Project Number 876-NRM18-14

2018 SERVICE BUILDING RENOVATIONS

at the

Salisbury National Cemetery
(Historic Site)

Technical Specifications

TECHNICAL SPECIFICATION
TABLE OF CONTENTS
April 6, 2018

SECTIONS:

DRAWINGS:

SECTION 01 00 02
GENERAL REQUIREMENTS

1.1 STATEMENT OF BID ITEM(S)

A. Contractor shall provide all labor, tools, materials, equipment, services, submittals, supervision, approvals, and related work to make noted Service Building renovations and repairs for the "2018 Service Building Renovations" (NRM) Project located at the Salisbury National Cemetery on the south side of South Railroad Street along Government Drive. The work includes twelve (12) generally different Projects identified as follows:

1. **"Select Demolition"**: this work is for the removal and disposal of item shown on the "Demolition Plan" drawing to include the removal of the of existing exterior wood siding, metal doors and frames of the shed addition located on the southeast corner of the service building and the removal of the metal box and conduit located on the west side of the building. All work shall be in conformance with Division 1 – "General Requirements" and Section 02 41 10 "Select Demolition".

2. **"Gutter Replacement & Repair"**: this work is for the repair, fabrication, and replacement of the existing building roof gutter and downspouts located on all sides of the original Service Building. The work includes replacing gutters and downspouts, changing direction of gutter, fabrication and installation of roof collection box, providing new fasteners and securing for a complete working system as shown on the Drawings. All work shall be in conformance with Division 1 – "General Requirements" and Section 07 71 23 "Gutters and Downspouts".

3. **"Painting of Exterior Wood"**: this work is for the restoration of wood trim on all sides and all sections of the Service Building. Work includes scraping and chipping of painted wood surfaces, providing two coats of primer, and two coats of paint to match the existing wood trim around building, windows, and garage door openings. All work shall be in conformance with Division 1 – "General Requirements" and Section 09 91 00 "Painting of Exterior Wood".

4. **"Garage Door Replacement"**: this work is for replacement of garage door's "A" & "B" as shown on Drawings. Work will include the removal and replacement of existing doors with an aluminum "overhead roll-up door" that is similar to the existing bay door located on the north end building addition. All work shall be in conformance with Division 1 – "General Requirements" and Section 08 33 24 "Overhead Roll-up Doors".

5. **"Exterior Stucco Maintenance and Repair"**: this work is for the cleaning and repair including finish painting of all existing and new stucco surfaces on all sides of the Service Building. Work will include cleaning, crack repairs, stucco repair work, and painting of new and existing stucco surfaces. All work shall be in conformance with Division 1 – "General Requirements" and Section 04 02 00 "Historic Stucco Maintenance & Repair".

6. **“Window Replacement”**: this work is for the complete replacement of existing Windows No. 1, No. 2, and No.3 at locations shown on the Drawings. Work will include the removal and replacement of wood sill and frame. Provide and install windows to match existing window on north end building addition. All work shall be in conformance with Division 1 – “General Requirements”, Division 8 – “Doors and Windows” and Division 9 – “Finishes”.

7. **“Window Restoration”**: this work is for the complete restoration of Windows No. 4, No. 5, No. 6, and No.7 at locations shown on the Drawings. Work will include the removal of broken windows and loose putty, replacement of window glass, glazing, repainting all wood surfaces, and providing new hardware. All work shall be in conformance with Division 1 – “General Requirements” and Section 08 51 03 “Historic Treatment of Wood Windows”.

8. **“Exterior Security Lighting Improvements”**: The miscellaneous improvements required for the west side of the service building include the removal of the existing flood light over the garage door and furnishing and installing a LED wall pack fixture centered above garage door “A” and just below the roof gutter. The miscellaneous improvements required for the east side of the service building include the removal of the existing flood light above the porch roof and furnishing and installing a LED wall pack fixture centered over the porch roof just below the roof gutter. All work shall be in conformance with Division 1 – “General Requirements” and Section 26 56 20 “LED Exterior Lighting & Controls”.

9. **“HVAC Improvements”**: this work is for the removal, disposal, and replacement of the existing heat pump located on the outside northwest corner of the building and replacement of the air handling unit located in the attic of the new addition. Work will include the removal, disposal, and replacement of the units along with submittals, start-up services, and providing O&M manuals. All work shall be in conformance with Division 1 – “General Requirements” and Section 23 05 11 “HVAC Improvements”.

10. **“Eye-Wash Station Improvements”**: this work is for furnishing and installing an Electric Tankless Water Heater improvements at the existing eye-wash station located on the east end of the service bay in the building addition. Work will include submittals, mounting, plumbing connections, wiring to nearby electric panel, providing adequate size breaker, Start-Up, and providing O&M manual. All work shall be in conformance with Division 1 – “General Requirements” and Section 22 33 13 “Electric Tankless Water Heaters”.

11. **“Space Heating Improvements”**: this work is for the replacement of two (2) non-working heaters located in the older portion of the Service Building. This includes the wall unit located in the restroom and the overhead heating unit located in the maintenance shop. Work will include removing, disposing, submittals, furnishing, installing, providing new conduit and breaker in the electrical panel. All work shall be in conformance with Division 1 – “General Requirements” and Section 23 82 39 “Electric Unit Heaters”.

12. **“Lighting Controls Improvements”**: this work is for replacing the existing light timer switch located just west of the original electric panel in the maintenance shop. Work includes the removal, disposal, submittals, furnishing, installing the unit, start-up, and providing O&M manual. All work shall be in conformance with Division 1 – “General Requirements” and section 26 56 20 “LED Exterior Lighting & Controls”.

1.2 GENERAL PROJECT REQUIREMENTS

A. The Contractor shall comply with the following General Project Requirements:

1. CONTRACTOR SHALL READ AND COMPLY WITH ALL CONDITIONS OF THIS CONTRACT INCLUDING THE TECHNICAL SPECIFICATION AS IT RELATES TO ALL REQUIREMENTS, PRODUCTS & MATERIALS, SUBMITTALS, TESTING, AND EXECUTION.

2. CONTRACTOR SHALL HAVE HARD COPIES OF ALL CONTRACT DOCUMENTS, DRAWINGS, TECHNICAL SPECIFICATIONS, AND ALL PERMIT APPROVALS AT THE PROJECT SITE AT ALL TIME.

3. CONTRACTOR SHALL NOT BEGIN ANY EXCAVATION UNTIL ALL THE APPROPRIATE UNDERGROUND UTILITES HAVE BEEN LOCATED AND MARKED IN THE FIELD.

4. CONTRACTOR SHALL MINIMIZE THE NEED FOR RESTORATION TO THE LAWNS, PAVEMENT, OR OTHER FEATURE ALONG THE PATH OF THE WORK.

5. CONTRACTOR SHALL CONDUCT WORK WITH THE SPECIAL CARE, REVERENCE, DIGNITY, AND RESPECT THAT ACKNOWLEDGE THE CEMETERY AS THE FINAL RESTING PLACE THAT COMMEMORATES THE SERVICE AND SACRIFICE THAT SERVICE MEMBERS, VETERANS AND THEIR FAMILIES MADE FOR OUR NATION.

6. CONTRACTOR SHALL KEEP THE PROJECT WORK SITE CLEAN AND TIGHTY AT ALL TIME. AT THE END OF EACH WORK DAY, ALL MATERIAL AND EQUIPMENT SHALL BE STORED IN A DESIGNATED PLACE PER THE CEMETARY DIRECTOR.

1.3 SPECIFIC WORK ITEMS INCLUDED

The Contractor will be required to perform the following basic tasks as part of his work for this Project:

A. Contractor shall furnish all tools, labor, materials, equipment, services, and related service to perform work described within the Drawings, Contract, Statement of Work, and Technical Specifications.

B. Contractor shall obtain the services and pay for private locator to locate all underground utilities within the project area. There shall be no demolition or excavation until all utilities have been located and marked in the field.

C. Contractor shall secure, install, and comply with all permit requirements for Soil Erosion & Sediment Control prior to conducting any work.

D. Contractor shall make proper notification to the COR on Demolition work. Contractor shall adhere to the “Demolition Plan”.

E. Contractor shall provide all traffic control to perform work. Traffic Control measures shall be in conformance with local and state DOT Standards and Specifications.

F. Contractor shall remove and properly dispose off-site all excess or unsuitable materials from the Demolition and Construction activities.

G. Contractor shall install 6-inch schedule 80 PVC Solid Pipe from the existing down spouts located along the west side of the Service Building to the proposed catch basins as shown on Drawing 803-NRM18-10-004.

H. Contractor shall cut concrete trench and install 6-inch PVC pipe from relocated downspout to grass surface in front of garage door “B” as shown on Drawing 876-NRM18-14-003. Work is part of “Gutter Replacement & Repair”.

I. Contractor shall provide and install downspout extension away from the building in the southeast corner of the Service Building as shown on Drawing 876-NRM18-14-005. Work is part of “Gutter Replacement & Repair”.

J. Contractor shall remove and replace existing line sets between the Air Handling Unit and the Heat Pump as part of the “HVAC Improvements” work.

K. Contractor shall remove and replace existing HVAC thermostat with seven day programable thermostat that is compatible with the HVAC equipment as part of the “HVAC Improvements” work.

1.4 DRAWINGS

A. The following Drawings are made part of this Contract:

1. 876-NRM18-14-001 Site Plan / Project Location
2. 876-NRM18-14-002 Demolition Plan
3. 876-NRM18-14-003 Exterior Renovation – East View
4. 876-NRM18-14-004 Exterior Renovation – West View
5. 876-NRM18-14-005 Exterior Renovation – North View
6. 876-NRM18-14-006 Interior Electro Mechanical Improvements

1.5 SITE VISIT

A. Bidders may inspect the site, investigate by observation, and Request Information via (RFI) and responses through the Contracting Office to satisfy their understanding of the work to be done, all general, local and technical conditions that may affect the cost and the feasibility of their proposal.

B. In no event, shall failure of the Bidder to inspect the site constitute grounds for a claim after Award. Bidders planning to conduct a site visit shall contact the Cemetery Director or Foreman to make arrangements at the following:

Government POC:

Salisbury National Cemetery

Steve Fezler, Cemetery Director

707-636-2661 x 103

Steve.Fezler@va.gov

District Engineer POC:

Ron Horton, P.E., Project Engineer / COR

North Atlantic District (NAD) Project Engineer

(215) 381-3787 (ext. 5799)

Ronald.Horton@va.gov

1.6 SAFETY REQUIREMENTS

A. Contractor foreman shall be onsite during all work activities and shall have completed OSHA 30-hour training. All other employees and sub-contractors shall have as a minimum, 10-hour OSHA training. Prior to commencing work, Contractor shall provide proof that an OSHA certified “competent person” (CP) (29 CFR 1926.20(b)(2)) will maintain a presence at the work site whenever the general or subcontractors are present.

B. Contractor shall provide safeguards, including warning signs, barricades, temporary fences, warning lights, and related items that are required for protection of all personnel during demolition and removal operations.

C. Contractor shall ensure that all Fire and Safety Rules observed in performance of work: Wherever a cutting torch or other equipment that might cause a fire is used, the Contractor shall provide and maintain fire extinguishers nearby ready for immediate use. Contractor shall instruct all possible users in use of fire extinguishers.

1.7 PERFORMANCE DETAILS

A. Contractor shall complete all work within **90 calendar days** after receipt of Notice to Proceed, subject to all terms, conditions, provisions and schedules of the contract. No cost time extension will be considered for cold weather delays as requested by the Contractor.

B. Work Hours: Work may be performed between the normal hours of 8:00 a.m. and 4:30 p.m., Monday through Friday. The following conditions also may applicable:

1. At the Contractor’s request; with prior coordination with the Cemetery Director and with the written permission of the COR; work will also be permitted to be scheduled for weekends and/or Holidays, only in the following situations:

2. In emergency situations caused by the Contractor, or when severe adverse weather prohibits work during the week, the Contractor shall arrange to work on weekends and/or holidays to meet the contract performance period.

3. The Government will not compensate the Contractor for any alternate work schedules needed to complete all contract work within the contract performance period.

4. No work will be permitted during Memorial Day or Veteran’s Day weekend activities or during any other Federal Holidays.

5. No work will be performed at the immediate site of a scheduled interment or ceremony.

6. Notwithstanding, if any work under this contract is required outside of the VA's normal working hours (8:00 a.m. to 4:30 p.m. Monday through Friday excluding holidays), the Contractor shall coordinate with the Cemetery Director and COR and request a deviation in writing to the COR at least 72 hours in advance.

C. When working on a Government site, the Contractor shall coordinate with the Cemetery Director daily, before start of work, the daily work schedule to ensure that no work is being performed at the immediate site of a scheduled interment or ceremony. The Contractor shall note the following:

1. **Burial activities at a National Cemetery shall take precedence over Contractor activities. Cemetery interment services cannot be disturbed at any time.**

2. **To cause the least possible interference with cemetery activities, the Contractor shall cease all work in areas where burials are taking place.**

3. **Contractor equipment and personnel are prohibited from passing through the procession or service area during the burial period.**

D. The Contractor shall execute daily work in such a manner as to interfere as little as possible with work being done by others. Keep roads clear of materials, debris, equipment and vehicles at all times. Materials and equipment shall not be stored in other than assigned areas. At the end of each day the Contractor shall maintain all Contractor and Government property impacted by the Contractor’s performance of work in a high standard of quality and cleanliness required for a national shrine.

E. Contractor personnel are subject to the cemetery rules of conduct. The Contractor is responsible for ensuring that no contract work causes any committal service, ceremony, procession or visitation to be delayed, altered, or otherwise impacted in such a way that the dignity, security, or safety of the event or visit is compromised.

F. Motor Vehicle Restrictions: Contractor, employees, and Sub-Contractors shall coordinate parking and access with the Cemetery Director.

1.8 OPERATIONS AND STORAGE AREAS

A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Cemetery Director or COR. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance. Contractor shall coordinate all work and obtain and pay for any required permits necessary for completion of this project.

B. The Contractor shall use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer Representative. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading

capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged utilities, curbs, sidewalks, roads, or any other site feature.

C. Construction Fence shall be required only when noted on construction drawings or as directed by the COR. Before construction operations begin, Contractor shall provide a chain link construction fence, seven feet minimum height, around the construction area when indicated on the drawings. Provide gates as required for access with necessary hardware, including hasps and padlocks. Fasten fence fabric to terminal posts with tension bands and to line posts and top and bottom rails with tie wires spaced at maximum 15 inches. Bottom of fences shall extend to one inch above grade. Remove the fence when directed by the COR.

D. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of the Cemetery Director and COR. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without a detailed work plan, and the Cemetery Director’s prior knowledge and written approval.

E. Contractor shall submit a request to interrupt any such utility services to the COR, in writing, 7 days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.

F. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Cemetery. Interruption time approved by Cemetery may not occur at other than Contractor's normal working hours.

G. Major interruptions of any other system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the COR.

H. Abandoned Lines: All service lines such as wires, cables, conduits, ducts, pipes and the like, and their hangers or supports, which are to be

abandoned but are not required to be entirely removed, shall be sealed, capped or plugged at the main, branch or panel they originate from. The lines shall not be capped in finished areas, but shall be removed and sealed, capped or plugged in ceilings, within furred spaces, in unfinished areas, or within walls or partitions; so, that they are completely behind the finished surfaces.

I. The Contractor shall minimize interference of construction activities with flow of Cemetery traffic and comply with the following:

1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.

2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be coordinated and approved by the Cemetery Director and the COR.

J. Coordination of Construction with Cemetery Director: The burial activities at a National Cemetery shall take precedence over construction activities. The Contractor shall cooperate and coordinate with the Cemetery Director, through the COR, in arranging construction schedule to cause the least possible interference with cemetery activities in actual burial areas. Construction noise during the interment services shall not disturb the service. Trucks and workmen shall not pass through the service area during this period:

1. The Contractor is required to discontinue his work 24 hours in advance of Easter Sunday, Mother's Day, Father's Day, Memorial Day, Veteran's Day and/or Federal holidays, to ensure that all areas of operation adjacent to existing burial plots are clean and immaculate before these dates.

2. Daily Cleaning shall include the removal of all equipment, tools, materials and debris and leaving the areas in a clean, safe, and neat condition.

K. The Contractor shall clean any Government property; including cemetery structures, headstones and monuments; that are soiled or stained because of Contractor's performance. The Contractor shall wash-down with water all soiled or stained structures, headstones and monuments at the end of

each workday. Any such cleaning or washing shall be brought to the immediate attention of the COR prior to cleaning or washing. No hazardous chemicals shall be used at any time on Government property.

L. At the end of each work day, the Contractor shall remove all debris from the cemetery site resulting from the performance of the work. The Contractor shall ensure at all times that rubbish and trash generated by the Contractor is kept clear of vehicular and pedestrian traffic throughout the site. The Government will not provide receptacle(s) for disposal of debris related to this contract. The Contractor will be permitted to place trash receptacle dumpsters in the COR approved staging area at the National Cemetery.

