates.

B. Wire and cable markers.

C. Conduit markers.

1.2 REFERENCES

A. ANSI/NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS

A. Submit under provisions of Section 01310 – Submittals.

B. Product Data: Provide catalog data for nameplates, labels, and markers.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70-08.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.5 SAMPLES

A. Furnish under provisions of Section 01310 - Submittals.

B Provide two of each size and type nameplate and warning tape.

PART 2 - PRODUCTS

2.1 NAMEPLATES

A. Nameplates: Engraved three-layer laminated plastic, white letters on black background. Screw on type with two self tapping screws. Mastic type nameplates not allowed.

B. Locations:
1. Main disconnect switch (indicate maximum allowable fuse size where fuse is smaller than switch ampere rating).
2. Each switch in switchboard.
3. Each lighting and appliance panelboard.
4. Each breaker in distribution panel.
5. Each safety switch not in sight of utilization equipment. Indicate correct fuse size in fusible switches.
6. Each automatic motor starter and variable speed drive. Indicate correct fuse size for combination starters and drives.
7. Relays and contactors. Indicate loads controlled.
8. Time switches. Indicate load controlled.
9. Fire alarm and mass notification equipment cabinets.
10. Transformers.
11. Where more than two switches are located adjacent to each other or where switches control loads not in same space.
12. Where noted on plans.

C. Letter Size:
1. Use 1/8 inch letters for identifying individual equipment and loads such as safety switches, motor starters, and relays.

2. Use 1/4 inch letters for identifying grouped equipment and loads such as panelboards, switchboards, and motor control centers.

2.2 WIRE MARKERS

A. Description: Cloth, tape, split sleeve, or tubing type wire markers.

B. Locations: Each conductor at distribution equipment panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.

C. Legend:
1. Power and Lighting Circuits: Branch circuit or feeder circuit number.
2. Control Circuits: Control wire number corresponding to applicable control schematics.

2.3 CONDUIT MARKERS

A. Location: Furnish markers for each conduit longer than 6 feet. At contractor's option, provide pre-colored conduit. Allied "True color" or equal.

B. Spacing: 10 feet on center, minimum 4" band.

C. Color:
1. 208 Volt System: Silver.
2. Fire Alarm System: Red.
3. Security System: Black.
4. Emergency: Red
5. Comm/Data: Blue

2.4 UNDERGROUND WARNING TAPE

A. Description: 6 inch wide plastic tape, detectable type, A.P.W.A. colored tape with suitable warning legend describing buried electrical lines. Detection shall be by means of continuous integral metal conductor factory installed in warning tape.
1. Red – "Caution Buried Electric Line Below."
2. Orange – "Caution Buried Telephone Line Below."

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive nameplates.

3.2 APPLICATION

A. Install nameplate parallel to equipment lines.

B. Secure nameplate to equipment front using screws.

C. Identify conduit using field painting under provisions of Section 09900.

D. Paint colored band on each conduit longer than 6 feet and conduit stubs.

E. Paint bands 10 feet on center, minimum 4" band.

F. Color:
1. 208 Volt System: Silver.
2. Fire Alarm System: Red.
3. Security System: Black.
4. Emergency: Red
5. Comm/Data: Blue

G. Identify underground conduits using underground warning tape. Install one tape per trench at 12 inches above conduits or duct bank.

END OF SECTION

SECTION 16426 - DISTRIBUTION SWITCHBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pad mounted switchboards.

B. Switchboard accessories.

1.2 REFERENCES

A. NEMA AB 1 - Molded Case Circuit Breakers.

B. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

C. NEMA PB 2 - Dead Front Distribution Switchboards.

D. NEMA PB 2.1 - Instructions for Safe Handling, Installation, Operation and Maintenance of Deadfront Switchboards Rated 600 Volts or Less.

E. NEMA 260 - Safety Labels for Padmounted Switchgear and Transformers Sited in Public Areas.

F. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment (International Electrical Testing Association).

G. NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS FOR REVIEW

A. Section 01310 – Submittals: Procedures for submittals.

B. Product Data: Provide electrical characteristics including voltage and ampere ratings, fault current withstand ratings, and time-current curves of all equipment and components.

C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground; and switchboard instrument details.

1.4 SUBMITTALS FOR INFORMATION

A. Section 01310 – Submittals: Submittals for information.

B. Test Reports: Indicate results of factory production tests.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.5 SUBMITTALS FOR CLOSEOUT

A. See Division 1 Sections Project Record Documents and Project Closeout.: Submittals for project closeout.

B. Record actual locations of switchboard in project record documents.

C. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated. Provide UL service equipment listing and labeling.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with NEMA PB 2.1 and manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.9 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.10 MAINTENANCE MATERIALS

A. See Division 1 Sections Project Record Documents and Project Closeout.

B. Furnish two of each key.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. General Electric.

B. Siemens.

C. Square D.

2.2 MAIN SWITCHBOARD

A. Description: NEMA PB 2 switchboard with electrical ratings and configurations as indicated and specified.

B. Ratings:

1. Voltage: 120/208 volts.
2. Configuration: Three phase, four wire, grounded.
3. Main Bus: As indicated on riser diagram.
4. Integrated Equipment Rating: 200,000 rms amperes symmetrical.

C. Main Section Devices: Bolted pressure switch for use with class L fuses. Provide with electrical shunt trip operator.

D. Distribution Section Devices: Individually mounted and compartmented.

E. Auxiliary Section Devices: Individually mounted and compartmented.

F. Bus Material: Copper, standard size.

G. Bus Connections: Bolted, accessible from front only for maintenance.

H. Fully insulate load side bus bars in rear accessible compartments. Do not reduce spacing of insulated bus.

I. Ground Bus: Extend length of switchboard.

J. Fusible Switch Assemblies: NEMA KS 1, load interrupter enclosed knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Provide mechanism to defeat interlock by qualified persons. Handle lockable in OFF position. Fuse clips: Designed to accommodate Class R fuses. Provide rejection clips to prevent the use of other than class R fuses.

K. Fusible Switch Assemblies, 800 Amperes and Larger: Bolted pressure contact switches. Fuse clips: Designed to accommodate Class L fuses.

L. Line and Load Terminations: Accessible from the front only of the switchboard, suitable for the conductor materials and sizes indicated.

M. Pull Section: 36 inch wide, depth and height to match switchboard.

N. Future Provisions: Fully equip spaces for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents. Provide continuous current rating as indicated.

O. Enclosure: Type 1 - General Purpose.
1. Align sections at front and rear.

2. Switchboard Height: 90 inches, excluding floor sills, lifting members and pull boxes.
3. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide concrete housekeeping pad under the provisions of Section 03300. Provide 6" high pad with 6" x 6" continuous wire mesh at vertical center of pad. Extend pad 3" beyond front and sides of switchboard. Provide 1 inch x 45 degree chamfer at front and side edges.