1.9 Contractor Personnel Standards of Behavior (Work on a Government Installation)

A. Dignity Clause:

1. Every action by Contractor personnel at a national cemetery shall be performed with the special care, reverence, dignity, and respect that acknowledge the cemetery as the final resting place that commemorates the service and sacrifice that service members, Veterans and their families made for our Nation. Critically important is the awareness required of the Contractor employees of the remains buried in the grounds where the work is performed. The utmost care shall be given to these remains and the headstones and flat grave markers that mark those gravesites and memorialize the service of individuals.

2. Contractors shall not walk, stand, lean, sit or jump on headstones or markers. Nor shall they drive over them. Contractor personnel should use tools approved by the Contracting Officer Representative (COR), such as shovels, pry bars or pinch bars to lift flat markers out of the ground; pick axes are not an acceptable tool.

B. Smoking is prohibited inside any buildings at the cemetery. Possession of weapons is prohibited from any cemetery buildings and grounds. Enclosed containers, including tool kits, shall be subject to search. Violations of VA regulations may result in citation answerable in the United States (Federal) District Court, not a local district, state, or municipal court

C. Contractor personnel are required to adhere to the following standards of dress, conduct, supervision and training while performing work on a Government Installation. Any violations shall be subject to immediate enforcement action by the Contracting Officer if these standards are not met. Contractor is responsible for training and safety precautions prescribed by OSHA regarding safety equipment and devices. Contractor personnel shall:

(1) Be fully clothed at all times, to include upper garment to cover body from the waist to the neck and long pants or slacks. Garments, which have a message, slogan or printing

of any kind other than the Contractor's business attire, are prohibited. Uniforms are acceptable.

(2) Maintain a neat and professional appearance throughout its workforce, vehicles, equipment, and maintenance areas. Uniforms are acceptable. If uniforms are used, they must be in unison among all employees.

(3) Not engage in loud or boisterous behavior, angry outbursts or use profane or abusive language at any time on Government premises. Playing radios and/or electronic games/devices shall only be done at lunchtime and in a designated break area. Due to the sensitive mission of the cemetery, Contractor employees shall come into daily contact with grieving individuals, therefore Contractor employees shall exercise and exhibit absolute decorum, courtesy, and respect while within the cemetery or at its perimeter or entrances. Inquiries from cemetery visitors shall be politely referred to Government cemetery staff. Gratuities of any kind are strictly prohibited.

(4) Consume food and beverage only within areas designated by the cemetery director (or his/her designated representative). Intoxication, and violence or criminal acts of any kind shall not be tolerated and is cause for immediate removal from a Government Installation. Use or sale of intoxicating beverages and/or drugs is strictly prohibited and use of tobacco products is only allowed in specific areas designated by the Cemetery Director (or his/her designated representative).

(5) Only take breaks/rest periods, lunch breaks and bathrooms breaks in the Contractor Break Area, designated by the Cemetery Director (or his/her designated representative), not in the field. Misconduct shall form the basis for immediate contract enforcement action, to include immediate removal from the cemetery.

(6) The Contractor shall ensure that his/her employees (including Contractor Consultants, Sub-Contractors, etc.) are aware of all the terms and conditions set forth in the contract regarding the "Dignity Clause", their performance, and conduct while at the Cemetery.

1.10 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only

remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those utilities, facilities, or any site condition including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer Representative will have the necessary work performed and charge the cost to the Contractor or withhold from any payments.

1.11 RESTORATION

A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified. The Contractor shall do not cut, alter or remove any structural work, disturb any ducts, plumbing, steam, gas, or electric systems without approval of the COR. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the COR before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified in the Contract.

B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.

C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire

protection systems and communications systems (including telephone) which are not scheduled for discontinuance or abandonment.

D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2).

1.12 LAYOUT OF WORK

A. The Contractor shall lay out the work from Government established base lines and bench marks, when indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Drawings.

B. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Contracting Officer Representative may replace them and deduct the expense of the replacement from any future payment.

1.13 TEMPORARY TOILETS

A. When necessary, Contractor shall provide temporary sanitary toilet accommodations. Coordinate location with Cemetery Director. Keep such places clean and free from flies. Failure to maintain satisfactory condition of Temporary Toilets will deprive Contractor of the privilege to use such toilets.

1.14 AVAILABILITY AND USE OF UTILITY SERVICES

A. 120 outlets may be available and shall be coordinated with the Cemetery Director or COR for use if necessary.

B. Water for Construction: Furnish temporary water service.

1. Contractor may obtain water at no cost by connecting to the Cemetery water distribution system. Provide reduced pressure backflow preventer at each connection as per code.

2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes will be cause for revocation at COR’s discretion of use of water from Cemetery's system.

1.15 DISPOSAL AND RETENTION

A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:

1. Reserved items which are to remain property of the Government are described as such in the scope of work above. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by COR.
2. Items not reserved shall become property of the Contractor and be removed by Contractor from the Cemetery.
3. Items of portable equipment and furnishings located in rooms and spaces in which work is to be done under this contract shall remain the property of the Government. When rooms and spaces are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.

- - - E N D - - -

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 – GENERAL

1.1 DESCRIPTION

A. This specification defines the general requirements and procedures for submittals. A submittal is information submitted for VA review to establish compliance with the contract documents.

B. Detailed submittal requirements are found in the technical sections of the contract specifications. The Contracting Officer Representative (COR) may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective technical specifications at no additional cost to the government.

C. VA approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor’s expense.

1.2 DEFINITIONS

A. Preconstruction Submittals: Submittals which are required prior to issuing contract notice to proceed or starting construction. For example, Certificates of insurance; Surety bonds; Site-specific safety plan; Construction progress schedule; Schedule of values; Submittal register; List of proposed subcontractors.

B. Shop Drawings: Drawings, diagrams, and schedules specifically prepared to illustrate some portion of the work. Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be integrated and coordinated.

C. Product Data: Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions, and brochures, which describe and illustrate size, physical appearance, and other characteristics of materials, systems, or equipment for some portion of the work. Samples of warranty language when the contract requires extended product warranties.

D. Samples: Physical examples of materials, equipment, or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged. Color samples from the manufacturer's standard line (or custom color samples if

specified) to be used in selecting or approving colors for the project. Field samples and mock-ups constructed to establish standards by which the ensuing work can be judged.

E. Design Data: Calculations, mix designs, analyses, or other data pertaining to a part of work.

F. Test Reports: Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work. Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

G. Certificates: Document required of Contractor, or of a manufacturer, supplier, installer, or subcontractor through Contractor. The purpose is to document procedures, acceptability of methods, or personnel qualifications for a portion of the work.

H. Manufacturer's Instructions: Pre-printed material describing installation of a product, system, or material, including special notices and MSDS concerning impedances, hazards, and safety precautions.

I. Manufacturer's Field Reports: Documentation of the testing and verification actions taken by manufacturer's representative at the job site on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must indicate whether the material, product, or system has passed or failed the test.

J. Operation and Maintenance Data: Manufacturer data that is required to operate, maintain, troubleshoot, and repair equipment, including manufacturer's help, parts list, and product line documentation. This data shall be incorporated in an operations and maintenance manual.

K. Closeout Submittals: Documentation necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a phase of construction on a multi-phase contract.

1.3 SUBMITTAL REGISTER

A. The submittal register will list items of equipment and materials for which submittals are required by the specifications. This list may not be all inclusive and additional submittals may be required by the specifications. The Contractor is not relieved from supplying submittals required by the contract documents but which have been omitted from the submittal register.

B. The submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period.

C. The VA will provide the initial submittal register in electronic format. Thereafter, the Contractor shall track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the VA.
D. The Contractor shall update the submittal register as submittal actions occur and maintain the submittal register at the project site until final acceptance of all work by Contracting Officer.
E. The Contractor shall submit formal monthly updates to the submittal register in electronic format. Each monthly update shall document actual submission and approval dates for each submittal.

1.4 SUBMITTAL SCHEDULING

A. Submittals are to be scheduled, submitted, reviewed, and approved prior to the acquisition of the material or equipment.
B. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow time for potential resubmittal.
C. No delay costs or time extensions will be allowed for time lost in late submittals or resubmittals.
D. All submittals are required to be approved prior to the start of the specified work activity.

1.5 SUBMITTAL PREPARATION

A. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.
B. Collect required data for each specific material, product, unit of work, or system into a single submittal. Prominently mark choices, options, and portions applicable to the submittal. Partial submittals will not be accepted for expedition of construction effort. Submittal will be returned without review if incomplete.
C. If available product data is incomplete, provide Contractor-prepared documentation to supplement product data and satisfy submittal requirements.
D. All irrelevant or unnecessary data shall be removed from the submittal to facilitate accuracy and timely processing. Submittals that contain the excessive amount of irrelevant or unnecessary data will be returned with review.
E. Provide a transmittal form for each submittal with the following information:
   1. Project title, location and number.

2. Construction contract number.
3. Date of the drawings and revisions.
4. Name, address, and telephone number of subcontractor, supplier, manufacturer, and any other subcontractor associated with the submittal.
5. List paragraph number of the specification section and sheet number of the contract drawings by which the submittal is required.
6. When a resubmission, add alphabetic suffix on submittal description. For example, submittal 18 would become 18A, to indicate resubmission.
7. Product identification and location in project.

F. The Contractor is responsible for reviewing and certifying that all submittals are in compliance with contract requirements before submitting for VA review. Proposed deviations from the contract requirements are to be clearly identified. All deviations submitted must include a side by side comparison of item being proposed against item specified. Failure to point out deviations will result in the VA requiring removal and replacement of such work at the Contractor's expense.

G. Stamp, sign, and date each submittal transmittal form indicating action taken. Stamp used by the Contractor on the submittal transmittal form to certify that the submittal meets contract requirements is to be similar to the following:

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

1.6 SUBMITTAL FORMAT AND TRANSMISSION

A. Provide submittals in electronic format, with the exception of material samples. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer.

B. Compile the electronic submittal file as a single, complete document. Name the electronic submittal file specifically according to its contents.

C. Electronic files must be of sufficient quality that all information is legible. Generate PDF files from original documents so that the text included in the PDF file is both searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required.

D. E-mail electronic submittal documents smaller than 5MB in size to e-mail addresses as directed by the COR.

E. Provide electronic documents over 5MB through an electronic FTP file sharing system. Confirm that the electronic FTP file sharing system can be accessed from the VA computer network. The Contractor is responsible for setting up, providing, and maintaining the electronic FTP file sharing system for the construction contract period of performance.

F. Provide hard copies of submittals when requested by the Contracting Officer. Up to 3 additional hard copies of any submittal may be requested at the discretion of the COR, at no additional cost to the VA.

1.7 SAMPLES

A. Submit two sets of physical samples showing range of variation, for each required item.

B. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified.

C. When color, texture, or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

D. Before submitting samples, the Contractor is to ensure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

E. The VA reserves the right to disapprove any material or equipment which previously has proven unsatisfactory in service.

F. Physical samples supplied maybe requested back for use in the project after reviewed and approved.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.

B. In the event the Contractor fails to deliver O&M Data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.9 TEST REPORTS

A. The COR may require specific test after work has been installed or completed which could require contractor to repair test area at no additional cost to contract.

1.10 VA REVIEW OF SUBMITTALS AND RFI'S

A. The VA will review all submittals for compliance with the technical requirements of the contract documents. The COR for this project will review all submittals and determining contractual compliance.

B. Period of review for submittals begins when the COR receives submittal from the Contractor.

C. Period of review for each resubmittal is the same as for initial submittal.

D. VA review period is 15 working days for submittals.

E. VA review period is 10 working days for RFIs.

F. The VA will return submittals to the Contractor with the following notations:

1. "Approved": authorizes the Contractor to proceed with the work covered.
2. "Approved as noted": authorizes the Contractor to proceed with the work covered provided the Contractor incorporates the noted comments and makes the noted corrections.
3. "Disapproved, revise and resubmit": indicates noncompliance with the contract requirements or that submittal is incomplete. Resubmit with appropriate changes and corrections. No work shall proceed for this item until resubmittal is approved.
4. "Not reviewed": indicates submittal does not have evidence of being reviewed and approved by Contractor or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals after taking appropriate action.

1.11 APPROVED SUBMITTALS

A. The VA approval of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing, and other information are satisfactory.

B. VA approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor’s expense.

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

D. Retain a copy of all approved submittals at project site, including approved samples.

1.12 WITHHOLDING OF PAYMENT

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

- - - E N D - - -

SECTION 01 35 26
SAFETY REQUIREMENTS – NON-ELECTRICAL

A. Latest publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.

B. American Society of Safety Engineers **(ASSE)**:

A10.1-2011.....Pre-Project & Pre-Task Safety and Health Planning

A10.34-2012.....Protection of the Public on or Adjacent to Construction Sites

A10.38-2013.....Basic Elements of an Employer’s Program to Provide a Safe and Healthful Work Environment American National Standard Construction and Demolition Operations

C. American Society for Testing and Materials **(ASTM)**:

E84-2013.....Surface Burning Characteristics of Building Materials

D. The Facilities Guidelines Institute **(FGI)**:

FGI Guidelines-2010..Guidelines for Design and Construction of Healthcare Facilities

E. National Fire Protection Association **(NFPA)**:

10-2013.....Standard for Portable Fire Extinguishers

30-2012.....Flammable and Combustible Liquids Code

51B-2014.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work

70-2014.....National Electrical Code

70B-2013.....Recommended Practice for Electrical Equipment Maintenance

70E-2015 .....Standard for Electrical Safety in the Workplace

99-2012.....Health Care Facilities Code

241-2013.....Standard for Safeguarding Construction, Alteration, and Demolition Operations

F. The Joint Commission **(TJC)**

TJC Manual .....Comprehensive Accreditation and Certification Manual

G. U.S. Nuclear Regulatory Commission

10 CFR 20 .....Standards for Protection Against Radiation

H. U.S. Occupational Safety and Health Administration **(OSHA)**:

29 CFR 1904 .....Reporting and Recording Injuries & Illnesses

29 CFR 1910 .....Safety and Health Regulations for General Industry

29 CFR 1926 .....Safety and Health Regulations for Construction Industry

CPL 2-0.124.....Multi-Employer Citation Policy

I. VHA Directives

2017-7715.....Safety and Health During Construction

2017-7714.....Asbestos Management Program

2015-7705.....Management of Hazardous Chemicals

2014-1028.....Electric Power Distribution Systems

2005-007.....Fire Code Reviews of Delegated Construction Projects

1.2 DEFINITIONS:

A. **“Critical Lift”**. A lift with the hoisted load exceeding 75% of the crane’s maximum capacity; lifts made out of the view of the operator (blind picks); lifts involving two or more cranes; personnel being hoisted; and special hazards such as lifts over occupied facilities, loads lifted close to power-lines, and lifts in high winds or where other adverse environmental conditions exist; and any lift which the crane operator believes is critical.

B. **OSHA "Competent Person"** (CP). One who is capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them (see 29 CFR 1926.32(f)).

C. **"Qualified Person"** means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

D. **"High Visibility Accident"**. Any mishap which may generate publicity or high visibility.

E. "**Accident/Incident Criticality Categories"**:

No impact – near miss incidents that should be investigated but are not required to be reported to the VA;

Minor incident/impact – incidents that require first aid or result in minor equipment damage (less than $5000). These incidents must be investigated but are not required to be reported to the VA;

Moderate incident/impact – Any work-related injury or illness that results in:

1. Days away from work (any time lost after day of injury/illness onset);

2. Restricted work;

3. Transfer to another job;

4. Medical treatment beyond first aid;

5. Loss of consciousness;

6. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (5) above or,

7. any incident that leads to major equipment damage (greater than $5000).

These incidents must be investigated and are required to be reported to the VA;

“Major incident/impact”: – Any mishap that leads to fatalities, hospitalizations, amputations, and losses of an eye as a result of contractors’ activities. Or any incident which leads to major property damage (greater than $20,000) and/or may generate publicity or high visibility. These incidents must be investigated and are required to be reported to the VA as soon as practical, but not later than 2 hours after the incident.

E. **“Medical Treatment”**: Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

1.3 REGULATORY REQUIREMENTS:

A. In addition to the detailed requirements included in the provisions of this contract, comply with 29 CFR 1926, comply with 29 CFR 1910 as incorporated by reference within 29 CFR 1926, comply with ASSE A10.34, and all applicable [federal, state, and local] laws, ordinances, criteria, rules and regulations

1.4 ACCIDENT PREVENTION PLAN (APP):

A. The APP (aka Construction Safety & Health Plan) shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and ensure it is site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all worksite safety and health of each subcontractor(s). Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out.

B. The APP shall be prepared as follows:

1. Written in English by a qualified person who is employed by the Prime Contractor articulating the specific work and hazards pertaining to

the contract (model language can be found in ASSE A10.33). Specifically articulating the safety requirements found within these VA contract safety specifications.

2. Address both the Prime Contractors and the subcontractors work operations.

3. State measures to be taken to control hazards associated with materials, services, or equipment provided by suppliers.

4. Address all the elements/sub-elements and in order as follows:

   a. **SIGNATURE SHEET.** Title, signature, and phone number of the following:

      1) Plan preparer (Qualified Person such as corporate safety staff person or contracted Certified Safety Professional with construction safety experience);

      2) Plan approver (company/corporate officers authorized to obligate the company);

      3) Plan concurrence (e.g., Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, project manager or superintendent, project safety professional). Provide concurrence of other applicable corporate and project personnel (Contractor).

   b. **BACKGROUND INFORMATION**. List the following:

      1) Contractor;

      2) Contract number;

      3) Project name;

      4) Brief project description, description of work to be performed, and location; phases of work anticipated (these will require an AHA).

   c. **STATEMENT OF SAFETY AND HEALTH POLICY**. Provide a copy of current corporate/company Safety and Health Policy Statement, detailing commitment to providing a safe and healthful workplace for all employees. The Contractor’s written safety program goals,

objectives, and accident experience goals for this contract should be provided.

d. **RESPONSIBILITIES AND LINES OF AUTHORITIES**. Provide the following:

1) A statement of the employer’s ultimate responsibility for the implementation of his SOH program;

2) Identification and accountability of personnel responsible for safety at both corporate and project level. Contracts specifically requiring safety or industrial hygiene personnel shall include a copy of their resumes.

3) The names of Competent and/or Qualified Person(s) and proof of competency/qualification to meet specific OSHA Competent/Qualified Person(s) requirements must be attached.;

4) Requirements that no work shall be performed unless a designated competent person is present on the job site;

5) Requirements for pre-task Activity Hazard Analysis (AHAs);

6) Lines of authority;

7) Policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified;

e. SUBCONTRACTORS AND SUPPLIERS. If applicable, provide procedures for coordinating SOH activities with other employers on the job site:

1) Identification of subcontractors and suppliers (if known);

2) Safety responsibilities of subcontractors and suppliers.

f. **TRAINING.**

1) Site-specific SOH orientation training at the time of initial hire or assignment to the project for every employee before working on the project site is required.

2) Mandatory training and certifications that are applicable to this project (e.g., explosive actuated tools, crane operator, rigger, crane signal person, fall protection, electrical lockout/NFPA 70E, machine/equipment lockout, confined space,

etc…) and any requirements for periodic retraining/recertification are required.

3) Procedures for ongoing safety and health training for supervisors and employees shall be established to address changes in site hazards/conditions.

4) OSHA 10-hour training is required for all workers on site and the OSHA 30-hour training is required for Trade Competent Persons (CPs)

g. SAFETY AND HEALTH INSPECTIONS.

1) Specific assignment of responsibilities for a minimum daily job site safety and health inspection during periods of work activity: Who will conduct (e.g., “Site Safety and Health CP”), proof of inspector’s training/qualifications, when inspections will be conducted, procedures for documentation, deficiency tracking system, and follow-up procedures.

2) Any external inspections/certifications that may be required (e.g., contracted CSP or CSHT)

h. ACCIDENT/INCIDENT INVESTIGATION & REPORTING. The Contractor shall conduct mishap investigations of all Moderate and Major as well as all High Visibility Incidents. The APP shall include accident/incident investigation procedure and identify person(s) responsible to provide the following to the Contracting Officer Representative or Government Designated Authority:

1) Exposure data (man-hours worked);

2) Accident investigation reports;

3) Project site injury and illness logs.

i. PLANS (PROGRAMS, PROCEDURES) REQUIRED. Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational, patient, and public safety risks in site-specific compliance and accident prevention plans. These Plans shall include but are not be limited to procedures for addressing the risks associates with the following:

1) Emergency response;

2) Contingency for severe weather;

3) Fire Prevention;

4) Medical Support;

5) Posting of emergency telephone numbers;

6) Prevention of alcohol and drug abuse;

7) Site sanitation(housekeeping, drinking water, toilets);

8) Night operations and lighting;

9) Hazard communication program;

10) Welding/Cutting “Hot” work;

11) Electrical Safe Work Practices (Electrical LOTO/NFPA 70E);

12) General Electrical Safety;

13) Hazardous energy control (Machine LOTO);

14) Site-Specific Fall Protection & Prevention;

15) Excavation/trenching;

16) Asbestos abatement;

17) Lead abatement;

18) Crane Critical lift;

19) Respiratory protection;

20) Health hazard control program;

21) Radiation Safety Program;

22) Abrasive blasting;

23) Heat/Cold Stress Monitoring;

24) Crystalline Silica Monitoring (Assessment);

25) Demolition plan (to include engineering survey);

26) Formwork and shoring erection and removal;

27) PreCast Concrete;

28) Public (Mandatory compliance with ANSI/ASSE A10.34-2012).

C. Submit the APP to the Contracting Officer Representative for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.

D. Once accepted by the Contracting Officer Representative the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer in accordance with FAR Clause 52.236-13, *Accident Prevention*, until the matter has been rectified.

E. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Contracting Officer Representative. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public and the environment.

1.5 ACTIVITY HAZARD ANALYSES (AHAS)- NOT REQUIRED AS PART OF THIS CONTRACT:

A. AHAs are also known as Job Hazard Analyses, Job Safety Analyses, and Activity Safety Analyses. Before beginning each work activity involving a type of work presenting hazards not experienced in previous project operations or where a new work crew or sub-contractor is to perform the work, the Contractor(s) performing that work activity shall prepare an AHA (Example electronic AHA forms can be found on the US Army Corps of Engineers web site)

B. AHAs shall define the activities being performed and identify the work sequences, the specific anticipated hazards, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk.

C. Work shall not begin until the AHA for the work activity has been accepted by the Contracting Officer Representative or Government Designated

Authority and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.

1. The names of the Competent/Qualified Person(s) required for a particular activity (for example, excavations, scaffolding, fall protection, other activities as specified by OSHA and/or other State and Local agencies) shall be identified and included in the AHA. Certification of their competency/qualification shall be submitted to the Government Designated Authority (GDA) for acceptance prior to the start of that work activity.

2. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).

    a. If more than one Competent/Qualified Person is used on the AHA activity, a list of names shall be submitted as an attachment to the AHA. Those listed must be Competent/Qualified for the type of work involved in the AHA and familiar with current site safety issues.

    b. If a new Competent/Qualified Person (not on the original list) is added, the list shall be updated (an administrative action not requiring an updated AHA). The new person shall acknowledge in writing that he or she has reviewed the AHA and is familiar with current site safety issues.

3. Submit AHAs to the Contracting Officer Representative or Government Designated Authority for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES for review at least 15 calendar days prior to the start of each phase. Subsequent AHAs as shall be formatted as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

4. The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

5. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. All activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier, or subcontractor and provided to the prime contractor for review and approval and then submitted to the Contracting Officer Representative or Government Designated Authority.

1.6 PRECONSTRUCTION CONFERENCE:

A. Contractor representatives who have a responsibility or significant role in implementation of the accident prevention program, as required by 29 CFR 1926.20(b)(1), on the project shall attend the preconstruction conference to gain a mutual understanding of its implementation. This includes the project superintendent, subcontractor superintendents, and any other assigned safety and health professionals.

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

1.7 “SITE SAFETY AND HEALTH OFFICER” (SSHO) AND “COMPETENT PERSON” (CP):

A. The Prime Contractor shall designate a minimum of one SSHO at each project site that will be identified as the SSHO to administer the Contractor's safety program and government-accepted Accident Prevention Plan. Each subcontractor shall designate a minimum of one CP in compliance with 29 CFR 1926.20 (b)(2) that will be identified as a CP to administer their individual safety programs.

B. Further, all specialized Competent Persons for the work crews will be supplied by the respective contractor as required by 29 CFR 1926 (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).

C. These Competent Persons can have collateral duties as the subcontractor’s superintendent and/or work crew lead persons as well as fill more than

one specialized CP role (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).

D. The SSHO or an equally-qualified Designated Representative/alternate will maintain a presence on the site during construction operations in accordance with FAR Clause 52.236-6: *Superintendence by the Contractor*. CPs will maintain presence during their construction activities in accordance with above mentioned clause. A listing of the designated SSHO and all known CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.

E. The repeated presence of uncontrolled hazards during a contractor's work operations will result in the designated CP as being deemed incompetent and result in the required removal of the employee in accordance with FAR Clause 52.236-5: Material and Workmanship, Paragraph (c).

1.8 TRAINING:

A. The designated Prime Contractor SSHO must meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State and local requirements are met for the project. As a minimum the SSHO must have completed the OSHA 30-hour Construction Safety class and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.

B. All designated CPs shall have completed the OSHA 30-hour Construction Safety course within the past 5 years.

C. In addition to the OSHA 30 Hour Construction Safety Course, all CPs with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition & control associated with those high hazard work operations. Documented "repeat" deficiencies in the execution of safety requirements will require retaking the requisite formal course.

D. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment.

E. Submit training records associated with the above training requirements to the Contracting Officer Representative or Government Designated Authority for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance.

F. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing shall include information on the site-specific hazards, construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, emergency procedures, accident reporting etc... Documentation shall be provided to the Resident Engineer that individuals have undergone contractor’s safety briefing.

G. Ongoing safety training will be accomplished in the form of weekly documented safety meeting.

1.9 INSPECTIONS:

A. The SSHO shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs shall conduct frequent and regular safety inspections (daily) of the their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO shall conduct a formal documented inspection of the entire construction areas with the subcontractors’ “Trade Safety and Health CPs” present in their work areas. Coordinate with, and report findings and corrective actions weekly to the Contracting Officer Representative or Government Designated Authority.

B. A Certified Safety Professional (CSP) with specialized knowledge in construction safety or a certified Construction Safety and Health Technician (CSHT) shall randomly conduct a monthly site safety inspection. The CSP or CSHT can be a corporate safety professional or independently contracted. The CSP or CSHT will provide their certificate number on the required report for verification as necessary.

1. Results of the inspection will be documented with tracking of the identified hazards to abatement.

2. The Contracting Officer Representative or Government Designated Authority will be notified immediately prior to start of the inspection and invited to accompany the inspection.

3. Identified hazard and controls will be discussed to come to a mutual understanding to ensure abatement and prevent future reoccurrence.

4. A report of the inspection findings with status of abatement will be provided to the Contracting Officer Representative or Government Designated Authority within one week of the onsite inspection.

1.10 ACCIDENTS, OSHA 300 LOGS, AND MAN-HOURS:

A. The prime contractor shall establish and maintain an accident reporting, recordkeeping, and analysis system to track and analyze all injuries and illnesses, high visibility incidents, and accidental property damage (both government and contractor) that occur on site. Notify the Contracting Officer Representative or Government Designated Authority as soon as practical, but no more than four hours after any accident meeting the definition of a Moderate or Major incidents, High Visibility Incidents, , or any weight handling and hoisting equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Contracting Officer Representative or Government Designated Authority determine whether a government investigation will be conducted.

B. Conduct an accident investigation for all Minor, Moderate and Major incidents as defined in paragraph DEFINITIONS, and property damage accidents resulting in at least $20,000 in damages, to establish the root cause(s) of the accident. Complete the VA Form 2162 (or equivalent), and provide the report to the Contracting Officer Representative or Government Designated Authority within 5 calendar days of the accident. The Contracting Officer Representative or Government Designated Authority will provide copies of any required or special forms.

C. A summation of all man-hours worked by the contractor and associated sub-contractors for each month will be reported to the Contracting Officer Representative or Government Designated Authority monthly.

D. A summation of all Minor, Moderate, and Major incidents experienced on site by the contractor and associated sub-contractors for each month will be provided to the Contracting Officer Representative or Government Designated Authority monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the Contracting Officer Representative or Government Designated Authority as requested.

1.11 PERSONAL PROTECTIVE EQUIPMENT (PPE):

A. PPE is governed in all areas by the nature of the work the employee is performing. For example, specific PPE required for performing work on electrical equipment is identified in NFPA 70E, Standard for Electrical Safety in the Workplace.

B. Mandatory PPE includes:

1. Hard Hats – unless written authorization is given by the // Resident Engineer Contracting Officer Representative or Government Designated Authority in circumstances of work operations that have limited potential for falling object hazards such as during finishing work or minor remodeling. With authorization to relax the requirement of hard hats, if a worker becomes exposed to an overhead falling object hazard, then hard hats would be required in accordance with the OSHA regulations.

2. Safety glasses - unless written authorization is given by the Contracting Officer Representative or Government Designated Authority in circumstances of no eye hazards, appropriate safety glasses meeting the ANSI Z.87.1 standard must be worn by each person on site.

3. Appropriate Safety Shoes – based on the hazards present, safety shoes meeting the requirements of ASTM F2413-11 shall be worn by each person on site unless written authorization is given by the Contracting Officer Representative or Government Designated Authority in circumstances of no foot hazards.

4. Hearing protection - Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks.

1.12 FALL PROTECTION

A. The fall protection (FP) threshold height requirement is 6 ft for ALL WORK, unless specified differently or the OSHA 29 CFR 1926 requirements are more stringent, to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work.

1. The use of a Safety Monitoring System (SMS) as a fall protection method is prohibited.

2. The use of Controlled Access Zone (CAZ) as a fall protection method is prohibited.

3. A Warning Line System (WLS) may ONLY be used on floors or flat or low-sloped roofs (between 0 - 18.4 degrees or 4:12 slope) and shall be erected around all sides of the work area (See 29 CFR 1926.502(f) for construction of WLS requirements). Working within the WLS does not require FP. No worker shall be allowed in the area between the roof or floor edge and the WLS without FP. FP is required when working outside the WLS.

4. Fall protection while using a ladder will be governed by the OSHA requirements.

1.13 SCAFFOLDS AND OTHER WORK PLATFORMS

A. All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926 Subpart L.

B. The fall protection (FP) threshold height requirement is 6 ft as stated in Section 1.16.

C. The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.

1. Scaffolds, platforms, or temporary floors shall be provided for all work except that can be performed safely from the ground or similar footing.

2. Ladders less than 20 feet may be used as work platforms only when use of small hand tools or handling of light material is involved.

3. Ladder jacks, lean-to, and prop-scaffolds are prohibited.

4. Emergency descent devices shall not be used as working platforms.

D. Contractors shall use a scaffold tagging system in which all scaffolds are tagged by the Competent Person. Tags shall be color-coded: green indicates the scaffold has been inspected and is safe to use; red indicates the scaffold is unsafe to use. Tags shall be readily visible, made of materials that will withstand the environment in which they are used, be legible and shall include:

1. The Competent Person’s name and signature;

2. Dates of initial and last inspections.

E. Mast Climbing work platforms: When access ladders, including masts designed as ladders, exceed 20 ft. in height, positive fall protection shall be used.

1.14 EXCAVATION AND TRENCHES

A. All excavation and trenching work shall comply with 29 CFR 1926 Subpart P. Excavations less than 5 feet in depth require evaluation by the contractor’s “Competent Person” (CP) for determination of the necessity of an excavation protective system where kneeing, laying in, or stooping within the excavation is required.

B. All excavations and trenches 24 inches in depth or greater shall require a written trenching and excavation permit (NOTE – some States and other local jurisdictions require separate state/jurisdiction-issued excavation permits). The permit shall have two sections, one section will be completed prior to digging or drilling and the other will be completed prior to personnel entering the excavations greater than 5 feet in depth. Each section of the permit shall be provided to the Contracting Officer Representative and /or other Government Designated Authority prior to proceeding with digging or drilling and prior to proceeding with entering the excavation. After completion of the work and prior to opening a new section of an excavation, the permit shall be closed out and provided to the Contracting Officer Representative and / or Government Designated Authority. The permit shall be maintained onsite and the first section of the permit shall include the following:

1. Estimated start time & stop time.

2. Specific location and nature of the work.

3. Indication of the contractor's "Competent Person" (CP) in excavation safety with qualifications and signature. Formal course in excavation safety is required by the contractor's CP.

4. Indication of whether soil or concrete removal to an offsite location is necessary.

5. Indication of whether soil samples are required to determined soil contamination.

6. Indication of coordination with local authority (i.e. "One Call") or contractor's effort to determine utility location with search and survey equipment.

7. Indication of review of site drawings for proximity of utilities to digging/drilling.

The second section of the permit for excavations greater than five feet in depth shall include the following:

1. Determination of OSHA classification of soil. Soil samples will be from freshly dug soil with samples taken from different soil type layers as necessary and placed at a safe distance from the excavation by the excavating equipment. A pocket penetronmeter will be utilized in determination of the unconfined compression strength of the soil for comparison against OSHA table (Less than 0.5 Tons/FT2 – Type C, 0.5 Tons/FT2 to 1.5 Tons/FT2 – Type B, greater than 1.5 Tons/FT2 – Type A without condition to reduce to Type B).