3.2 INSTALLATION

A. Install switchboard in locations shown on Drawings, according to NEMA PB 2.1.

B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.

C. Install fuses in each switch. See Section 16477.

D. Provide sheet metal barriers to seal any void around equipment if not tight to walls. Gauge and color to match equipment.

3.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.1.

3.4 ADJUSTING

A. See Division 1 Sections Project Record Documents and Project Closeout.: Adjusting installed work.

B. Adjust all operating mechanisms for free mechanical movement.

C. Tighten bolted bus connections in accordance with manufacturer's instructions.

3.5 CLEANING

A. Section 01720 – Cleaning: Cleaning installed work.

B. Touch up scratched or marred surfaces to match original finish.

C. Clean dust and debris from interior and exterior of switchboard.

END OF SECTION

SECTION 16441 - ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fusible switches.

B. Nonfusible switches.

1.2 REFERENCES

A. NECA - Standard of Installation (published by the National Electrical Contractors Association).

B. NEMA FU1 - Low Voltage Cartridge Fuses.

C. NEMA KS1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (published by the International Electrical Testing Association).

E. NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS FOR REVIEW

A. Section 01310 – Submittals: Procedures for submittals.

B. Product Data: Provide switch ratings and enclosure dimensions.

1.4 SUBMITTALS FOR CLOSEOUT

A. See Division 1 Sections Project Record Documents and Project Closeout.: Submittals for project closeout.

B. Record actual locations of enclosed switches in project record documents.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. General Electric.

B. Siemens.

C. Square D.

2.2 FUSIBLE SWITCH ASSEMBLIES

A. Description: NEMA KS 1, Type HD, enclosed load interrupter knife switch. Handle lockable in OFF position.

B. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses. Provide rejection clips to prevent the use of other than Class R fuses.

2.3 NONFUSIBLE SWITCH ASSEMBLIES

A. Description: NEMA KS 1, Type HD enclosed load interrupter knife switch. Handle lockable in OFF position.

2.4 ENCLOSURES

A. Fabrication: NEMA KS 1.
1. Interior Dry Locations: Type 1.
2. Exterior Locations: Type 3R.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with NECA "Standard of Installation."

B. Install fuses in fusible disconnect switches with fuse labels visible from fronts of enclosures.

C. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

D. Provide engraved nameplates for switches not in sight of controlled loads. Indicate load type and location and correct fuse size for fusible switches.

3.2 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.5.

3.3 CLEANING

A. Section 01720 – Cleaning: Clean installed work.

B. Touch up scratched or marred surfaces to match original finishes.

C. Clean dust and debris from interior and exterior of cabinet.

END OF SECTION

SECTION 16470 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Distribution panelboards.

B. Branch circuit panelboards.

1.2 REFERENCES

A. NECA Standard of Installation (published by the National Electrical Contractors Association).

B. NEMA AB1 - Molded Case Circuit Breakers.

C. NEMA ICS 2 - Industrial Control Devices, Controllers and Assemblies.

D. NEMA KS1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

E. NEMA PB 1 - Panelboards.

F. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

G. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment (published by the International Electrical Testing Association).

H. NFPA 70-08-08 - National Electrical Code, 2008 Edition

1.3 SUBMITTALS FOR REVIEW

A. Section 01310 – Submittals: Procedures for submittals.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

C. Arrange circuit breakers in panels same as shown on plans.

1.4 SUBMITTALS FOR INFORMATION

A. Section 01310 – Submittals: Submittals for information.

B. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.5 SUBMITTALS FOR CLOSEOUT

A. See Division 1 Sections Project Record Documents and Project Closeout.: Submittals for project closeout.

B. Record actual locations of panelboards and record actual circuiting arrangements in project record documents.

C. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08-08.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.8 MAINTENANCE MATERIALS

A. See Division 1 Sections Project Record Documents and Project Closeout.

B. Furnish twelve extra panelboard keys. Obtain hand receipt and include with O & M manual.

PART 2 -PRODUCTS

2.1 DISTRIBUTION PANELBOARDS

A. Manufacturers:
1. General Electric.
2. Siemens.
3. Square D.

B. Description: NEMA PB 1, circuit breaker type.

C. Service Conditions:
1. Temperature: 100 degrees F.
2. Altitude: 1000 feet.

D. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.

E. Minimum Integrated Short Circuit Rating: 22,000 amperes rms symmetrical for 208 volt panelboards. Provide higher ratings where indicated.

F. Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for heating, air conditioning, or refrigeration equipment branch circuits. Provide circuit breakers UL listed SWD for NO-OFF control of lighting or other loads.

G. Provide handle locks for certain breakers.

H. Enclosure: NEMA PB 1, Type 1 for dry locations, type 3R for exterior locations.

I. Cabinet Front: Surface type, fastened with hinge and latch, hinged door with flush lock, metal directory frame, finish in manufacturer's standard gray enamel.

J. Where multiple section panel cabinets are specified, all cabinets shall be of same dimensions.

2.2 LIGHTING AND APPLIANCE PANELBOARDS

A. Manufacturers:
1. General Electric.
2. Siemens.
3. Square D.

B. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

C. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard; provide insulated ground bus where scheduled.

D. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 208 volt panelboards. Provide higher ratings where indicated.

E. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for heating, air conditioning, or refrigeration equipment circuits, Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers.

F. Enclosure: NEMA PB 1, Type 1 for dry locations, type 3R for exterior locations.

G. Cabinet Box: 6 inches deep, 20 inches wide. Where multiple section panel cabinets are specified, all cabinets shall be of same dimensions.

H. Cabinet Front: With concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1 and the NECA "Standard of Installation."

B. Install panelboards plumb. Install recessed panelboards flush with wall finishes.

C. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor and with handle of top circuit breaker no more than 6'-6" above floor.

D. Provide filler plates for unused spaces in panelboards.

E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

F. Provide screw-on type engraved plastic nameplates under the provisions of Section 16195.

G. Provide spare conduits out of each recessed panelboard to an accessible location above ceiling. Stub spare conduits out of wall minimum 6" below roof joist in areas with exposed roof structure. Minimum spare conduits: 5 empty 1 inch. Identify each as SPARE.

H. Ground and bond panelboard enclosure according to Section 16170.

I. Do not splice conductors in panelboard cabinets.

J. Land only one conductor to each circuit breaker. Where multiple conductors are used, splice in junction box before entering panelboard.

3.2 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.4 for switches, Section 7.5 for circuit breakers.