2. Indication of selected protective system (sloping/benching, shoring, shielding). When soil classification is identified as "Type A" or "Solid Rock", only shoring or shielding or Professional Engineer designed systems can be used for protection. A Sloping/Benching system may only be used when classifying the soil as Type B or Type C. Refer to Appendix B of 29 CFR 1926, Subpart P for further information on protective systems designs.

3. Indication of the spoil pile being stored at least 2 feet from the edge of the excavation and safe access being provided within 25 feet of the workers.

4. Indication of assessment for a potential toxic, explosive, or oxygen deficient atmosphere where oxygen deficiency (atmospheres containing

less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist. Internal combustion engine equipment is not allowed in an excavation without providing force air ventilation to lower the concentration to below OSHA PELs, providing sufficient oxygen levels, and atmospheric testing as necessary to ensure safe levels are maintained.

C. As required by OSHA 29 CFR 1926.651(b)(1), the estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

1. The planned dig site will be outlined/marked in white prior to locating the utilities.

2. Used of the American Public Works Association Uniform Color Code is required for the marking of the proposed excavation and located utilities.

3. 811 will be called two business days before digging on all local or State lands and public Right-of Ways.

4. Digging will not commence until all known utilities are marked.

5. Utility markings will be maintained

D. Excavations will be hand dug or excavated by other similar safe and acceptable means as excavation operations approach within three (3) feet of identified underground utilities. Exploratory bar or other detection equipment will be utilized as necessary to further identify the location of underground utilities.

E. Excavations greater than ten (10) feet in depth require a Professional Engineer designed excavation protective system.

1.15 CRANES

A. All crane work shall comply with 29 CFR 1926 Subpart CC.

B. Prior to operating a crane, the operator must be licensed, qualified or certified to operate the crane. Thus, all the provisions contained with Subpart CC are effective and there is no “Phase In” date.

C. A detailed lift plan for all lifts shall be submitted to the Contracting Officer Representative 14 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing and all other elements of a critical lift plan where the lift meets the definition of a critical lift. Critical lifts require a more comprehensive lift plan to minimize the potential of crane failure and/or catastrophic loss. The plan must be reviewed and accepted by the General Contractor before being submitted to the VA for review. The lift will not be allowed to proceed without prior acceptance of this document.

D. Crane operators shall not carry loads

1. over the general public or VAMC personnel

2. over any occupied building unless

a. the top two floors are vacated

b. or overhead protection with a design live load of 300 psf is provided

1.16 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

A. All installation, maintenance, and servicing of equipment or machinery shall comply with 29 CFR 1910.147 except for specifically referenced operations in 29 CFR 1926 such as concrete & masonry equipment [1926.702(j)], heavy machinery & equipment [1926.600(a)(3)(i)], and process safety management of highly hazardous chemicals (1926.64). Control of hazardous electrical energy during the installation, maintenance, or servicing of electrical equipment shall comply with Section 1.15 to include NFPA 70E and other VA specific requirements discussed in the section.

1.17 CONFINED SPACE ENTRY

A. All confined space entry shall comply with 29 CFR 1926, Subpart AA except for specifically referenced operations in 29 CFR 1926 such as excavations/trenches [1926.651(g)].

B. A site-specific Confined Space Entry Plan (including permitting process) shall be developed and submitted to the Contracting Officer Representative or other Government Designated Authority.

1.18 WELDING AND CUTTING

As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Contracting Officer Representative and/or other Government Designated Authority.

1.19 LADDERS

A. All Ladder use shall comply with 29 CFR 1926 Subpart X.

B. All portable ladders shall be of sufficient length and shall be placed so that workers will not stretch or assume a hazardous position.

C. Manufacturer safety labels shall be in place on ladders

D. Step Ladders shall not be used in the closed position

E. Top steps or cap of step ladders shall not be used as a step

F. Portable ladders, used as temporary access, shall extend at least 3 ft. above the upper landing surface.

1. When a 3 ft (0.9-m) extension is not possible, a grasping device (such as a grab rail) shall be provided to assist workers in mounting and dismounting the ladder.

2. In no case shall the length of the ladder be such that ladder deflection under a load would, by itself, cause the ladder to slip from its support.

G. Ladders shall be inspected for visible defects on a daily basis and after any occurrence that could affect their safe use. Broken or damaged ladders shall be immediately tagged "DO NOT USE," or with similar wording, and withdrawn from service until restored to a condition meeting their original design.

1.20 FLOOR & WALL OPENINGS

A. All floor and wall openings shall comply with 29 CFR 1926 Subpart M.

B. Floor and roof holes/openings or any that measure over 2 inches in any direction of a walking/working surface which persons may trip or fall into or where objects may fall to the level below. Skylights located in floors or roofs are considered floor or roof hole/openings.

C. All floor, roof openings or hole into which a person can accidentally walk or fall through shall be guarded either by a railing system with toe boards along all exposed sides or a load-bearing cover. When the cover is not in place, the opening or hole shall be protected by a removable guardrail system or shall be attended when the guarding system has been removed, or other fall protection system.

1. Covers shall be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.

2. Covers shall be secured when installed, clearly marked with the word “HOLE”, “COVER” or “Danger, Roof Opening-Do Not Remove” or color-coded or equivalent methods (e.g., red or orange “X”). Workers must be made aware of the meaning for color coding and equivalent methods.

3. Roofing material, such as roofing membrane, insulation or felts, covering or partly covering openings or holes, shall be immediately cut out. No hole or opening shall be left unattended unless covered.

4. Non-load-bearing skylights shall be guarded by a load-bearing skylight screen, cover, or railing system along all exposed sides.

5. Workers are prohibited from standing/walking on skylights.

- - E N D - -

SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the availability and source of references and standards specified in the project manual under paragraphs APPLICABLE PUBLICATIONS and/or shown on the drawings.

1.2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS FPMR PART 101-29 (FAR 52.211-1) (AUG 1998)

A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to – GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.

B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

1.3 AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-4) (JUN 1988)

The specifications and standards cited in this solicitation can be examined at the following location:

DEPARMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Facilities Quality Service (00CFM1A)
425 Eye Street N.W, (sixth floor)
Washington, DC 20001
Telephone Numbers: (202) 632-5249 or (202) 632-5178
Between 9:00 AM - 3:00 PM

1.4 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-3) (JUN 1988)

A. The specifications cited in this solicitation may be obtained from the associations or organizations listed below.

AAN American Nursery and Landscape Association
http://www.anla.org

AASHTO American Association of State Highway and Transportation Officials
http://www.aashto.org

ANLA American Nursery & Landscape Association
http://www.anla.org

ANSI American National Standards Institute, Inc.
http://www.ansi.org

ASAE American Society of Agricultural Engineers
http://www.asabe.org

ASTM American Society for Testing and Materials
http://www.astm.org

CSI Cast Stone Institute
http://www.caststone.org

EGSA Electrical Generating Systems Association
http://www.egsa.org

EEI Edison Electric Institute
http://www.eei.org

EPA Environmental Protection Agency
http://www.epa.gov

ETL ETL Testing Laboratories, Inc.
http://www.et1.com

GSA General Services Administration
http://www.gsa.gov

ICEA Insulated Cable Engineers Association Inc.
http://www.icea.net

IEEE Institute of Electrical and Electronics Engineers
http://www.ieee.org\

IMSA International Municipal Signal Association
http://www.imsasafety.org

IPCEA Insulated Power Cable Engineers Association

http://www.icea.net/

NBS National Bureau of Standards
See - NIST

NEC National Electric Code
http://www.nfpa.org/nec

NEMA National Electrical Manufacturers Association
http://www.nema.org

NFPA National Fire Protection Association
http://www.nfpa.org

NIST National Institute of Standards and Technology
http://www.nist.gov

OSHA Occupational Safety and Health Administration
Department of Labor
http://www.osha.gov

PPI The Plastic Pipe Institute
http://www.plasticpipe.org

UL Underwriters' Laboratories Incorporated
http://www.ul.com

ULC Underwriters' Laboratories of Canada
http://www.ulc.ca

- - - E N D - - -

SECTION 02 41 10
SELECT DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

A. There will be limited Demolition as part of this Contract.

B. Demolition will be limited to the removal of existing exterior wood siding, metal doors and frames, and exterior metal boxes and associated conduits, and related items.

1.2 RELATED WORK

A. Section 01 00 02, GENERAL REQUIREMENTS

1.3 PROTECTION

A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of GENERAL CONDITIONS Article, ACCIDENT PREVENTION.

B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 02, GENERAL REQUIREMENTS.

C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been filled.

D. Before beginning any demolition work the Contractor Shall Survey the site and examine the drawings and specifications to determine the extent of the work.

E. Contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Cemetery; any damaged items shall be repaired or replaced at NO COST to the Government.

F. Contractor shall be responsible for increasing structural supports or adding new supports as may be required because of any cutting, removal, or demolition work performed under this contract.

1.4 UTILITY SERVICES

A. Protect existing utilities always.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 SITE CLEARING

A. General: This Project does not anticipate the removal of any trees or shrubs. The Project will require that limited grass and pavement will be removed and replaced as part of the work. NO Trees or tree root systems shall be disturbed. Leave existing topsoil in place within drip lines to prevent damage to root system.

B. Erosion Control: Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Install silt fence and inlet protection as shown and as per requirements of the SWPPP, prior to any soil disturbance activities. Provide temporary seeding as required by the SWPPP.

C. Maintain site controls in accordance with Storm Water Pollution Prevention Plan and repair as directed by COR to sustain compliance with SPDES permit. Maintain all records as required by the SWPPP. Perform inspections as required by the SWPPP.

D. Topsoil - On-site: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 6 inches. Satisfactory topsoil is reasonably free and/or screened of subsoil, clay lumps, stones, and other objects over 1 inch in diameter, and without weeds, roots, and other objectionable material.

1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.
2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles to prevent wind erosion in accordance with the Storm Water Pollution Prevention Plan.
3. Stockpile shall be contained with erosion and sediment controls (silt fence) and stabilized if undisturbed in accordance with the Storm Water Pollution Prevention Plan.
4. Dispose of unsuitable or excess topsoil as specified for disposal of waste material only after approval of the COR.

E. Clearing and Grubbing: Clear site of trees, shrubs, and other vegetation, except for those indicated to be left standing.

1. Completely remove stumps, roots, and other debris protruding through ground surface.

2. Use only hand methods for grubbing inside drip line of trees indicated to remain.
3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
4. Place fill material in horizontal layers not exceeding 150 mm (6 inches) loose depth, and thoroughly compact each layer to a density equal to adjacent original ground.

F. Removal of Improvements: Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

G. Abandonment or removal of certain underground pipe or conduits may be indicated on the Drawings and is included in the Work. Removing abandoned underground piping or conduits interfering with construction is included under this Section, except as indicated to be abandoned in-place.

H. Continue maintenance of Erosion Controls in compliance with the Storm Water Pollution Prevention Plan until the work is completed and the threat of erosion is gone by either around surface stabilizer or lawn “grow-in” is at 85% complete.

I. Temporary erosion control devices shall not be removed until the area is certified as being stabilized by the Qualified Inspector.

3.2 DEMOLITION OF BUILDINGS & STRUCTURES

A. Demolish and remove buildings and structures as shown on Drawings, including all appurtenances related or connected thereto, as noted below:
1. As required for installation of new utility service lines.
2. To full depth within an area defined by hypothetical lines located 5 feet outside building lines of new structures.

B. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Cemetery Property to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the COR. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 24 inches’ square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.

C. In removing buildings and structures of more than two stories, demolish work story by story starting at highest level and progressing down to third floor level. Demolition of first and second stories may proceed simultaneously.

D. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations. All materials in the indicated trash dump areas, including above surrounding grade and extending to a depth of 1500 mm (5 feet) below surrounding grade, shall be included as part of the lump sum compensation for the work of this section. Materials that are located beneath the surface of the surrounding ground more than 1500 mm (5 feet), or materials that are discovered to be hazardous, shall be handled as unforeseen. The removal of hazardous material shall be referred to Hazardous Materials specifications. Burning is not permitted on the property.

E. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the COR. When Utility lines are encountered that are not indicated on the drawings, the COR shall be notified prior to further work in that area.

3.3 CLEAN-UP

A. On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to COR. Clean-up shall include off the Cemetery Property disposal of all items and materials not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations.

- - - E N D - - -

SECTION 04 02 00
HISTORIC STUCCO MAINTENANCE & REPAIR

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This Section provides general guidance on approaches to the preservation and restoration of Historic Stucco found on a National Cemetery.

B. The Contractor should not hesitate to question the specifications if it appears that the work specified would damage the structure.

C. The Contractor shall provide all labor, materials, equipment, and operations required to complete the rehabilitation work indicated herein.

1.2 RELATED WORK:

A. Section 01 00 02, General Requirements.

B. Section 01 33 23, Shop Drawings, Product Data, and Samples.

C. Section 01 42 19, Reference Standards.

1.3 REFERENCES

A. Publications listed below form a part of specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Society for Testing and Materials **(ASTM)**:

C5-10.....Standard Specification for Quicklime for Structural Purposes

C25-17.....Standard Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime

C50-13.....Standard Practice for Sampling, Sample Preparation, Packaging, and Marking of Lime and Limestone Products

C51-11.....Standard Terminology Relating to Lime and Limestone

C110-16.....Standard Test Methods for Physical Testing of Quicklime, Hydrated Lime, and Limestone

C141-14.....Standard Specification for Hydrated Hydraulic Lime for Structural Purposes

C144-17.....Standard Specification for Aggregate for Masonry Mortar

C150-17.....Standard Specification for Portland Cement

C207-06(2011).....Hydrated Lime for Masonry Purposes

C926-18.....Standard Specification for Application of Portland Cement-Based Plaster

C 1328-12.....Standard Specification for Plastic (Stucco) Cement.

C1489-15.....Standard Specification for Lime Putty for Structural Purposes

D1653-13.....Standard Test Methods for Water Vapor Transmission of Organic Coating Films

E96-16.....Standard Test Methods for Water Vapor Transmission of Materials

E514-14.....Standard Test Method for Water Penetration and Leakage Through Masonry

C. National Park Service **(NPS):**

NPS Hist. Prop. (1995)..National Standards for the Treatment of Historic Properties with Guidelines for Preservation, Rehabilitating, Restoring, and Reconstructing Historic Buildings.

NPS TPS Brief 1 (2000)..Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings.

NPS TPS Brief 22 (1990).The Preservation and Repair of Historic Stucco

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. The Contractor shall submit a detailed schedule of the areas to be stuccoed, including an assessment of the problem areas, and detailed procedures for stucco repairs, to the COR for approval.

C. The Contractor shall submit manufacturer’s product literature to the Architect for all proprietary products specified for stucco patching, grouting and replacement. Product literature shall include specification data, Material Safety Data Sheets, and instructions for storage, handling, and use.

D. The Contractor shall submit samples of the stucco repair and replacement materials for the COR approval of color and texture match.

E. Submit portable samples of 6x6 inches. Once a matching stucco color has been approved by the COR, placement of on-site mock-ups may begin.

F. Submit all phases of stucco restoration and repair, including prior to the start of restoration work. Provide thorough photo documentation of the project and project details and targeted areas.

1.5 QUALITY ASSURANCE

A. Contractor shall submit a written list of projects similar in nature that was completed no longer than five (5) years ago. Submit contact information for owner, architect and contractor references.

B. Contractor must have a minimum of 5 years' experience in the preparation and installation of historic stucco. Submit resumes for all historic stucco workers, demonstrating the minimum experience required.

C. Product manufacturers, vendors, distributors, or suppliers of materials will not be permitted to offer on-site project training certificates or historic stucco consultation services.

D. When outlined in Section 01 00 02 General Requirements, Secure the services of a Historic Stucco Consultant with a minimum of 10 years of experience applying Historic Preservation.

E. The Contractor shall not change sources or manufacturers of stucco materials during the course of the work.

F. The Contractor shall retain an experienced full-time supervisor that will be on the project site at all times when the restoration and repair is in progress. A single individual shall be responsible for supervising the historic masonry restoration work throughout the duration of the project.

G. Employ craftspeople who are experienced with and specialize in restoration work of the types they will be performing. All stucco restoration treatments must be performed by a craftsperson that is familiar with historic stucco construction and has worked on historic stucco projects for at least five years.

1.6 WARRANTY

A. Warrant exterior Stucco work against any defects in materials and installation and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be five (5) years.

1.7 PRE-CONSTRUCTION CONFERENCE

A. Prior to beginning the work of this Section, Contractor to attend a Pre-Construction Conference with the COR to review the requirements of the Quality Control Plan, installation procedures, location of required test panel / mockup areas, and all job conditions, submittals, and processes.

B. All subcontracting firms involved with this work shall participate in the Pre-Construction Conference.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

A. The Contractor shall deliver all products to the site in original packaging, unopened, and undamaged with manufacturer's name and product identification visible thereon, and manufacturer's instructions and Material Safety Data Sheets.

B. The Contractor shall store products in a dry location and protect them from dampness and freezing following manufactures instructions. Store materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.

C. Lime and cement must be protected from rainwater and ground moisture, as water vapor in the air can begin the setting process.

D. Detergents, cleaners, solvents, epoxies and other chemicals used for cleaning shall be in sealed containers that legibly show the designated name, formula or specification number, quantity, date of manufacture, manufacturer's directions including any warnings and special precautions.

E. When directed, store materials in weathertight structures which will exclude moisture and contaminants. All accessories shall be stored avoiding contamination and deterioration.

1.9 CLEANING AND RESTORATION METHODS

A. Submit the cleaning and restoration methods, and materials selected for a specific structure for approval before work starts. Take into account the total construction system of the building to be worked upon, including different stucco materials, as well as non-stucco elements which may be affected by the work.

B. Utilize Test Panel / Mock-Up to identify the appropriate cleaning and restoration treatment and materials.

1.10 TEST PANEL / MOCK-UP

A. Contractor shall prepare mock-up installations of each type of stucco to be installed at locations selected by the COR. Test panels shall have a minimum area of 2x2 feet and shall include all types of work required in the overall project, such as patching, and crack repair.

B. Submit mock-ups of each treatment proposed for use in the work. No masonry or stucco shall be used in the work until the mock-ups and the represented material and workmanship have been approved.

C. If cleaning tests are also to take place, test panels should be prepared on the same area. Test panels should not be undertaken in areas that are highly visible. Test panels will be inspected by the Architect for color, texture, and installation technique.

D. After the test panels have cured for a period of ten (10) days, the test panels will be inspected for color, texture, and installation technique by the COR prior to any further work.

E. Where stucco is not acceptable to the COR, the Contractor shall prepare up to two additional mock-ups of each stucco without further compensation from the Government. The Test Panel / Mock-up shall become the standard of workmanship for the stucco work outlined in the project.

PART 2 - PRODUCTS

2.1 EVALUATION OF EXISTING STUCCO

A. Microscopical and chemical analysis of historic stucco.

B. Visual inspection, conditions assessment, and documentation.

2.2 LIME STUCCO

A. The chosen stucco composition must be compatible in color, texture, finish, and strength with the existing stucco and substrate.

B. Lime should conform to ASTM C 207, Type S, Hydrated Lime for Masonry Purposes: 1,800 psi.

C. Lime putty should conform to ASTM C 1489.

D. Sand should match the sand in the existing stucco as closely as possible in color, texture, and gradation, should be free from impurities, and should conform to ASTM C 144.

E. As appropriate, hair or fiber (if used) could be goat, horse, or cattle hair, or pure manila fiber of good quality, ½ to 2 inches in length, clean and free of dust, dirt, oil, grease, or other impurities.

F. Colorants (if required for exact color match) should be non-fading, mineral oxide masonry pigment or earth pigments.

G. Equipment: Trough, wheelbarrow, plastic buckets, hoe, hawk, trowel, burlap (clean, undyed, and unprinted).

2.3 PORTLAND CEMENT AND PORTLAND CEMENT-AMENDED STUCCO

A. The chosen stucco composition must be compatible in color, texture, finish, and quality with the existing stucco and substrate.

B. Lime should conform to ASTM C 207, Type S, Hydrated Lime for Masonry Purposes.

C. Sand should match the existing stucco in color, texture and gradation; be free from impurities; and conform to ASTM C 144.

D. Cement should be gray and/or white, non-staining Portland cement and conform to ASTM C 150, Type II. Gray and white cements may be combined as required to achieve the required color.

E. Hair or fiber (if used) should be goat or cattle hair, or pure manila fiber of good quality, ½ to 2 inches in length, clean and free of dust, dirt, oil, grease, or other impurities.

F. Pigment (if used) should be compatible with the stucco mix and conform to ASTM C 979.

G. Equipment: Trough, wheelbarrow, plastic buckets, hoe, hawk, trowel, burlap (clean, undyed, and unprinted).

2.4 WATER

A. Potable, free of substances that are detrimental to mortar and masonry.

2.5 LIME AND CEMENT STUCCO MIXES

A. General: Unless the historic stucco analysis recommends otherwise, comply with the requirements of ASTM C 926 for the proportioning of materials and the manner of mixing the plaster for each required application.

B. Lime-Based Stucco:

1. Scratch and brown coats: 1-part lime putty, 3-parts sand, Approx. 6 pounds hair or fiber.
2. Finish coat: 1-part lime putty, 3-parts sand.

C. Lime-Portland Cement Stucco

1 Type N:

Scratch and brown coats: 1-part hydrated lime, 1 parts Portland cement, 6 parts sand, Approx. 6-pounds hair or fiber, and Water to form a workable mix.

Finish coat: 1-part hydrated lime, 1-parts Portland cement, 6-parts sand, and Water to form a workable mix.

2. Type O:

Scratch and brown coats: 2-part hydrated lime, 1-parts Portland cement 9 parts sand, Approx. 6-pounds hair or fiber, and Water to form a workable mix.

Finish coat: 2-part hydrated lime, 1-parts Portland cement, 9-parts sand, and Water to form a workable mix.

3. Portland cement stucco: 1 part Portland cement, 2.5 parts sand, Hydrated lime to not more than 15% of the cement volume, and Water to form a workable mix.

2.6 CLEANING PRODUCTS & EQUIPMENT

A. Use products that have a minimum 5-year performance record on similar projects. Selection of the products shall be predicated on long-term negative effects to the stucco rather than current level of cleanliness of the comparable structure.

B. Cleaning equipment shall not cause staining, erosion, marring, or other damage or changes in the appearance of the surfaces to be cleaned.

C. Sandblasting equipment is not allowed for cleaning masonry surfaces.

D. Water blasting equipment should not be operated at a pressure which will cause etching or other damage to the masonry surface or mortar joints.

2.7 REPAIR MATERIALS

A. Use materials, physical and chemical properties, and composition of Stucco in renovation work that match the original existing stucco to be repaired, unless samples and testing determine that existing mixtures and materials are faulty or non-performing.

B. Stucco materials used for repair and renovation shall match the original existing historic materials as closely as possible in composition, color, texture, strength, size, finishing and porosity.

2.8 METAL SUPPORT AND ACCESSORY MATERIALS FOR STUCCO

A. Metals and Finishes: hot-dip galvanized finish; ASTM A653 for 18-gauge and lighter formed metal products; ASTM A 123 galvanized after fabrication for 16-gauge and heavier products.

B. Exterior Exposed Plastering Accessories: Provide zinc alloy accessories.

C. Wire Ties: Galvanized soft steel wire, gauge as required.

D. Metal Lathing Materials: Exterior Metal Lath: Self-furring, 3.4 lbs. per square yard, galvanized steel with black asphaltic coating.

E. Fasteners: Galvanized steel, of type and length suitable for adequate penetration of the substrate.

2.9 WATER REPELLENT SEALER

A. Water repellent sealer primers shall be commercially available silane siloxane based products designed to preclude water droplet entry into the stucco walls without affecting the vapor transmission properties of the original material.

B. The product shall provide an invisible protection without changing the surface appearance or leaving a sheen.

C. The product shall have 100% Vapor Water Vapor Transmission per ASTM D-1653 and have a Water Repellency of 95% or better per ASTM E514.

D. Provide COR with 5-year Manufacturer Product Warranty.

PART 3 - EXECUTION

3.1 STUCCO RESTORATION, GENERAL

A. Contractor shall coordinate stucco work with the other trades involved in exterior rehabilitation work, including but not limited to masonry cleaning, sealing, and painting.

B. The Contractor shall provide visible barriers and / or warning tape around the perimeter of the work area for visitor protection and shall provide that nearby vehicles and adjacent structures and foliage are protected from damage during the course of the work.

C. It is the Contractor’s responsibility to determine the cause of the stucco deterioration and ensure that it is corrected before the stucco repair and restoration work is conducted. This includes a visual examination of all damage areas. Contractor shall submit his findings along with remediation plan in writing to the COR as part of the Submittal Requirements.

D. Contractor shall be knowledgeable of all State and Local environmental regulations related to the work that may restrict the options for cleaning methods, as well as the disposal of materials.

E. Cleaning and restoration techniques are potentially dangerous and shall be carried out only by experienced and qualified workers using proper eye protection, protective clothing, and other workplace safety conditions.

E. Contractor shall provide Test Panels on the work area using the same techniques that will be used on the remainder of the project. Usually a 3-foot by 3-foot area is sufficient for stucco Test Panels.

F. All cleaning procedures should first be identified and submitted to the COR. Once approved, the Contractor shall test at different concentrations in an inconspicuous area to judge their effectiveness and potential harm to the stucco prior to implementing at full scale.

G. Stucco shall not be placed when weather conditions detrimentally affect the quality of the finished product. No stucco shall be placed when the air temperature is below 5 degrees C 40 degrees F in the shade.

H. Stop material placements, and protect all in-place material from exposure, during periods of rain or other precipitation.

I. Protect adjacent work from moisture deterioration and soiling due to stucco application operations. Provide temporary coverings as required to minimize spattering of stucco on other materials.

J. Minimize levels of dust during stucco removal and application operations.

3.2 PROJECT SITE CONDITIONS

A. Normal conditions for the work of this Section shall be defined as when the air and surface temperatures are 40 degrees F and rising or less than 90 degrees F and falling. When temperatures are predicted to rise above or fall below this temperature range, the Contractor shall implement hot or cold weather procedures as defined by the Masonry Institute of America.

B. The Contractor is responsible for protecting existing adjacent materials and surfaces during the execution of the work. Provide all necessary protection and follow all necessary work procedures to avoid damage to existing material assemblies not a part of the work in the Section.

C. Temporarily remove and store metal downspouts, window grilles, and other surface mounted appurtenances during stucco restoration work. Install temporary drainage leaders and window protection if required and reinstall immediately upon completion of work in the immediate area.

D. Protect open joints and other vulnerable areas from water penetration to prevent leakage during the course of the work. Open areas shall not be left exposed overnight or when inclement weather is predicted.

E. Protect window sashes and frames with plywood or other sturdy barrier during removal of stucco around window openings. Protect existing built-in gutters and gutter outlets from damage and accumulation of mortar debris during work on chimneys and parapets.

F. Coordinate stucco work with other repairs such as gutter and roof work, cleaning, removal of overgrown vegetation, water runoff and diversion from the building, and painting and sealing.

G. Protect the existing roof surface from damage during the course of the stucco rehabilitation work. Repair all damage to slates, metal roofing, gutters, flashings, etc., to the satisfaction of, and at no additional cost to, the Government.

3.3 EVALUATION OF EXISTING STUCCO

A. The Contractor shall Identify cause and location of stucco deterioration.

B. The extent of the stucco work and areas to be stuccoed shall be approved by the COR on site prior to beginning operations.

C. Testing should be carried out systematically by an experienced professional on all elevations of the building or structure to determine the overall and specific areas of stucco repair or replacement.

D. Contractor shall submit to the COR a testing schedule, compatible stucco mix and a stucco schedule, including the methods and materials to be used.

E. For stucco repair and replacement where no paint or other surface finish is applied, the Contractor shall revisit the site with the COR after the new stucco has cured at least 30 days to inspect the work to see if the desired effect has been achieved.

F. The Contractor and COR shall provide a final report of complete work including all approved submittals and photographs of the repaired areas taken before, during, and after the work.

3.4 STUCCO REPAIR OF MINOR CRACKS (⅛ INCH AND SMALLER)

A. Crack should be free from dirt, grease, and vegetation. Blow cracks clean with compressed air, not to exceed 150 psi.

B. As appropriate, coat crack with a bonding agent in accordance with manufacturer’s instructions.

C. Prepare a slurry coat of stucco to match the color and finish of the existing stucco.

D. Apply a light coat of the slurry along the crack and work to match existing stucco.

E. Caulking compounds ARE NOT SUITABLE for patching hairline cracks.

3.5 STUCCO REPAIR OF LARGE CRACKS (LARGER THAN ⅛ INCH)

A. Cracks to be repaired shall be routed to a minimum width and depth of ¼ inch to accommodate stucco fill. The edges of the crack shall be undercut where possible. Brush cracks clean of loose debris with a soft brush.

B. The area to receive the stucco fill shall be thoroughly wetted to prevent dehydration of the stucco. Re-wet as necessary. Using the approved stucco mix, fill the crack and work stucco in as tightly as possible until flush with adjoining surface.

C. Remove excess stucco. Protect filled areas with plastic sheeting and re-wet periodically to allow a full cure.

3.6 STUCCO REPAIR BY PATCHING

A. Extent and area of patches shall be carefully assessed, submitted and reviewed by the COR. Stucco repair shall be carried out in a contained or well defined area as approved by the COR and / or as shown on the Drawings.

B. Remove all loose, deteriorated, and severely cracked stucco to the masonry substrate or lath. Avoid over-sounding to prevent additional damage to adjacent keys.

C. Stucco on Masonry Substrate:

1. Stucco is applied directly to masonry substrates such as brick, stone, concrete, or hollow tile without lath.
2. Rake out brick or stone mortar joints to a depth of 3/4 inch.

D. Masonry on Wood Substrate:

1. Wood Substrate: Determine type of lath—horizontal wood slats or wire mesh, if appropriate.
2. Wood Lath should be in good condition, free of rot and / or rust.
3. Replace areas of metal lath and underlay as approved by the COR. New wire lath should be nailed over existing wood lath, following review by the COR.
4. It is not recommended to insert metal lath when re-stuccoing historic masonry is in sound condition.

E. Surface should be free of debris, dust, dirt, grease, oil, paint, and vegetation. Clean with a bristle brush.

F. Area should be cut on the diagonal and squared off with a butt joint to provide a neat patch. DO NOT overlap new patch on old stucco.

G. Mix only as much stucco as can be used in two hours. Stucco should not be over mixed.

H. Wood lath or masonry substrate, but not metal lath, shall be thoroughly wetted before applying stucco to ensure that it does not draw moisture from the fresh stucco to rapidly.

I. Apply the scratch coat to the masonry substrate or lath. Number and thickness of the repair coats should match the historic stucco but no less than two. The scratch coat is generally ¼ to ⅜ inch thick, and must be scratched or crosshatched with a comb to provide a key for the second coat. Allow scratch coat to dry 48-hours.

J. The leveling or second coat is often applied in the same thickness as the initial coat. The total thickness of the first two coats is generally ⅝ inch. Roughen the surface to provide a key for the finish coat.

K. The final or finish coat is applied when the leveling coat is initially set. Work the finish coat to match the texture of the historic stucco.

L. To prevent cracking the area to be stucco should be shaded or covered. During hot weather (80 Degrees F or greater) keep the newly stuccoed area damp for a period of 48 hours.

3.7 LIME BASED STUCCO MIXING

A. Mix lime stucco thoroughly prior to use.

B. Add sand and lime alternately to the mixer while it is running. Unless sand is extremely dry, water is most likely not needed. If the mixture is crumbly after 15minutes of mixing, a small amount of water may be added.

C. Avoid locating the mixer in direct sunlight to minimize heating of the mortar. When thoroughly mixed, lime mortar should be dry to the appearance, but spreadable.

D. Fiber may be added into the mortar in the last few minutes of mixing. Once fibers are well distributed, discontinue mixing.

3.8 PORTLAND CEMENT AMENDED STUCCO MIXING

A. Mix Portland cement amended stuccoes in accordance with ASTM C 926 and the PCA Portland Cement Plaster Manual.

B. Measure dry ingredients by volume or equivalent weight. Do not measure by shovel. Combine in a clean, mechanical batch mixer.

C. For Portland cement-amended stuccoes, materials shall be pre-hydrated to reduce shrinkage. Lime and sand shall be thoroughly mixed, adding only enough water to produce a damp, workable mix that will retain its form when pressed into a ball.

D. Add Portland cement and remainder of water and mix to provide a workable consistency. Stucco should be easily thrown from trowel and adhere to the surface for easy spreading.

3.9 WATER REPELLENT SEALER

A. Water repellents are designed to preclude water infiltration through the pore structure of stucco while allowing water vapor transmission. May be applied to fresh stucco after 48 hours.

B. Contractor to provide water repellant treatment only when shown on the Drawings or as clearly indicated in Section 01 00 02 – General Requirements of the Contract Documents.

C. All surfaces to be coated shall be clean of any dirt and grime, efflorescence, lime run, form oils and release agents, grease, mud, excess mortar, mold and mildew, etc.

D. All cracks shall be pointed or caulked. All voids, bee holes, masonry surface defects and openings such as conduits, pipes, drains, door frames, vents, air conditioner openings, electrical openings, control joints, or any dissimilar materials shall be repaired using urethane or other approved patching. May be applied to fresh concrete/stucco after 48 hours.

E. Do not apply to surfaces if moisture content is greater than 25% as measured with an electronic moisture meter. Establish that air, surface, and material temperatures are above 40°F and at least 5°F above the dew point prior to application. Do not apply at temperatures below 40°F or when temperatures are expected to drop below 40°F within 48 hours of application.