3.3 CLEANING

A. Section 01720 – Cleaning: Clean installed work.

B. Touch up scratched or marred surfaces to match original finish.

C. Clean dust and debris from interior and exterior of panelboards.

END OF SECTION

SECTION 16477 - FUSES

PART 1- GENERAL

1.1 SECTION INCLUDES

A. Fuses.

1.2 REFERENCES

A. NFPA 70-08 - National Electric Code, 2008 Edition.

B. NEMA FU 1 - Low Voltage Cartridge Fuses.

1.3 SUBMITTALS

A. Submit under provisions of Section 01310 – Submittals.

B. Product Data: Provide data sheets showing electrical characteristics including time-current curves.

1.4 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1 Sections Project Record Documents and Project Closeout.

B. Record actual fuse sizes.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Furnish products listed and classified by UL as suitable for purpose specified and indicated.

1.7 MAINTENANCE MATERIALS

A. Provide two fuse pullers. Obtain hand receipt and include with O & M information.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Class L: Bussman Hi-Cap or approved equal.

B. Class RK1: Bussman Low-Peak or approved equal.

2.2 FUSE REQUIREMENTS

A. Dimensions and Performance: NEMA FU 1, Class as specified or indicated.

B. Voltage: Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.

C. Switches Larger than 600 amperes: UL Class L (time delay).

D. Switches 600 amperes or Smaller: UL Class RK1 (time delay).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fuses in accordance with manufacturer's instructions.

B. Install fuse with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION

SECTION 16481 - ENCLOSED MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manual motor starters.

B. Magnetic motor starters.

1.2 REFERENCES

A. NFPA 70-08 - National Electrical Code, 2008 Edition.

B. UL 198C - High-Interrupting Capacity Fuses; Current Limiting Type.

C. UL 198E - Class R Fuses.

D. NECA "Standard of Installation," published by National Electrical Contractors Association.

E. NEMA AB 1 - Molded Case Circuit Breakers.

F. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.

G. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

H. NEMA KS 1 - Enclosed Switches.

1.3 SUBMITTALS

A. Submit under provisions of Section 01310 – Submittals.

B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.

C. Test Reports: Indicate field test and inspection procedures and test results.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Square D.

B. Siemens.

C. G.E.

2.2 MANUAL CONTROLLERS

A. Manual Motor Controller: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller without overload element, red pilot light, when not in sight of controlled motor and toggle operator. Flush mount in finished spaces such as toilets and janitor closets.

B. Enclosure: NEMA ICS 6; Type 1 unless otherwise noted.

2.3 AUTOMATIC CONTROLLERS

A. Magnetic Motor Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower.

B. Coil operating voltage: 120 volts, 60 Hertz.

C. Overload Relay: NEMA ICS; melting alloy.

D. Enclosure: NEMA ICS 6, Type 1 for interior, dry locations, Type 3R for exterior locations.

2.4 PRODUCT OPTIONS AND FEATURES

A. Auxiliary Contacts: NEMA ICS 2, 2 each normally open and normally closed.

B. Cover Mounted Pilot Devices: NEMA ICS 2, heavy duty type, HAND-OFF-AUTO rotary switch unless noted otherwise.

C. Pilot Device Contacts: NEMA ICS 2, Form Z, rated A150.

D. Pushbuttons Where Required: Unguarded STOP, shrouded START unless noted otherwise.

E. Indicating Lights: LED type red RUN light unless otherwise noted.

F. Relays: NEMA ICS 2.

G. Control Power Transformers: 120 volt secondary, in each motor starter. Provide fused secondary, and bond unfused leg of secondary to enclosure.

2.5 DISCONNECTS

A. Combination Controllers: Combine motor controllers with thermal magnetic circuit breaker, motor circuit protector or non-fusible switch disconnect as shown in common enclosure.

B. Non-fusible Switch Assemblies: NEMA RS-1 enclosed knife switch with externally operable handle.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Install enclosed controllers where indicated, in accordance with manufacturer's instructions.

B. Install enclosed controllers plumb. Provide supports in accordance with Section 16190.

C. Height: 5 ft to operating handle, switch, or pushbutton.

D. Select and install overload heater elements in motor controllers to match installed motor characteristics.

E. Provide screw-on type engraved plastic nameplates under the provisions of Section 16195. Nameplates shall indicate load type and location and correct fuse size for fusible combination controllers.

F. Provide neatly typed label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

3.2 FIELD QUALITY CONTROL

A. Inspect and test each enclosed controller to NEMA ICS 2.

3.3 CLEANING

A. Section 01720 – Cleaning: Cleaning installed work.

B. Touch up scratched or marred surfaces to match original finish.

C. Clean dust and debris from interior and exterior of motor controller.

END OF SECTION

SECTION 16485 - ENCLOSED CONTACTORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. General purpose contactors.

B. Lighting contactors.

1.2 REFERENCES

A. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

B. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.

C. NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS FOR REVIEW

A. Section 01310 – Submittals: Procedures for submittals.

B. Product Data: Provide dimensions, size, voltage ratings and current ratings.

1.4 SUBMITTALS FOR INFORMATION

A. Section 01310 - Submittals: Submittals for information.

B. Submit manufacturer's installation instructions.

1.5 PROJECT CLOSEOUT SUBMITTALS

A. See Division 1 Sections Project Record Documents and Project Closeout.

B. Record actual locations of each contactor and indicate circuits controlled on project record documents.

C. Maintenance Data: Include instructions for replacing and maintaining coil and contacts.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 GENERAL PURPOSE CONTACTORS

A. Manufacturers:
1. General Electric.
2. Siemens.
3. Square D.
4. ASCO.
5. Allen-Bradley.

B. Description: NEMA ICS 2, AC general purpose magnetic contactor.

C. Coil Voltage: 277 volts, 60 Hertz or as indicated. Separate latching and unlatching coils with coil clearing contacts in series with each coil to ensure only momentary contact.

D. Poles: As scheduled or indicated.

E. Size: As scheduled or indicated.

F. Enclosure: ANSI/NEMA ICS 6, Type as required to meet conditions of installation.

G. Surface mount in janitor, mechanical and electrical spaces. Surface mount above panels where panel is surface mounted. Flush mount above flush mounted panel or surface mount above accessible ceiling.

H. Label per Section 16195.

2. 2 LIGHTING CONTACTORS

A. Manufacturers:
1. General Electric.
2. Siemens.
3. Square D.
4. Asco.
5. Allen-Bradley.

B. Description: NEMA ICS 2, magnetic lighting contactor.

C. Configuration: Mechanically held, 3 wire control.

D. Coils: 120 volts, 60 Hertz. Separate latching and unlatching coils with clearing contacts in series with each coil to ensure only momentary energization of coils.

E. Poles: As scheduled or indicated.

F. Contact Rating: As scheduled or indicated. Match branch circuit overcurrent protection, considering derating for continuous loads.

G. Enclosure: ANSI/NEMA ICS 6, Type as required to meet conditions of installation.

H. Accessories:
1. Auxiliary Contacts: Two field convertible.

I. Label per Section 16195.

2.3 ACCESSORIES

A. Selector Switches: NEMA ICS 2, heavy duty type, 3 position momentary contact selector switch with center off position. Switch factory mounted in door.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount contactors true and plumb according to manufacturer's written instructions.