F. Do not apply if rain, snow, or lower temperatures are expected within 48 hours. Do not apply if relative humidity is greater than 90%.

G. Apply two (2) coats per product manufacturer requirements in areas shown on the Drawings or as outlined in Section 01 00 02 General Requirements.

3.10 STUCCO COLORS AND TINTS

A. Contractor shall conduct visual or microscopic analysis on the source of the color to match the finish stucco color by pigments or by applying the appropriate paint.

B. Limewash paint, latex paint, or oil-based paint are appropriate coatings for stucco buildings. Contractor shall make submittal of the most appropriate paint that is compatible with coating already on the service of the building.

C. A minimum of two coats shall be applied per product manufacturer requirements.

- - - E N D - - -

SECTION 07 71 23
GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section apply to the replacement of gutters and downspouts located on the Service Building.

B. The gutters and downspouts located on the new building addition to remain are to be cleaned and repaired as needed.

1.2 RELATED WORK

A. Section 01 00 02, GENERAL REQUIREMENTS.

B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.3 REFERENCE STANDARDS

A. All work and materials shall conform to the Federal, State and local building codes in addition to all contract documents.

B. Architectural Sheet Metal Standards (2012), Sheet Metal & Air Conditioning Contractors' National Association (SMACNA).

1.4 QUALITY ASSURANCE

A. All construction firms and personnel shall be experienced and qualified specialists in the fabrication and installation of Aluminum gutters and downspouts.

B. Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 5 years. The design, model and size of each item shall have been in satisfactory and efficient operation on at least three installations for approximately three years.

C. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.

D. Conform to codes and standards as required by the specifications. Conform to local codes, if required by local authorities.

E. Apply and install all items in accordance with Manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract drawings and specifications to the COR for resolution.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, and with requirements in the individual specification sections.

B. Contractor shall make all necessary field measurements and investigations to assure that the components, hardware, and assemblies will meet contract requirements.

C. At time for submittal of fabrication drawings, the Contractor shall certify in writing that the area has been reviewed, measurements have been taken, and fabrication drawings have been checked to provide a complete and efficient installation.

1.6 DELIVERY, STORAGE AND HANDLING

A. Equipment and material placed on the job site shall remain in the custody of the Contractor until phased acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material.

B. The Contractor is solely responsible for the protection of such equipment and material against any damage.

C. Make sure that the roof drainage components are handled with care during transport, storage and unpacking.

D. Exercise care in storage and handling of equipment and material to be incorporated in the work. Remove debris arising from cutting, threading, and fabrication of the metal components.

E. All material shall be stored on work site on elevated platform and protected from damage to coated finishes.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide “K-Style” gutters with minimum (.032") gauge aluminum for gutters, downspouts, fabricated fittings, and hangers.

B. Minimum gutter size shall be 6-inch “K-Style” and minimum downspout shall be 3-inch round.

C. Color to match existing gutter located on the building addition located on the north end of the Service Building.

D. Gutters will have uniform sections from 12’ to 20’.

E. Downspouts shall be one continuous section.

2.2 FABRICATION

A. Equipment and materials installed shall be compatible in all respects with other items being furnished so that the result will be a complete and fully operational system that conforms to contract requirements.
B. Inside and outside corner miters will be stamped out of a single piece of metal with finish and profile compatible with the gutter.
C. End caps for gutters shall have a watertight seal.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION OF EQUIPMENT

A. All areas of drainage system installation shall be examined for any conditions that may be detrimental to proper installation. Start of installation means acceptance of existing conditions.
B. Prepare layout drawings to coordinate proper location and personnel access of all facilities. Submit the drawings to the COR for review.
C. Install downspout strap hangers using a minimum .032″ thickness straps, screwed, (not nailed) into building sheathing at 24″ o.c. for the lowest 8′ of downspout and at 48″ o.c. for the upper portions. Do not use cast aluminum spike type downspout hangers.
D. Downspouts shall be installed plum and in accordance to SMACNA's "Architectural Sheet Metal Manual". Gutters shall have a slope to downspout of 1-inch per 32′ of run.
E. Do not perforate downspout or connectors or elbow with screws, excluding ribbed elbow at foot of downspout.
F. Connections and fittings shall be snug and water tight.
G. Gutter Hangers should be mounted at 2′ c/c, and 8″ from the start of the fascia-board.

3.2 PROTECTION

A. The Contractor shall be responsible for protecting materials and work before and during the installation process.
B. Upon completion of installation the Contractor shall be responsible for protecting the work from damage during the remaining construction.
C. Any damage to gutters or downspouts shall be repaired, including touch up paint to small scratches to finish coat.

- - - E N D - - -

SECTION 07 92 22
JOINT SEALANTS – ELECTRICAL WORK

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section covers interior and exterior sealant and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK (INCLUDING BUT NOT LIMITED TO THE FOLLOWING):

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONNECTORS AND CABLES

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

D. Section 26 05 33, RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

1.3 QUALITY ASSURANCE:

A. Installer Qualifications: An experienced installer with a minimum of three (3) years’ experience and who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance. Submit qualification.

B. Source Limitations: Obtain each type of joint sealant through one (1) source from a single manufacturer.

C. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates.

1.4 CERTIFICATION:

A. Contractor is to submit to the COR written certification that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials will properly perform to provide permanent watertight, airtight or vapor tight seals (as applicable), and that materials supplied meet specified performance requirements.

1.5 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's installation instructions for each product used.

C. Cured samples of exposed sealants for each color.
D. Manufacturer's Literature and Data: Sealing compound, each type, including compatibility when different sealants are in contact with each other.
E. Manufacturer warranty.

1.6 PROJECT CONDITIONS:

A. Environmental Limitations:
   1. Do not proceed with installation of joint sealants under following conditions:
      a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C (40 degrees F).
      b. When joint substrates are wet.
B. Joint-Width Conditions:
   1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
C. Joint-Substrate Conditions:
   1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 DELIVERY, HANDLING, AND STORAGE:

A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.
B. Carefully handle and store to prevent inclusion of foreign materials.
C. Do not subject to sustained temperatures exceeding 32 degrees C (90 degrees F) or less than 5 degrees C (40 degrees F).

1.8 WARRANTY:

A. Construction Warranty: Comply with FAR clause 52.246-21 "Warranty of Construction".
B. Manufacturer Warranty: Manufacturer shall warranty their sealant for a minimum of five (5) years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.9 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. ASTM International (ASTM):

C1193-16.....Standard Guide for Use of Joint Sealants.

C. All Sealants Products used shall be validated by the Sealant, Waterproofing and Restoration Institute (SWRI). Submit such validation as part of Item 1.05 Submittals.

2.1 SEALANTS:

A. Exterior Sealants:

1. Provide location(s) of exterior sealant as follows:

a. Provide sealant at exterior surfaces of exterior wall penetrations.

b. Voids where electrical improvements penetrate exterior walls.

B. Interior Sealants:

1. Provide location(s) of interior sealant as follows:

a. Interior surfaces of exterior wall penetrations.

b. Voids where electrical improvements penetrate interior walls.

2.2 COLOR:

A. Color of sealants to be light gray or aluminum, unless otherwise indicated in construction documents.

2.3 JOINT SEALANT BACKING:

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

2.4 PRIMER:

A. As recommended by manufacturer of caulking or sealant material.

B. Stain free type.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.

B. Coordinate for repair and resolution of unsound substrate materials.

C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

A. Prepare joints in accordance with manufacturer's instructions and SWRI (The Professionals' Guide).

B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.

3.3 INSTALLATION:

A. General:

1. Apply sealants and caulking only when ambient temperature is between 5 degrees C and 38 degrees C (40 degrees and 100 degrees F).
2. Do not install polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
3. Do not install sealant type listed by manufacture as not suitable for use in locations specified.
4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions. Test sealants for compatibility with each other and substrate.
5. Avoid dropping or smearing compound on adjacent surfaces.
6. Fill joints solidly with compound and finish compound smooth.
7. Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in **ASTM C1193-16 "Standard Guide for Use of Joint Sealants"** unless shown or specified otherwise in construction documents.
8. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Remove any excess sealant from adjacent surfaces of joint, leaving the working in a clean finished condition.
9. Replace sealant which is damaged during construction process.

C. For application of sealants, follow requirements of **ASTM C1193-16 "Standard Guide for Use of Joint Sealants"** unless specified otherwise.

D. Interior Sealants:

1. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cutouts to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.

3.4 CLEANING:

A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by manufacturer of the adjacent material or if not otherwise indicated by the caulking or sealant manufacturer.

B. Leave adjacent surfaces in a clean and unstained condition.

- - - E N D - - -

SECTION 08 33 24
OVERHEAD ROOL-UP DOORS

1.1 SUMMARY

A. This section specifies the furnishing, installation, and finishing of exterior overhead insulated aluminum or stainless steel roll-up doors for existing garage door openings in areas shown on the Drawings or as described in Section 01 00 02 General Requirements.

1.2 RELATED REQUIREMENTS

A. Section 01 00 02, General Requirements

B. Section 01 33 23, Shop Drawings, Product Data, and Samples

C. Section 01 42 19, Reference Standards

1.3 APPLICABLE STANDARDS

A. ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

B. ANSI/DASMA 108-2012, Standard Method for Testing Sectional Garage Doors and Rolling Doors. Submit Test Report as part of Submittals.

C. ASTM E 330 - Structural performance of exterior windows, curtain walls, and doors by uniform static air pressure difference.

D. ASCE 7, Minimum Design Loads for Buildings and Other Structures (Wind Loads).

E. International Building Code, Aluminum (Chapter 20)

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 23, Shop Drawings, Product Data, and Samples.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.

D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.

E. Wiring Diagrams: For power, signal, and control wiring.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

G. Closeout Submittals: Provide manufacturer’s maintenance instructions that include recommendations for periodic checking, adjustment and lubrication of components.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years of experience in the fabrication and installation of security closures.

B. Installer Qualifications: Installer Qualifications: Company specializing in performing Work of this section with minimum three years and an authorized Wayne Dalton installer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

D. Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7 (Wind Loads).

E. Wind Loads: Uniform pressure (velocity pressure) of 20 lbf / sq.ft., acting inward and outward. Basic Wind Speed: 120 mph.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store products in manufacturer's unopened packaging with seals and labels intact until ready for installation.

B. Store materials off the ground in a dry, warm, ventilated weathertight location.

1.7 SEQUENCING

A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.8 WARRANTY

A. Provide a 5 Year, 500,000 cycle Warranty on all door systems materials and workmanship.

PART 2 - PRODUCTS

2.1 DOOR CONSTRUCTION GENERAL

A. All doors shall be custom and individually manufactured by a manufacturer that has been in business for a minimum of five (5) years.

B. The panels shall be laminated, using a high-performance adhesive to thermally broken, stiles and rails forming a perimeter to reduce transmission and allow for field preparation of hardware.

C. The bottom edge shall be manufactured from a moisture-resistant and decay-resistant composite.

D. Door shall be composed of flat slats with foamed-in-place polyurethane insulation with an R-value of 7.7 or better. Slats shall have free-acting interlocking joints that permit easy articulation when the door coils.

E. Door to feature a strong bottom bar designed for easy installation and does not require fasteners in the guide openings, so the bottom bar does not interfere with door operation.

F. The counterbalance assembly should serve as load-carrying beam and provide the axis around which the curtain coils.

G. Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

H. Provide slats of thickness and mechanical properties that match the existing Bay Door on the north building addition.

I. Aluminum Door Curtain Slats: shall conform with ASTM B 209 sheet or ASTM B 221 extrusions, alloy and temper standard with manufacturer for type of use and finish indicated; minimum thickness of 1/4 inch and as required to meet requirements.

J. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from manufacturer's

standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.

K. Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

L. Curtain Jamb Guides shall be of the same material and finish as slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading.

M. Hood to enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Minimum 22-gauge aluminum.

N. Door will be operated by means of motor operation with pneumatic sensing edge attached to bottom bar to stop and reverse door when it contacts an object during the closing cycle.

O. Equip each door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.

P. Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

Q. Provide pull-down straps for doors more than 84 inches high.

2.2 ELECTRIC DOOR OPERATORS

A. Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

B. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc. Door Operator Location will be determined as part of the Submittal requirements for model and manufacturer proposed.

C. Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch.

D. Motor shall comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements of manufacturer. Reversible motor and controller.

E. The Motor shall be selected based on the existing electric service and electric panel availability. Submit sketch of Panel Box upgrades to COR prior to conducting any work.
F. Existing electric service appears to be 1 Phase 3 wire 120 / 240 volt. Contractor to confirm.
G. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with Sub-Contractors.
H. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
I. Provide exterior Remote-Control Station units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
J. Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening.
K. Equip each electrically powered door with capability for emergency manual operation.

2.3 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
C. Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.
D. Provide Lock Cylinders and three keys for each cylinder.

2.4 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
B. Aluminum Mill Finish: Manufacturer's standard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

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

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service and to train maintenance personnel to adjust, operate, and maintain overhead coiling doors.

B. Perform installation and startup checks according to manufacturer's written instructions.

C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide weathertight fit around entire perimeter.

--- END ---

SECTION 08 51 03

HISTORIC TREATMENT OF WOOD WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this Section Includes:

1. Window Restoration: wood rehabilitation and refinishing.
2. Glass repair and replacement glazing.
3. Window hardware repair, refinishing, and replacement.

1.2 RELATED WORK

A. Section 01 00 02, General Requirements
B. Section 01 42 19, Reference Standards
C. Section 09 91 05, Painting of Exterior Wood

1.3 REFERENCES

A. ASTM C 1036 (2016)- Standard Specification for Flat Glass.
B. ASTM C 920 (2018) - Standard Specification for Elastomeric Joint Sealants.
C. GLASS ASSOCIATION OF NORTH AMERICA (GANA): GANA Glazing Manual (2004) Glazing Manual.
D. 16 CFR 1201 Safety Standard for Architectural Glazing Materials.

1.4 PRECONSTRUCTION TESTING

A. Engage a qualified historic treatment specialist to perform preconstruction testing on historic wood windows.

1. Select sizes and configurations of existing work to adequately demonstrate capability of products to comply with requirements.
2. Test historic treatment methods for effectiveness and compliance with specified requirements.
3. Notify COR seven days in advance of the dates and times when testing will be performed.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: For repair and replacement of historic wood windows and components. Show location and extent of replacement work, with enlarged details of replacement parts indicating materials, profiles, joinery, reinforcing, and method of splicing into or attaching to existing wood window, accessory items, and finishes.
C. Samples: For each exposed product and for each color and texture specified.

1.6 QUALITY ASSURANCE

A. Historic Treatment Specialist Qualifications: A qualified historic

wood window specialist.

B. Sample Installation: Prepare repair and refinishing sample to demonstrate aesthetic effects and set quality standards for materials and execution and for repair techniques, materials and refinishing. Prepare sample so it is inconspicuous or reversible.

1. Locate Window Restoration repair sample on the building where directed by COR.

2. ***Window Restoration***: Prepare one entire window unit to serve as sample to demonstrate repairs/refinishing and aesthetic effects of wood window members including frame, sash, glazing, and hardware.

C. AWI Quality Standard: Comply with applicable requirements in AWI's "Architectural Woodwork Quality Standards" for construction, finishes, grades of wood windows, and other requirements.

D. WI Quality Standard: Comply with WI's "Manual of Millwork" for construction, finishes, grades of wood windows, and other requirements.

E. Salvage, survey and inventory windows to identify pieces or sections removed during repair work for reinstallation.

F. Pre-installation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 REPLACEMENT WOOD MATERIALS

A. Wood: Clear fine-grained lumber; kiln dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible dutchman joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch (0.8 mm) deep by 2 inches (51 mm) wide.

B. Species: Match wood species of exterior window trim and frame parts.

C. Wood Window Members and Trim: Match profiles and detail of existing window members and trim.

2.2 WOOD REPAIR MATERIALS

A. Wood Consolidant: Ready-to-use product designed to penetrate, consolidate, and strengthen soft fibers of wood materials that have deteriorated due to weathering and decay and designed specifically to enhance the bond of wood-patching compound to existing wood.

B. Wood-Patching Compound: Two-part epoxy-resin wood-patching compound; knife-grade formulation as recommended by manufacturer for type of wood repair indicated, tooling time required for the detail of work, and site conditions. Compound shall be designed for filling voids in damaged wood materials that have deteriorated due to weathering and decay. Compound shall be capable of filling deep holes and spreading to feather edge.

2.3 GLAZING MATERIALS

A. Glass and Glazing Materials:

1. Provide minimum (1/4 inch) thick glass units unless otherwise indicated on Drawings. ASTM C1036, Type I, Class 1.
2. Glazing Sealants: ASTM C920, silicone neutral cure, Type S, Class 25 or 50 as recommended by manufacturer for application, Grade NS, Shore A hardness of 25 to 30 Durometer.
3. Glazing Points (Sprigs): Pure zinc stock, thin, flat, triangular or diamond shaped pieces, 6 mm (1/4 inch) minimum size.
4. Color of glazing compounds, gaskets, and sealants used for color frames to match color of the finished window and be non-staining.