B. Ensure proper operation by several open/close operations of the load contacts.

3.2 CLEANING

A. Section 01720 – Cleaning: Cleaning installed work.

B. Touch up scratched or marred surfaces to match original finish.

C. Clean dust and debris from interior and exterior of contactors.

3.3 LABELLING

A. Provide engraved nameplate per 16195. Nameplate shall indicate contactor designation and branch circuits controlled. Example: "CONTACTOR LC-1" on first line; "CKTS HAA 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41" on second line.

END OF SECTION

SECTION 16510 - INTERIOR LUMINAIRES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Interior luminaires and accessories.

B. Exit signs.

C. Ballasts.

D. Lamps.

E. Luminaire accessories.

1.2 REFERENCES

A. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.

B. ANSI C82.1 - Ballasts for Fluorescent Lamps - Specifications.

C. ANSI C82.4 - Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type).

D. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

E. NFPA 70-08 - National Electrical Code, 2008 Edition.

F. NFPA 101 - Life Safety Code.

1.3 SUBMITTALS FOR REVIEW

A. Section 01310 – Submittals: Procedures for submittals.

B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

C. Product Data: Provide dimensions, ratings, and performance data.

1.4 SUBMITTALS FOR INFORMATION

A. Section 01310 – Submittal: Submittals for information.

B. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.5 SUBMITTALS FOR CLOSEOUT

A. See Division 1 Sections Project Record Documents and Project Closeout.: Submittals for project closeout.

B. Submit manufacturer's operation and maintenance instructions for each product.

C. Warranty for normal ballasts, exit signs, and emergency standby ballasts.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Conform to requirements of NFPA 101.

C. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Furnish products as scheduled. Contractors wishing to submit voluntary substitutions shall submit complete cut sheet information showing fixture dimensions, options and photometrics. Alternate fixtures must be received at engineers' office minimum two weeks prior to bidding. Engineers' evaluation shall be final. Fixtures submitted without prior approval will be returned to contractor without comment.

2.2 FLUORESCENT BALLASTS

A. Manufacturers:
1. General Electric Ultramax or prior approved equal.

B. Unless otherwise noted, fluorescent ballasts shall be General Electric Ultramax solid state electronic type for use with T8 fluorescent lamps. Ballasts shall have a total harmonic distortion of 10% or less, minimum ballast factor of 0.87 and a minimum power factor of 0.95. Where noted on plans, provide high output General Electric Ultramax ballasts having a ballast factor of 1.15. Maximum input wattage for normal ballast factor ballasts shall be as follows:

		120V	277V
1.	One lamp:	26 watts.	26 watts
2.	Two lamps:	52 watts.	51 watts
3.	Three lamps:	77 watts	75 watts
4.	Four lamps:	101 watts.	99 watts

C. Certify fluorescent ballast design by Certified Ballast Manufacturer, Inc.

2.3 HIGH INTENSITY DISCHARGE (HID) BALLASTS

A. Manufacturers:
1. Sylvania.
2. General Electric.
3. Philips.
4. Advance.
5. Universal.

B. Description: ANSI C82.4, metal halide ballast as indicated on schedule, suitable for lamp specified. Provide high power factor ballasts with best commercially available sound rating and pulse start where available.

C. Voltage: As indicated on schedule volts unless otherwise noted.

2.4 FLUORESCENT LAMP EMERGENCY BALLASTS

A. Manufacturers: Bodine or approved equal.

B. Description: Emergency battery power supply suitable for installation in ballast compartment of fluorescent luminaire or for remote mounting.

C. Ratings: Ballasts to power one F32 lamp: 1100 lumens. Ballasts to power two F32 lamps: 3000 lumens. Provide ballast canister for two lamp ballast for remote mounting above luminaire. Contractor to provide wire and conduit between ballast and luminaire.

D. Battery: Sealed pure lead type, rated for 10 year life. Provide 3 year full warranty.

E. Include TEST switch and AC ON indicator light, installed to be operable and visible from the outside of an assembled luminaire.

2.5 LAMPS

A. Lamp Manufacturers:

1. General Electric Wattmiser Series or prior approved equal.

B. Lamp Types: As specified for luminaire.

C. Unless otherwise noted 4 foot fluorescent lamps shall be premium grade T8 type instant start type rated 28 watts maximum, 2725 lumens minimum, 3500 degrees Kelvin, rendering index (CRI) of 85 or greater. Lamps shall pass federal TCLP criteria (low mercury).

D. Metal halide lamps shall have a constant color temperature of 3000 degrees Kelvin, shall be pulse and have CRI = 85.

E. Lamps of each type shall be by one manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. **Support recessed luminaires independent of ceiling framing.** For recessed fluorescent luminaires, provide four hanger wires fastened at corners of luminaires and at structural joists. Provide two hanger wires for recessed downlights. Supports wires shall be same type and gauge as ceiling support wires.

B. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.

C. Support surface mounted luminaires on grid ceiling directly from building structure.

D. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

E. Install recessed luminaires to permit removal from below.

F. Install accessories furnished with each luminaire.

G. Connect luminaires to branch circuit outlets provided under Section 16130 using flexible conduit. In exposed grid ceiling areas, use premanufactured wiring systems at contractor's option.

H. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

I. Bond products and metal accessories to branch circuit equipment grounding conductor.

J. Install specified lamps in each luminaire.

3.2 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.3 ADJUSTING

A. Aim and adjust luminaries as directed.

B. Position exit sign directional arrows as indicated.

3.4 CLEANING

A. Section 01720 – Cleaning: Cleaning installed work.

B. Clean electrical parts to remove conductive and deleterious materials.

C. Remove dirt and debris from enclosures.

D. Clean photometric control surfaces as recommended by manufacturer.

E. Clean finishes and touch up damage.

3.5 PROTECTION OF FINISHED WORK

A. Prior to final acceptance, relamp luminaires that have failed lamps.

END OF SECTION

SECTION 16530 - SITE LIGHTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exterior luminaires and accessories.

B. Poles.

1.2 REFERENCES

A. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.

B. ANSI C82.1 - Ballasts for Fluorescent Lamps-Specifications.

C. ANSI C82.4 - Ballasts for High-Intensity-Discharge and Low Pressure Sodium Lamps (Multiple-Supply Type).

D. IES RP-8 - Recommended Practice for Roadway Lighting.

E. IES RP-20 - Lighting for Parking Facilities.

F. NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS FOR REVIEW

A. Section 01310 – Submittals: Procedures for submittals.

B. Shop Drawings: Indicate dimensions and components for each luminaire which is not a standard Product of the manufacturer.

C. Product Data: Provide dimensions, ratings, photometric data, and performance data.

D. Provide Auto Cad drawing from lighting manufacturer showing photometric data from pole and building mounted light fixtures. Submittal shall show all relevant information used in calculations. Auto Cad drawings available from engineer after bidding at $65.00 per drawing.

1.4 SUBMITTALS FOR INFORMATION

A. Section 01310 – Submittals: Submittals for information.

B. Test Reports: Indicate measured illumination levels.

C. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

D. Provide computer generated photometric layout at parking lot and building perimeter lighting levels.

1.5 SUBMITTALS FOR CLOSEOUT

A. See Division 1 Sections Project Record Documents and Project Closeout.: Submittals for project closeout.

B. Maintenance Data: For each luminaire.

C. Ballast warranty.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Transport, handle, store, and protect products to avoid damage to poles, luminaires, lenses, and paint finishes.

B. Store poles and luminaires in original shipping containers.

1.9 COORDINATION

A. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

B. Furnish one gallon of touch-up paint. Provide the paint formula to AAFES manager and include with O & M manual for future access to paint. Obtain singed receipt showing manufacturer and paint model number.

PART 2 - PRODUCTS

2.1 LUMINAIRES AND ACCESSORIES

A. Provide luminaires, poles, and accessories as scheduled on plans.

B. Poles shall be high density aluminum.

C. Pole/luminare assembly shall be rated for 100 mph wind loads with a 1.3 gust factor.

2.2 HIGH INTENSITY DISCHARGE (HID) BALLAST

A. Manufacturers:
1. Advance.
2. Universal.
3. Sylvania.

B. Description: ANSI C82.4, metal halide lamp ballast as scheduled.

C. Provide ballast suitable for lamp specified.

D. Provide pulse start lamp and ballast when available.

E. Voltage: Match luminaire voltage.

F. Provide minimum 3 year warranty.

2.3 LAMPS

A. High Intensity Discharge (HID) Lamp Manufacturers:
1 Sylvania.
2. General Electric.
3. Phillips

B. Lamp Types: As specified for luminaire.

C. Lamps shall be as specified for luminaire.

2.4 POLES

A. Material and Finish:
1. Aluminum, dark bronze, square cross section, 0.250 inch wall thickness.
2. Concrete base. Hand rub with grout to give finished appearance.

B. Accessories:
1. Handhole.
2. Anchor bolts.
3. Built-in pole vibration dampeners.

C. Loading Capacity Ratings:
1. Steady Wind: 100 miles per hour, minimum.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide reinforced concrete bases for lighting poles at locations indicated, in accordance with Section 03300.

B. Install poles plumb. Provide double nuts to adjust plumb. Grout around each base.

C. Install lamps in each luminaire.

D. Bond luminaires and metal accessories to branch circuit equipment grounding conductor. Provide supplementary grounding electrode at each pole.

3.2 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

3.3 CLEANING

A. Section 01720 – Cleaning: Cleaning installed work.

B. Clean electrical parts to remove conductive and deleterious materials.

C. Remove dirt and debris from enclosure.

D. Clean photometric control surfaces as recommended by manufacturer.

E. Clean finishes. Use touch-up paint to cover scratched or damaged surfaces.

3.4 PROTECTION OF FINISHED WORK

A Relamp luminaires which have failed lamps at beneficial occupancy.

END OF SECTION

SECTION 16685 - TRANSIENT VOLTAGE SURGE SUPPRESSORS (TVSS)

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Contractor provide:
   1. TVSS units mounted integral to main distribution panelboard (MDP)

1.2 REQUIREMENTS OF REGULATORY AGENCIES

A. Underwriters Laboratory (UL)

B. American National Standards Institute (ANSI)

C. Institute of Electrical and Electronics Engineers (IEEE)

D. National Electrical Manufacturers Association (NEMA)

E. National Fire Protection Association (NFPA)

F. Occupational Safety and Health Act (OSHA)

G. Federal Information Processing Standards, Pub 94 (FIPS)

H. ANSI/IEEE C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits, Category C

I. ANSI/IEEE C62.45, Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.

J. UL 1449, Current Edition - Transient Voltage Surge Suppressors

K. UL 1283

L. NEMA LS-1 (1992), Low Voltage Surge Protective Devices

M. NEC Article 285

1.3 SUBMITTALS

A. In accordance with Section 01310, provide:
   1. Shop drawings and product data sheets indication physical and electrical characteristics in accordance with Division 1.
   2. UL1449 file card copies.
   3. Third party test results verifying label ratings.

1.4 WARRANTY

A. Warrant all equipment for five (5) years from date of shipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Liebert.

B. Current Technology.

C. EFI Electronics.

D. United Power.

E. Leviton.

F. Square D.

G. Seimens ITE.

H. G.E.

2.2 ELECTRICAL REQUIREMENTS

A. Nominal System Operating Voltages
   1. 208Y/120 VAC, 3-phase, 4 wire, plus ground for panelboard units.

B. Minimum Continuous Operating Voltages (MCOV)
   1. 125% of nominal system operating voltage.

C. Operating Frequency
   1. 60 Hertz.

D. Seven (7) Protection Modes on Grounded Wye System
   1. L-G, L-N and N-G (L = Line, N = Neutral, and G = Ground).

E. The TVSS shall be UL Tested and labeled as a complete assembly to a symmetrical fault current rating greater than or equal to the rating of the connected panel, in accordance with NEC Article 285, without the requirement of a dedicated breaker feeder to obtain the fault current withstand rating.

F. The Suppression Voltage Rating (SVR) shall be tested with the integral disconnect in accordance with UL-1449, Second Edition. The UL SVR values shall not exceed the following (including disconnect). If the device is remote mounted it shall be fed by a circuit breaker and the UL SVR rating shall include the breaker in series with the TVSS.

G. Maximum UL 1449 Voltage Surge (Category C1)

System Voltage	L-N, L-G, N-G Modes
208Y/120 VAC	400V

H. Protection and Filtering Elements:
   1. The TVSS shall have a maximum surge current rating of:

      Service Entrance 150 kA per mode.

      Devices that derive a maximum surge current rating by adding test results of individual components are not acceptable. Test documentation of kA rating shall be required. Devices must be rated per mode, not per PHASE per NEMA.
   2. The TVSS device repetitive surge current capacity shall be tested utilizing a 1.2x50ms, 20kV open circuit voltage, 8x20ms, 10kA short circuit Category C3 test waveform (as defined by ANSI/IEEE C62.41-1991 and ANSI/IEEE C62.45-1992) at one minute intervals. A failure is defined as either performance degradation or more than 10% deviation of clamping voltage at the specified surge current. The service entrance device shall be capable of surviving a minimum of 20,000 C3 impulses without failure or performance degradation of more than 10%. Downstream devices shall be capable of surviving a minimum of 5,000 C3 impulses without failure or performance degradation of more than 10%.
   3. The TVSS device shall be capable of surviving a minimum of 5,000 surges using a 10x1000ms impulse (1kV, 4kA for 277/480V devices, .5kV, 2kA for 120/208V devices), confirmed by an independent nationally recognized test lab (R&B Labs).
   4. Systems using selenium, gas tubes or silicon avalanche diodes in surge current path are not acceptable.
   5. The Maximum Continuous Operating Voltage (MCOV) for all voltage configurations shall be 125% of nominal or greater.
   6. The fusing system shall be capable of allowing the rated maximum surge current to pass through without fuse operation. Systems utilizing a fusing system that opens below the maximum surge current level are unacceptable. The fusing system shall be included in the surge current testing.