B. Sealant shall be chemically compatible with setting blocks, edge blocks, and sealing tapes, with sealants used in manufacture of insulating glass units. Color of sealant shall be white.

C. Accessories: Provide as required for a complete installation, including glazing points, clips, shims, angles, beads, and spacer strips. Provide noncorroding metal accessories. Provide primer-sealers and cleaners as recommended by the glass and sealant manufacturers.

2.4 WINDOW HARDWARE

A. General: Provide complete sets of window hardware consisting of sash balances, hinges, pulls, latches, and accessories indicated for each window or required for proper operation. Window hardware shall smoothly operate, tightly close, and securely lock wood windows and be sized to accommodate sash or ventilator weight and dimensions.

B. Replacement Window Hardware: Replace existing damaged or missing window hardware with new hardware.

C. Material: Solid Bronze, match existing hardware.

D. Weight and Pulley Sash-Balance: Concealed weight and pulley balance system including steel or cast iron weights, cast-bronze pulleys, synthetic sash cord or sash chain; size and capacity to hold sash stationary at any open position.

E. Window Hardware Finishes: Comply with BHMA A156.18 for base material and finish requirements indicated.

2.5 WINDOW HARDWARE

A. Metal Weather Stripping: Bronze weather stripping; designed either as one piece to seal by sliding into a groove in the sash or as two pieces that interlock with each other; and completely concealed when wood window is closed.

B. Full-perimeter and meeting rail weather stripping for each operable sash.

2.6 WINDOW FINISHES

A. Unfinished Repaired Windows: Provide exposed exterior and interior wood surfaces of replacement windows unfinished; smooth, filled, and suitably prepared for on-site priming and finishing.

B. Primer Coat: Manufacturer’s standard for application to existing painted and new wood repairs/replacement sections.

C. Finish Coats: Manufacturer's standard finish products for intermediate coat and topcoat products compatible with primer coat. Color and Gloss: Match historic colors.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect adjacent materials from damage by historic treatment of wood windows.

B. Clean existing wood window surfaces of mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris by scrubbing with bristle brush or sponge and detergent solution. Scrub mildewed areas with mildewcide. After cleaning, rinse thoroughly with fresh water. Allow to dry before repairing or painting.

C. Condition replacement wood members and replacement windows to prevailing conditions at installation areas before installing.

3.2 HISTORIC TREATMENT PROCEDURES, GENERAL

A. General: Have historic treatment of wood windows directed and performed by a qualified historic treatment specialist. Ensure that historic treatment specialist's field supervisors are present when historic treatment of wood windows begins and during its progress. In treating historic items, disturb them as minimally as possible and as follows:

1. Apply each product according to manufacturer's written instructions unless otherwise indicated.

2. Stabilize and repair wood windows to reestablish structural integrity and weather resistance while maintaining the existing form of each item.
3. Stop the progress of deterioration by removing coatings and applying borate preservative treatment before repair.
4. Repair items in place where possible and retain as much original material as possible.
5. Replace or reproduce historic items where indicated or scheduled.
6. Make historic treatment of materials reversible whenever

possible.
7. Install temporary protective measures to protect wood window work that is indicated to be completed later.

B. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use only the gentlest mechanical methods, such as scraping and natural-fiber bristle brushing and sanding that will not abrade wood substrate, reducing clarity of detail. Do not use abrasive methods such as wire brushing, or power tools except as indicated as part of the historic treatment program and as approved by COTR.

C. Repair and Refinish Existing Hardware: Dismantle window hardware; repair and refinish it to match finish samples.

D. Repair Wood Windows: Match existing materials and features, retaining as much original material as possible to perform repairs.

1. Unless otherwise indicated, repair wood windows by consolidating, patching, splicing, or otherwise reinforcing wood with new wood matching existing wood or with salvaged, sound, original wood.
2. Where indicated, repair wood windows by limited replacement matching existing material.
3. Compatible materials and treatments may be used where evaluated and approved by COTR.

E. Protection of Openings: Where sash or windows are indicated for removal, cover resultant openings with temporary enclosures so that openings are weathertight during repair period.

F. Identify removed windows, sash, and members with numbering system corresponding to window locations to ensure reinstallation in same location. Key windows, sash, and members to Drawings showing location of each removed unit. Permanently stamp units in a location that will be concealed after reinstallation.

3.3 GLAZING

A. Examine openings for glass and glazing units; determine they are proper size; plumb; square; and level before installation is started.

B. Review for conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

C. Remove cracked and damaged glass and glazing materials from openings and prepare surfaces for re-glazing.

D. For sealant glazing, prepare glazing surfaces in accordance with GANA Sealant Manual.

E. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.

F. Set glazing without bending, twisting, or forcing of units. Do not allow glass to rest on or contact any framing member.

G. Glaze windows in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.

H. Clean and dry glazing surfaces then prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

I. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by COR.

3.4 WOOD WINDOW PATCH-TYPE REPAIR

A. General: Patch wood members that are damaged and exhibit depressions, holes, or similar voids, and that have limited rotted or decayed wood.

1. Treat wood members with wood consolidant prior to application of patching compound. Allow treatment to harden before filling void with patching compound.
2. Remove rotted or decayed wood down to sound wood.

B. Apply borate preservative treatment to accessible surfaces either before applying wood consolidant or after removing rotted or decayed wood.

C. Apply wood-patching compound to fill depressions, nicks, cracks, and other voids created by removed or missing wood.

1. Apply patching compound in layers as recommended by manufacturer until the void is completely filled.
2. Finish patch surface to match contour of adjacent wood member. Sand patching compound smooth and flush, matching contour of existing wood member.

3.5 WOOD WINDOW MEMBER-REPLACEMENT REPAIR

A. General: Replace parts of or entire wood window members at locations where damage is too extensive to patch. And as approved by COTR.

1. Remove sash from windows before performing member-replacement repairs unless otherwise indicated.
2. Remove broken, rotted, and decayed wood down to sound wood.
3. Custom fabricate new wood to replace missing wood; either replace entire wood member or splice new wood part into existing member. Fabricate replacement members according to AWI Section 1000requirements for Custom Grade.
4. Secure new wood using finger joints or multiple dowels with adhesive and nailing to ensure maximum structural integrity at each splice. Use only concealed fasteners. Fill nail holes and patch surface to match surrounding wood.

B. Apply borate preservative treatment to accessible surfaces after replacements are made.

C. Repair remaining depressions, holes, or similar voids with patch-type repairs.

D. Mill glazed members to accommodate glass thickness.

E. Glazing: Provide replacement glazing in units prior to reinstallation.

1. Mill replacement glazed members to accommodate glass thickness.
2. Provide replacement glazing stops coordinated with glazing system indicated.
3. Provide glazing stops to match contour of sash frames.
4. Re-glaze with glazing compound after setting stops. Tool glazing putty smooth.

F. Reinstall units removed for repair into original openings.

G. Weather Stripping: Replace nonfunctioning and install missing weather stripping to ensure full-perimeter and meeting rail weather stripping for each operable sash.

--- END ---

SECTION 09 91 05
PAINTING OF EXTERIOR WOOD

PART 1-GENERAL

1.1 DESCRIPTION

A. Section specifies the preparation and painting of exterior wood surfaces.

B. Section specifies prime coats which may be applied in shop under other sections.

C. Painting includes shellacs, stains, varnishes, and coatings specified.

1.2 RELATED WORK

A. Section 01 00 02, General Requirements

B. Section 01 33 23, Shop Drawings, Product Data, and Samples

C. Section 01 35 26, Safety Requirements

D. Section 01 42 19, Reference Standards

1.3 SUSTAINABILITY REQUIREMENTS (NOT APPLICABLE FOR THIS CONTRACT)

A. Materials in this section may contribute towards contract compliance with sustainability requirements.

B. Biobased Material: For products designated by the USDA's BioPreferred® program, provide products that meet or exceed USDA recommendations for biobased content, subject to the products compliance with performance requirements in this Section. For more information regarding the product categories covered by the BioPreferred® program, visit http://www.biopreferred.gov.

1.4 REGULATORY REQUIREMENTS FOR RECYCLED CONTENT

A. Products and Materials with Post-Consumer Content and Recovered Materials Content:

1. Contractor is obligated by contract to satisfy Federal mandates for procurement of products and materials meeting recommendations for post-consumer content and recovered materials content; the list of designated product categories with recommendations has been compiled by the EPA - refer to http://www.epa.gov/wastes/conserve/tools/cpg/products/.
2. Materials or products specified by this section may be obligated to satisfy this Federal mandate and Comprehensive Procurement Guidelines program.
3. The EPA website also provides tools such as a Product Supplier Directory search engine and product resource guides.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Before work is started, or sample panels are prepared, submit manufacturer's literature, the current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.

C. Samples:

1. After painters' materials have been approved and before work is started submit samples showing each type of finish and color specified.
2. Samples to show color: Composition board, 150 by 150 (6 inch by 6 inch).
3. Panel to show transparent finishes: Wood of same species and grain pattern as wood approved for use, 100 by 250 by 3 mm (4 inch by 10 inch face by 1/4 inch) thick minimum, and where both flat and edge grain will be exposed, 250 mm (10 inches) long by sufficient size, 50 by 50 mm (2 by 2 inch) minimum or actual wood member to show complete finish.

D. Manufacturers' Certificates indicating compliance with specified requirements:

1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.
2. High temperature aluminum paint.
3. Epoxy coating.
4. Intumescent clear coating or fire retardant paint.
5. Plastic floor coating.

E. Manufacturer’s letter of recommendation:

1. Provide a letter addressed to the National Cemetery Administration from the manufacturer of the paint/coating, detailing their understanding of the substrate to be painted, preparations required

before painting, the application, and the national shrine aesthetically-pleasing appearance expected of the finished product. This letter shall be signed by a “Paint Specialist” or other approved equal or greater qualifications.

1.6 DELIVERY AND STORAGE

A. Deliver materials to site in manufacturer's sealed container marked to show following:
   1. Name of manufacturer.
   2. Product type.
   3. Batch number.
   4. Instructions for use.
   5. Safety precautions.

B. In addition to manufacturer's label, provide a label legibly printed as following:
   1. Federal Specification Number, where applicable, and name of material.
   2. Surface upon which material is to be applied.
   3. If paint or other coating, state coat types; prime, body or finish.

C. Maintain space for storage, and handling of painting materials and equipment in a neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.

D. Store materials at site at least 24 hours before using, at a temperature between 18 and 30 degrees C (65 and 85 degrees F).

1.7 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

B. Master Painters Institute (MPI):

No. 4-13	Interior/ Exterior Latex Block Filler
No. 5-13	Exterior Alkyd Wood Primer
No. 7-13	Exterior Oil Wood Primer
No. 8-13	Exterior Alkyd, Flat MPI Gloss Level 1 (EO)
No. 9-13	Exterior Alkyd Enamel MPI Gloss Level 6 (EO)
No. 10-13	Exterior Latex, Flat (AE)
No. 11-13	Exterior Latex, Semi-Gloss (AE)
No. 31-13	Polyurethane, Moisture Cured, Clear Gloss (PV)
No. 36-13	Knot Sealer

No. 68-13	Interior/ Exterior Latex Porch & Floor Paint, Gloss
No. 71-13	Polyurethane, Moisture Cured, Clear, Flat (PV)
No. 94-13	Exterior Alkyd, Semi-Gloss (EO)
No. 95-13	Fast Drying Metal Primer
No. 119-13	Exterior Latex, High Gloss (acrylic) (AE)
No. 134-13	Primer, Galvanized, Water Based

C. Steel Structures Painting Council (SSPC):

SSPC SP 1-04	Solvent Cleaning
SSPC SP 2-04	Hand Tool Cleaning
SSPC SP 3-04	Power Tool Cleaning

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood Sealer: Thinned with thinner recommended by manufacturer at rate of about one part of thinner to four parts of varnish.

B. Plastic Tape:

1. Pigmented vinyl plastic film in colors as specified.
2. Pressure sensitive adhesive back.
3. Widths as shown.

C. Interior/Exterior Latex Block Filler: MPI 4.

D. Exterior Alkyd Wood Primer: MPI 5.

E. Exterior Oil Wood Primer: MPI 7.

F. Exterior Alkyd, Flat (EO): MPI 8.

G. Exterior Alkyd Enamel (EO): MPI 9.

H. Exterior Latex, Flat (AE): MPI 10.

I. Exterior Latex, Semi-Gloss (AE): MPI 11.

J. Polyurethane, Clear Gloss: MPI 31.

K. Knot Sealer: MPI 36.

L. Interior/ Exterior Latex Porch & Floor Paint, Low Gloss: MPI 60.

M. Interior/ Exterior Latex Porch & Floor Paint, gloss: MPI 68.

N. Polyurethane, Moisture Cured, Clear, Flat (PV): MPI 71.

O. Exterior Alkyd, Semi-Gloss (EO): MPI 94.

P. Fast Drying Metal Primer: MPI 95.

Q. Exterior Latex, High Gloss (acrylic) (AE): MPI 119.

2.2 PAINT PROPERTIES

A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.

B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.

2.3 REGULATORY REQUIREMENTS

A. Paint materials must conform to the restrictions of the local Environmental and Toxic Control jurisdiction or the requirements of this section, whichever is most stringent.
   1. Lead-Based Paint:
      a. Lead based paint is not permitted to be used.
   2. Asbestos: Materials must not contain asbestos.
   3. Chromate, Cadmium, Mercury, and Silica: Materials must not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
   4. Human Carcinogens: Materials must not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
   5. Use high performance acrylic paints in place of alkyd paints, where possible.
   6. VOC content for solvent-based paints must not exceed specified performance requirement; aromatic hydro carbons contained in solvent-based paints must not exceed one percent by weight.

PART 3 - EXECUTION

3.1 JOB CONDITIONS

A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.
   1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
   2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each day’s work.

B. Atmospheric and Surface Conditions:
   1. Do not apply coating when air or substrate conditions are:
      a. Less than 3 degrees C (5 degrees F) above dew point.
      b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the Contracting Officer and the product manufacturer.
   2. Do not exceed application conditions recommended by the manufacturer.

3. Maintain interior temperatures until paint dries hard.
4. Do no exterior painting when it is windy and dusty.
5. Do not paint in direct sunlight or on surfaces that the sun will soon warm.
6. Apply only on clean, dry and frost free surfaces except as follows:
   a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces where allowed by manufacturer's printed instructions.
   b. Dampened with a fine mist of water on hot dry days concrete and masonry surfaces to which water thinned acrylic and cementitious paints are applied to prevent excessive suction and to cool surface.
7. Varnishing:
   a. Apply in clean areas and in still air.
   b. Before varnishing vacuum and dust area.
   c. Immediately before varnishing wipe down surfaces with a tack rag.

3.2 SURFACE PREPARATION

A. Method of surface preparation is optional, provided results of finish painting produce solid even color and texture specified with no overlays.

B. General:
   1. Remove prefinished items not to be painted such as lighting fixtures, escutcheon plates, hardware, trim, and similar items for reinstallation after paint is dried.
   2. Remove items for reinstallation and complete painting of such items and adjacent areas when item or adjacent surface is not accessible or finish is different.
   3. See other sections of specifications for specified surface conditions and prime coat.
   4. Clean surfaces for painting with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry.

C. Wood:
   1. Sand to a smooth even surface and then dust off.
   2. Sand surfaces showing raised grain smooth between each coat.
   3. Wipe surface with a tack rag prior to applying finish.
   4. Surface painted with an opaque finish:
      a. Coat knots, sap and pitch streaks with Knot Sealer before applying paint.
      b. Apply two coats of Knot Sealer over large knots.

5. After application of prime or first coat of stain, fill cracks, nail and screw holes, depressions and similar defects with wood filler paste. Sand the surface to make smooth and finish flush with adjacent surface.
6. Before applying finish coat, reapply wood filler paste if required, and sand surface to remove surface blemishes. Finish flush with adjacent surfaces.
7. Fill open grained wood such as oak, walnut, ash and mahogany with Wood Filler Paste, colored to match wood color.
   a. Thin filler in accordance with manufacturer's instructions for application.
   b. Remove excess filler, wipe as clean as possible, dry, and sand as specified.

3.3 PAINT PREPARATION

A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.
B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.
C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.
D. Mix two component and two part paint and those requiring additives in such a manner as to uniformly blend as specified in manufacturer's printed instructions unless specified otherwise.
E. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

3.4 APPLICATION

A. All conduit used on this project is to be shop painted prior to delivery to the project site. Limited touch up in the field will be permitted by the VA. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
B. Unless otherwise specified, apply paint in three coats; prime, body, and finish. When two coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
C. Apply each coat evenly and cover substrate completely.

D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by RE/COR.