I. Provide UL1283 listing and minimum electric noise filter attenuation per MIL-STD-200A. Insertion Test Method of 50 dB between 100 kHZ and 100 MHz.

J. Overcurrent Protection:
   1. Fuses rated for 200 KAIC (integral fused disconnect).

K. Diagnostic Monitoring:
   1. Fuse monitoring.
   2. MOV monitoring.
   3. Green/red indicator lights for each phase. Red light indicating damaged phase.
   4. Form C contacts for remote annunciation of unit status.
   5. Press-to-test diagnostics to verify operational integrity of monitoring system.

6. Transient event counter and audible alarm.
7. Remote status monitor.

L. Serviceability:
1. TVSS system module(s) must be field replaceable by qualified individuals or licensed Electricians.

M. Equipment Mounting:
1. Main Distribution Panel TVSS – The TVSS device shall include an integral disconnect switch which has been tested to the surge current rating of the TVSS and match or exceed the fault current rating of the board per NEC 285. The Disconnect must switch the phases and neutral. Use of circuit breakers for disconnect mean is not acceptable due to impedance and the requirement for neutral disconnect. The TVSS shall be mounted integral to the equipment.
2. Branch panel TVSS – the TVSS device shall be direct bus to bus connected. Use of a breaker to feed an integral device shall not be acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install TVSS units per manufacturer's written recommendations.

B. Verify TVSS unit ratings with service rating and voltage characteristics, and with Electrical Requirements section of this specification. Ensure proper system configuration and coordination prior to ordering any equipment.

C. Do not drill or tap equipment bus bars. Use suitable bolted bus connectors.

D. Connect separately mounted TVSS units to equipment with input conductors that are as short and straight as practically possible. Twist input conductors to reduce inductance.

E. Provide source breaker or fused disconnect switch for TVSS units sized in accordance with TVSS manufacturer's recommendations.

F. Ground equipment and TVSS units per manufacturer's recommendations, NEC, and Section 16170.

G. Provide mounting brackets, bus bar, breaker stabs, and filler pieces for unused spaces.

3.2 FIELD QUALITY CONTROL

A. Perform TVSS unit tests according to manufacturer's instructions. Provide verification of test results to Architect/Engineer.

B. Provide services of manufacturer's factory trained Engineer for length of time required to:
1. Coordinate installation.
2. Conduct functional tests on all equipment and field test listed herein.
3. Provide training during normal working hours to AAFES's personnel in operation, testing, adjusting, and maintenance.
4. Submit written report to Architect/Engineer and AAFES stating results of tests conducted and listing personnel trained.

3.3 ADJUSTMENT AND CLEANING

A. Adjust operating mechanisms for free mechanical movement.

B. Tighten bus connections and mechanical fasteners, in accordance with manufacturer's published torque value recommendations and UL 486A and B.

C. Touch-up scratched or marred surfaces to match original finish.

D. Clean interior and exterior of enclosure.

END OF SECTION

SECTION 16741 -TELEPHONE SERVICE, RACEWAYS AND WIRING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Telephone service raceways and cables.

B. Equipment and terminal backboards, building entrance terminals, and gas tube protectors.

C. Outlets and raceway for premises wiring and outlets.

1.2 REFERENCES

A. EIA/TIA 568B - Commercial Building Wiring Standard.

B. EIA/TIA 569 - Commercial Building Standard for Telecommunications Pathways and Spaces.

C. Directorate of Information Management (DOIM). Communications Squadron Standards.

D. National Fire Protection Association (NFPA). NFPA 70-08 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

A. Telephone Service Entrance Raceway: Nonmetallic conduit(s) from point of telephone utility connection to building service. Provide concrete encasement for lengths under paved areas.

B. Telephone Service Cable: 50 pair exchange grade copper cable.

C. Premises Wiring: AAFES furnished/AAFES installed.

D. Accessories: Connector blocks, building entrance terminals, gas tube protectors, jacks, etc.

E. Grounding.

F. The telephone system equipment is AAFES furnished and installed by Exponent Systems.

1.4 SUBMITTALS

A. Submit under provisions of 01310 – Submittals.

B. Product data for cables, outlets, and accessories.

C. Samples: Provide 12" long sample of each cable type showing all printed jacket information.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Divisions 1 Sections Project Record Documents and Project Closeout.

B. Record actual locations and sizes of raceways, outlets, and cable numbering system.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with EIT/TIA, DOIM and commercial telephone utility's rules and regulations.

1.7 QUALIFICATIONS

A. Installer: Workers specializing in installing telephone premises wiring with minimum three years documented experience.

B. Contractors responsible for installing telecom cabling will have a minimum "Technician" BISCI certification.

C. Submit names and qualifications of installers and five similar projects for each installer.

1.8 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Furnish Products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

1.9 SUBMITTALS FOR REVIEW

A. Section 01310 – Submittals: Procedure for submittals.

B. Product data: for cables and accessories.

C. Test: Manufacturer's certified on-reel test results.

D. Samples: Provide 12" sample of each cable type. Choose samples to show all information printed on jacket.

E. Test Results.

PART 2 - PRODUCTS

2.1 TELEPHONE TERMINATION BACKBOARDS

A. Material: Plywood.

B. Size: As indicated, 3/4 inch thick. Coordinate with fire department when area of any back board exceeds 32 sq.ft.

C. The telephone back board shall be painted with two coats of fire retardant paint to match the surrounding walls.

2.2 TELEPHONE CABLES

A. Service cable shall be 24 AWG copper, number of pairs as indicated on plans. Cable shall be jelly filled with rodent resistant black outer jacket. Cable shall have a bonded aluminum shield. Cable shall meet REA specifications for type PE exchange grade cable.

B. Premise Wiring: AAFES furnished/AAFES installed.

2.3 JACKS – AAFES furnished/AAFES installed.

2.4 PATCH PANELS – AAFES furnished/AAFES installed.

2.5 ACCESSORIES

A. Provide the following components for terminations of cables:
   1. Building Entrance Terminals: ATT&T #188ENAI series.
   2. Gas Tube Protectors:
      a. Standard Service: ATT&T #4B1-EW (black)].
      b. Special Circuits: AT&T #4B3-EW (red). For fire alarm, intrusion detection, and remote signaling.
   3. Wiring Blocks: 110AW1 series with legs.
   4. Connecting Blocks: 110C-4 (4 pair).
   5. Designation strips indicating correct cable and pair count on wiring blocks.
   6. Splice Cases: Re-enterable jelly filled stainless steel. 3M or equal.

2.6 GROUNDING

A. Provide a single point ground for all communications electronic equipment. Ground shall be by a copper ground plate 6" width x length of terminal board. Install ground plate along bottom edge of terminal board. Connect ground riser with #1 AWG directly connected to ground plate with no taps. Resistance shall be 10 ohms or less measured from main ground point.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Stub minimum ¾" conduit (or larger where indicated) from each outlet location up to roof level. Provide bushing at end of conduit.

B. Provide wire and cable in accordance with manufacturer's instructions and in accordance with EIA/TIA 568.

C. Finish paint termination backboards with durable white enamel under the provisions of Section 09900 prior to installation of telephone equipment.

D. Support raceways, backboards, and cabinets under the provisions of Section 16190.

E. Install termination backboards plumb, and attach securely to building wall at each corner.

F. All discrepancies must be retested/inspected and the results certified correct, in writing, by the DOIM QC representative prior to any final acceptance.

G. The contractor shall perform the following cable tests on service cable:
   1. Conductor OHM's resistance.
   2. Cable shield continuity.
   3. Conductor continuity including testing all pairs for; opens, shorts, grounds, crosses, splits, reversed and transposed pairs.
   4. Insulation resistance test between all groups including grounds and/or shields, and a minimum of 20% of the total conductors in each group.
   5. All voice circuits shall be toned out, tested for opens, shorts, grounds, and crossed pairs.

END OF SECTION

SECTION 16901 - ELECTRICAL SENSING AND MEASUREMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Watthour meters.

B. Instrument transformers.

1.2 REFERENCES

A. ANSI C12 - Code for Electricity Metering.

B. ANSI C39.1 - Requirements for Electrical Analog Indicating Instruments.

B. ANSI C57.13 - Requirements for Instrument Transformers.

C. NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS

A. Submit under provisions of Section 01310 Submittals.

B. Product Data: Provide electrical ratings, adjustment ranges, enclosure type, outline dimensions, mounting dimensions, and terminal connection information.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08-05.

B. Provide Products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

PART 2 - PRODUCTS

2.1 WATTHOUR METERS

A. Digital Watthour meter:
   1. Provide microprocessor-based multifunction meter with liquid crystal display. Provide the functions listed below.
   2. Metering values shall be phase selectable and include Amps for each phase and neutral, Volts (L-L & L-N), Watts, Vars, Voltamperes, Power Factor, Watthours, Varhours (Lag & Lead), Voltamperehours, Current Demand, Peak Current, Watt Demand, Peak Watts, Peak Vars (Lag & Lead), Var Demand (Lag & Lead), Peak Voltamperes, Voltampere Demand, Q-Hours, Power Factor Average, Power Factor during last Demand Interval, and Frequency.
   3. The device configuration, values, and settings entered via keypad on the front of the faceplate.
   4. Meter shall allow definition of a password to provide security protection.
   5. Meter shall accept 5A current inputs and direct voltage inputs up to 600Vac. Meter shall be self-powered from the voltage inputs. Accuracy shall be 0.5% for watt hours and 0.25% for amperes and voltage. Meter shall have pulse-initiation out-put programmable for Watthours, Voltampere hours, Varhours, or Qhours. [Pulse initiator and contacts shall be compatible with Installation Energy Monitoring and Control System (EMCS)].
   6. Manufacturers:
      a. General Electrical
      b. Siemens.
      c. Square D.

B. Factory mount meter in switchboard.

2.2 METERING TRANSFORMERS

A. Manufacturers:
1. General Electric.
2. Siemens.
3. Square D.

B. Current Transformers: ANSI C57.13; 5 ampere secondary, bar or window type, with primary/secondary ratio as required or shown on Drawings, burden and accuracy consistent with connected metering and relay devices, 60 Hertz. Primary ampere rating shall be 60 to 80 percent of service equipment ampere rating.

C. Factory mount metering transformers in switchboard.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Field calibrate current transformers and watthour meter to ± 1% accuracy or better. Under section 01720 – Project Record and Closeout Documents, submit calibration results as part of O & M manual.

END OF SECTION

SECTION 16902 - ELECTRIC CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Time switches.

1.2 REFERENCES

A. NEMA ICS 1 - General Standards for Industrial Control Systems.

B. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.

C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

D. NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS

A. Submit under provisions of Section 01310 – Submittals.

B. Product Data: Provide for each component showing electrical characteristics and connection requirements.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Furnish Products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Time switches shall be astronomic, seven day plus 365 day solid state electronic type, capable of independent programming of two (2) independent channels, with programmable automatic daylight savings time adjustment, and shall be housed in a lockable, non-metallic, surface mount case.

B. Switches shall be capable of fully independent 7 day scheduling, with up to 3 ON and 3 Off times per channel per day, plus a special 365 holiday schedule, assigned by month and day.

C. They shall be capable of independent duty cycling during the scheduled ON time, with up to 3 patterns per channel per day and built-in 5 minute short cycle protection.

D. They shall have independent timed override for each channel for manual control and be programmable independently per channel per day, from 1 minute to 23 hours and 59 minutes.

E. Switches shall have brown-out protection and automatic 4 second load staggering when channels are programmed to be ON at the same time or after power outages and shall be equipped with a rechargeable carry-over system for up to 14 hours of carry-over. Switches shall perform a self-test every 60 seconds to assure a fail-safe operation.

F. Time switches shall be powered by a 120VAC, 60HZ source. Contact configuration to be N.O. (N.C.) for each channel, with a rating of 15 amperes ballast, 120/240/277VAC. Contact closure on time switch shall be momentary for pilot control of mechanically held contactors and relays.

G. Manufacturers for time switches:
   1. Time Switch: Tork #DZM200A.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment according to manufacturer's written instructions.

B. Train and lace wiring in cabinets.

C. Program time switches according to instructions from Contracting Officer.

D. Label each time switch with engraved nameplate.

E. Label each time switch load contact indicating contactors controlled by each load contact.

F. Provide two hours training of AAFES personnel in programming operations.

END OF SECTION

SECTION 16904 - OCCUPANCY SENSORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Occupancy sensors for lighting control.

1.2 REFERENCES

A. NFPA 70-08 - National Electrical Code, 2008 Edition.

1.3 SUBMITTALS

A. In accordance with Section 01310 – Submittals, provide:
   1. Product Data: Provide electrical ratings, adjustment ranges, enclosure type, outline dimensions, mounting dimensions, and terminal connection information.
   2. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
   3. CAD generated lighting plans for each building marked by occupancy sensor manufacturer showing proper product, location, and orientation of each sensor.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70-08.

B. Provide Products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

PART 2 - PRODUCTS

2.1 SENSORS

A. Dual technology sensors shall employ both passive infrared and ultrasonic detection methods. Sensors shall have a multiple segmented lens and provide coverage for up to a 40' x 40' room.

B. All sensors shall be capable of operating normally with any electronic ballasts and compact fluorescent lamp systems.

C. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.

D. All sensors shall have readily accessible, user adjustable controls for time delay (0 - 15 minutes) and sensitivity.

E. In the event of failure, a bypass manual “override on” shall be provided on each sensor. When bypass is utilized, control shall divert to a wall switch until sensor is replaced.

F. All sensors shall provide a method of indication to verify that motion is being detected during testing and that the unit is working.

G. All sensors shall have no leakage current to load, in manual or in Auto/Off mode, for safety purposes and shall have voltage drop protection.

2.2 CIRCUIT CONTROL HARDWARE - CU

A. Control unit(s) shall mount through a 2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Transformer shall provide power to a maximum of four (4) sensors and shall power to a larger number of sensors where indicated on plans.

B. Relay contacts shall have ratings of:
   1. 20A - 277 VAC Ballast.
   2. Where noted on plans, provide relays with two (2) load contacts.

C. Control wiring between sensors and controls units shall be Class II, 18-24 AWG, stranded UL Classified, jacketed cable. Cable shall be plenum rated.

2.3 MANUFACTURERS

A. Leviton.

B. Wattstopper.

C. Hubble.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and aim sensors in the correct location required for complete coverage. Rooms shall have ninety (90) to one hundred (100) percent coverage. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. Provide additional sensors if required to properly and completely cover the respective room.

B. **Meet with the manufacturer's factory authorized representative, at the jobsite, to verify placement of sensors and installation criteria prior to beginning work.**

C. Locate sensors to ensure the best possible coverage in the available space and to overcome local difficulties due to space limitations or interference of structural components. Provide training necessary to familiarize Owner's key personnel with the operation, use, adjustment, and problem solving diagnosis of the occupancy sensing devices and systems.

END OF SECTION

SECTION 16950 - TESTING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Provide:
1. Testing of electrical components and systems:
   a. Insulation resistance test.
   b. Grounding electrode test.
   c. Continuity test.
   d. Voltage test.
   e. Phase relationship verification.
   f. Fire alarm acceptance test.
   g. Power transmission equipment test.
2. Test reports.
3. Correction of defective components or systems.
4. Retest of corrected components, systems.

1.2 SUBMITTALS

A. Test Reports: Submit seven (7) copies of all test reports to Contracting Officer.
1. Type each test report on 8-1/2 inch x 11 inch paper. Include:
   a. Project Number.
   b. Project title and location.
   c. Test performed.
   d. Date performed.
   e. Test equipment used.
   f. Contractor's name, address and telephone number.
   g. Testing firm's name, address and telephone number if other than Contractor.
   h. Name (s) and title (s) of person (s):
      1. Performing test.
      2. Observing test.
   i. Statement verifying each test.
   j. Nameplate data from each motor and equipment item tested.
   k. Test results.
   l. Retest results after correction of defective components, systems.
2. For each copy, assemble all test reports and bind them in a folder. Label each folder, "Electrical Test Reports".

PART 2 - PRODUCTS

2.1 MATERIALS: Furnish all equipment, manpower and casual labor to perform specified testing.

PART 3 - EXECUTION

3.1 PREPARATION

A. When temporary electrical service is used for testing, do not energize any equipment or portion of permanent system that exceeds capacity of temporary service.

B. Ensure that all electrical work is complete and ready for testing.

C. Disconnect all devices or equipment that might be damaged by application of test voltages, voltage of reversed phase sequence or other test procedures.

3.2 TESTING: Conduct tests and adjust equipment to verify compliance with specified performance.

3.3 INSULATION RESISTANCE TESTS

A. Resistance measured; line-to-ground.

B. Perform testing on the following items:

	Item Tested	Voltage of Test	Min. Acceptance Resistance in Megohms
1.	No. 2 and larger cables (600V)	1000V	50
2.	Motors	500V	5
3.	Switchboard and Panelboard Buses	1000V	25

3.4 GROUNDING ELECTRODE TEST: Measure and record ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Maximum acceptable resistance: 10 ohms. When resistance exceeds 10 ohms drive and bond another ground rod, one ground rod length away and repeat test.

3.5 CONTINUITY TESTS: Test branch circuits and control circuits to determine continuity of wiring and connections.

3.6 VOLTAGE TESTS

A. Make and record voltage tests and recorded at the following listed points. Conduct tests under normal load conditions.
   1. Service entrance at main panel.
   2. Terminals of all motors.

3.7 PHASE RELATIONSHIP

A. Examine connections to equipment for proper phase relationships. Verify proper motor rotation.

3.8 FIRE ALARM ACCEPTANCE TEST

A. Have the fire alarm acceptance test performed by the Alarm Company Representative and Installing Contractor in the presence of the Base Fire Chief's Representative.

B. Acceptance Test Procedures:

	PANEL/RECEIVING STATION	EXPECTED INDICATION ON PREMISES AND REMOTE STATION
1.	Normal Power to Panel	(Normal)
2.	Disconnect Power to Panel	(Trouble)
3.	Activate Detection Device	(Alarm)
4.	Silence Alarm Signaling Devices	(Trouble)
5.	Return Normal Power to Panel & Reset Panel	(Normal)
6.	Place Each Function Switch in an Abnormal Position	(Trouble)
7.	Remove supervised Devices from System (During this portion of testing, ensure proper wire has been used and devices are properly installed.)	
8.	Return Supervised Device to System	(Normal)
9.	Disconnect Normal Power to Panel	(Trouble)
10.	Activate Detector(s) for each Zone	(Alarm)
11.	Inspect all Horns Zone Indication, and Auxiliary Devices	(Working List)
12.	Silence Horns	(Alarm/Trouble)
13.	Reset System	(Trouble)
14.	Return Normal Power to System	(Normal)
15.	Place Panel in Alarm Condition. Disconnect Primary Power Source for a Minimum of 15 Seconds and Return to Normal Power. (The above transfer procedure shall not cause a loss of an alarm condition at Receiving Station.)	

3.9 CORRECTION OF DEFECTS

A. When tests disclose any unsatisfactory workmanship or equipment furnished under this Contract, correct defects and retest. Repeat tests until satisfactory results are obtained.

B. When any wiring or equipment is damaged by tests, repair or replace such wiring or equipment. Test repaired items to ensure satisfactory operation.

END OF SECTION

EVERGREEN
ARCHITECTS

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