E. Finish surfaces to show solid even color, free from runs, lumps, brush marks, laps, holidays, or other defects.

F. Apply by brush or roller, except as otherwise specified. No spray painting will be permitted at the project location.

H. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

3.5 PRIME PAINTING

A. After surface preparation, prime surfaces before application of body and finish coats, except as otherwise specified.

B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.

C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel. Apply an additional prime coat.

D. Prime rebates for stop and face glazing of wood, and for face glazing of steel.

E. Wood and Wood Particleboard:

1. Use same kind of primer specified for exposed face surface.
    a. Exterior wood: MPI 7 (Exterior Oil Wood Primer) for new construction and MPI 5(Exterior Alkyd Wood Primer) for repainting bare wood primer except where Interior Wood Stain, Semi-Transparent (WS) is scheduled.
    b. Interior wood except for transparent finish: MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat), thinned if recommended by manufacturer.
    c. Transparent finishes as specified under Transparent Finishes on Wood.
2. Apply one coat of primer MPI 7 (Exterior Oil Wood Primer) or MPI 5 (Exterior Alkyd Wood Primer) or sealer MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) as soon as delivered to site to surfaces of unfinished woodwork, except concealed surfaces of shop fabricated or assembled millwork and surfaces specified to have varnish, stain or natural finish.
3. Back prime and seal ends of exterior woodwork, and edges of exterior plywood specified to be finished.

3.6 PAINT COLOR

A. Color and gloss of finish coats to match existing color.

B. For additional requirements regarding color see Articles, REFINISHING EXISTING PAINTED SURFACE and MECHANICAL AND ELECTRICAL FIELD PAINTING SCHEDULE.

C. Coat Colors:

1. Color of priming coat: Lighter than body coat.
2. Color of body coat: Lighter than finish coat.
3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.

D. Painting, Caulking, Closures, and Fillers Adjacent to Casework:

1. Paint to match color of casework where casework has a paint finish.
2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.

3.7 PROTECTION CLEAN UP, AND TOUCH-UP

A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.

B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.

C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

- - - E N D - - -

APPENDIX

Coordinate the following abbreviations used in Section 09 91 00, PAINTING, with other Sections. Use the same abbreviation and terms consistently.

Paint or coating	Abbreviation
Acrylic Emulsion	AE (MPI 10 – flat/MPI 11 – semigloss/MPI 119 - gloss)
Alkyd Gloss Enamel	G (MPI 48)
Alkyd Semigloss Enamel	SG (MPI 47)
Aluminum Paint	AP)
Cementitious Paint	CEP (TT-P-1411)
Exterior Latex	EL?? (MPI 10 / 11 / 119)
Exterior Oil	EO (MPI 9 – gloss/MPI 8 – flat/MPI 94 – semigloss)
Fire Retardant Paint	FR
Fire Retardant Coating (Clear)	FC (intumescent type)
Heat Resistant Paint	HR
Latex Emulsion	LE (MPI 53, flat/MPI 52, eggshell/MPI 54, semigloss/MPI 114, gloss Level 6
Latex Flat	LF (MPI 138)
Latex Gloss	LG (MPI 114)
Latex Semigloss	SG (MPI 141)
Latex Low Luster	LL (MPI 139)
Plastic Floor Coating	PL
Polyurethane Varnish	PV
Rubber Paint	RF (CID-A-A-3120 - Paint for Swimming Pools (RF))
Water Paint, Cement	WPC (CID-A-A-1555 - Water Paint, Powder).
Wood Stain	WS

- - - E N D - - -

SECTION 22 05 11
COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section apply to all other Divisions and Sections outlined in the Technical Specifications.

1.2 RELATED WORK

A. Section 01 00 02, GENERAL REQUIREMENTS.
B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
C. Section 22 33 13, Electric Tankless Water Heater.

1.3 QUALITY ASSURANCE

A. Products Criteria: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years.
B. Welding: Before any welding is performed, contractor shall submit a certificate certifying that welders comply with the welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".
C. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Project Engineer and COR prior to installation.
D. Plumbing Systems: International Plumbing Code.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 11, COMMON WORK RESULTS FOR PLUMBING", with applicable "Group" number.
C. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements.
D. Manufacturer's Literature and Data: Submit under the pertinent section rather than under this section.

E. Maintenance Data and Operating Instructions: Maintenance and operating manuals in accordance with Section 01 00 02, GENERAL REQUIREMENTS, Article, INSTRUCTIONS, for systems and equipment.
F. Guaranty: Warranty of Construction, FAR clause 52.246-21.

1.5 DELIVERY, STORAGE AND HANDLING

A. Equipment and material placed on the job site shall remain in the custody of the Contractor until final acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material.
B. The Contractor is solely responsible for the protection of such equipment and material against any damage.
C. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.
D. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.
E. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading and welding of piping.
F. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
G. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.6 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
B. Boiler and Pressure Vessel Code (BPVC):
SEC IX-2007.....Welding and Brazing Qualifications
C. American Society of Mechanical Engineers (ASME):
B16.1-2010.....Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, 250
B16.3-2011.....Malleable Iron Threaded Fittings: Classes 150 and 300
B40.100-2013.....Pressure Gauges and Gauge Attachments
D. American Society for Testing and Materials (ASTM):
A53/A53M-2012.....Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless

D1785-2012.....Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120

E. American Water Works Association (AWWA):
C511-2007.....Reduced-Pressure Principle Backflow Prevention Assembly
C651-2014.....Disinfecting Water Mains

F. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc:
SP-58-2002.....Pipe Hangers and Supports-Materials, Design and Manufacture
SP 69-2003.....Pipe Hangers and Supports-Selection and Application

G. NSF International (NSF):
14-2013.....Plastics Piping System Components and Related Materials
61-2013.....Drinking Water System Components – Health Effects
372-2011.....Drinking Water System Components – Lead Content

H. National Electrical Manufacturers Association (NEMA):
MG1-2007.....Motors and Generators

I. International Plumbing Code (IPC):
IPC-2015.....International Plumbing Code

PART 2 - PRODUCTS

2.1 EXTERNAL PIPING

A. Pipe: ASTM A53/A53M, // galvanized, Schedule 40 // stainless steel // PVC, ASTM D1785, Schedule 80 //.

B. Fittings: // Malleable iron, ASME B16.3, or coated cast iron, ASME B16.1, Class 125 // PVC, Schedule 80 // stainless steel //.

C. Flanges: ASME B16.1, Class 125.

D. Threaded Joints: Shall be made with ends reamed out. Apply bituminous base lubricant or fluorocarbon resin tape to male threads only.

2.2 COMPATIBILITY OF RELATED EQUIPMENT

A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational building that conforms to contract requirements.

2.3 PIPE AND EQUIPMENT SUPPORTS AND RESTRAINTS

A. Suspended equipment support and restraints may be designed and installed in accordance with the National Uniform Seismic Installation Guidelines (NUSIG). Support of suspended equipment over 227 kg (500 pounds) shall be submitted for approval of the Project Engineer and COR in all cases.

B. Type Numbers Specified: MSS SP-58. For selection and application refer to MSS SP-69.

C. For Attachment to Concrete Construction: Type 18, MSS SP-58.

D. For Attachment to Steel Construction: MSS SP-58.

E. Attachment to Metal Pan or Deck: As required for materials specified.

F. For Attachment to Wood Construction: Wood screws or lag bolts.

G. Hanger Rods: All-thread rods are acceptable.

H. Multiple (Trapeze) Hangers: Galvanized, cold formed, lipped steel channel horizontal member, not less than 41mm by 41mm (1-5/8 inches by 1-5/8 inches), 2.7 mm (No. 12 gage), designed to accept special spring held, hardened steel nuts.

I. Pipe Hangers and Supports: (MSS SP-58), use hangers sized to encircle insulation on insulated piping.

J. Supports for plastic piping: As recommended by the pipe manufacturer with black rubber tape extending one inch beyond steel support or clamp.

K. Plumbing Piping: Horizontal piping: Type 1, 5, 7, 9, and 10.

   b. Chrome plated piping: Chrome plated supports.

2.4 PIPE PENETRATIONS

A. Install sleeves during construction.

B. Penetrations are not allowed through beams or ribs, but may be installed in concrete beam flanges. Any deviation from these requirements must receive prior approval of Project Engineer and COR.

C. Sheet Metal, Plastic, or Moisture-resistant Fiber Sleeves: Provide for pipe passing through floors, interior walls, and partitions, unless brass or steel pipe sleeves are specifically called for below.

D. Cast Iron or Zinc Coated Pipe Sleeves: Provide for pipe passing through exterior walls below grade. Make space between sleeve and pipe watertight with a modular or link rubber seal. Seal shall be applied at both ends of sleeve.

E. Galvanized Steel or an alternate Black Iron Pipe with asphalt coating Sleeves: Provide for pipe passing through concrete beam flanges, except where brass pipe sleeves are called for. Provide sleeve for pipe passing through floor of mechanical rooms.

F. Brass Pipe Sleeves: Provide for pipe passing through quarry tile, terrazzo or ceramic tile floors. Connect sleeve with floor plate.

G. Sleeves are not required for wall hydrants for fire department connections or in drywall construction.
H. Sleeve Clearance: Sleeve through floors, walls, partitions, and beam flanges shall be one inch greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation. Interior openings shall be caulked tight with fire stopping material and sealant to prevent the spread of fire, smoke, and gases.
I. Sealant and Adhesives: Shall be as specified in Section 07 92 00, JOINT SEALANTS.

2.5 VALVES

A. Ball: Carbon steel body, stainless steel trim, reinforced Teflon seat and seal, full port, threaded ends.

2.6 PRESSURE GAGES

A. ASME B40.100, Grade A, 1 percent accuracy, 115 mm (4-1/2 inches) diameter, all metal case, bottom connected. White dials, black hands, graduated from 0 to 690 kPa (0 to 100 psig) and identity labeled.

PART 3 - EXECUTION

3.1 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING

A. Coordinate location of piping, sleeves, inserts, hangers, and equipment, access provisions, and work of all trades. Locate piping, sleeves, inserts, hangers, and equipment clear of windows, doors, openings, light outlets, and other services and utilities.
Follow manufacturer's published recommendations for installation methods not otherwise specified.
B. Operating Personnel Access and Observation Provisions: Select and arrange all equipment and systems to provide clear view and easy access, without use of portable ladders, for maintenance and operation of all devices including, but not limited to: all equipment items, valves, filters, strainers, transmitters, sensors, and control devices. All gages and indicators shall be clearly visible by personnel standing on the floor or on permanent platforms. Do not reduce or change maintenance and operating space and access provisions that are shown on the drawings.
C. Equipment and Piping Support: Coordinate structural systems necessary for pipe and equipment support with pipe and equipment locations to permit proper installation.

D. Location of pipe sleeves, trenches and chases shall be accurately coordinated with equipment and piping locations.

E. Cutting Holes:

1. Cut holes through concrete and masonry by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by Project Engineer and COR where working area space is limited.
2. Locate holes to avoid interference with structural members such as beams or grade beams. Holes shall be laid out in advance and drilling done only after approval by Project Engineer and COR. If the Contractor considers it necessary to drill through structural members, this matter shall be referred to Project Engineer and COR for approval.
3. Do not penetrate membrane waterproofing.

F. Interconnection of Instrumentation or Control Devices: Generally, electrical and pneumatic interconnections are not shown but must be provided.

G. Minor Piping: Generally, small diameter pipe runs from drips and drains, water cooling, and other service are not shown but must be provided.

H. Protection and Cleaning: Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Project Engineer and COR. Damaged or defective items in the opinion of the Project Engineer and COR shall be replaced.

2. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water, chemical, or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.

J. Install gages, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gages to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.

K. Work in Existing Building:

1. Perform as specified in Article, OPERATIONS AND STORAGE AREAS, Article, ALTERATIONS, and Article, RESTORATION of the Section 01 00 02, GENERAL REQUIREMENTS for relocation of existing equipment, alterations and restoration of existing building(s).

2. As specified in Section 01 00 02, GENERAL REQUIREMENTS, Article, OPERATIONS AND STORAGE AREAS, make alterations to existing service piping at times that will least interfere with normal operation of the facility.
3. Cut required openings through existing masonry and reinforced concrete using diamond core drills. Use of pneumatic hammer type drills, impact type electric drills, and hand or manual hammer type drills, will be permitted only with approval of the Project Engineer and COR. Locate openings that will least effect structural slabs, columns, ribs or beams. Refer to the Project Engineer and COR for determination of proper design for openings through structural sections and opening layouts approval, prior to cutting or drilling into structure. After Project Engineer and COR approval, carefully cut opening through construction no larger than necessary for the required installation.

M. Inaccessible Equipment:
1. Where the Project Engineer and COR determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Government.
2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

3.2 TEMPORARY PIPING AND EQUIPMENT

A. Continuity of operation of existing facilities will generally require temporary installation or relocation of equipment and piping.
B. The Contractor shall provide all required facilities in accordance with the requirements of phased construction and maintenance of service. All piping and equipment shall be properly supported, sloped to drain, operate without excessive stress, and shall be insulated where injury can occur to personnel by contact with operating facilities. The requirements of Para. 3.1 apply.
C. Temporary facilities and piping shall be completely removed and any openings in structures sealed. Provide necessary blind flanges and caps to seal open piping remaining in service.

3.3 PIPE AND EQUIPMENT SUPPORTS

A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure

that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Drill or burn holes in structural steel only with the prior approval of the Project Engineer and COR.

B. Use of chain, wire or strap hangers; wood for blocking, stays and bracing; or hangers suspended from piping above will not be permitted. Replace or thoroughly clean rusty products and paint with zinc primer.

C. Use hanger rods that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. Provide a minimum of 15 mm (1/2-inch) clearance between pipe or piping covering and adjacent work.

D. Plumbing horizontal and vertical pipe supports, refer to the International Plumbing Code.

E. Overhead Supports:
   1. The basic structural system of the building is designed to sustain the loads imposed by equipment and piping to be supported overhead.
   2. Provide steel structural members, in addition to those shown, of adequate capability to support the imposed loads, located in accordance with the final approved layout of equipment and piping.

F. Floor Supports:
   1. Provide concrete bases, concrete anchor blocks and pedestals, and structural steel systems for support of equipment and piping. Anchor and dowel concrete bases and structural systems to resist forces under operating conditions without excessive displacement or structural failure.
   2. Do not locate or install bases and supports until equipment mounted thereon has been approved. Size bases to match equipment mounted thereon plus 50 mm (2 inch) excess on all edges. Bases shall be neatly finished and smoothed, shall have chamfered edges at the top, and shall be suitable for painting.
   3. All equipment shall be shimmed, leveled, firmly anchored, and grouted with epoxy grout. Anchor bolts shall be placed in sleeves, anchored to the bases. Fill the annular space between sleeves and bolts with a granular material to permit alignment and realignment.

3.4 FLUSHING AND DISINFECTING

A. Flush and disinfect new water lines and softener interiors in accordance with AWWA C651.

B. Material: Liquid chlorine: AWWA B301 or Hypochlorite: AWWA B300.

3.5 CLEANING AND PAINTING

A. Prior to final inspection and acceptance of the facilities for beneficial use by the Government, the facilities, equipment and systems shall be thoroughly cleaned and painted.

- - - E N D - - -

SECTION 22 33 13
ELECTRIC TANKLESS WATER HEATER

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide electric tankless water heater that can provide adequate temperature, flow, and flow rate requirements as outlined in (ANSI / ISEA Z358.1) for an existing Emergency Eyewash Station.

1.2 RELATED WORK

A. Section 01 00 02, General Requirements
B. Division 22, Plumbing Requirements
C. Division 26, Electric Requirements

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain electric tankless water heaters through a single source from a single manufacturer.
B. Electrical Components: Listed and labeled per NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
C. Lead-Free Construction: Comply with NSF 372 for fixture components in contact with potable water.
D. Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within five (5) year warranty period.

1.4 SUBMITTALS

A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
B. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated.
C. Buy American Act: Submit documentation certifying that products comply with provisions of the Buy American Act 41 U.S.C 10a – 10d.
D. Source and Field quality-control test reports.
E. Operation and maintenance data.

1.5 APPLICABLE PUBLICATIONS

A. The American National Standards Institute (ANSI) and the International Safety Equipment Association (ISEA): American National Standard for Emergency Eyewash and Shower Equipment standard (ANSI/ISEA Z358.1).

B. American Society of Sanitary Engineering (ASSE): ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems.

C. National Electrical Manufacturer's Association (NEMA):
70-2008.....National Electrical Code

D. Underwriters Laboratories (UL):
UL 499.....Electric Heating Appliances

PART 2 - PRODUCTS

2.1 ELECTRIC, TANKLESS WATER HEATER

A. UL 499, sized for temperature and flow requirements of (ANSI/ISEA Z358.1).

B. Unit shall be compatible with existing electric service of 1 Phase / 240-volt power. Unit shall not exceed 10KW or 40 Amp Breaker size.

C. Mounting: Wall mounted in doors any direction.

D. Microprocessor Temperature Control and Digital Display.

E. High Temperature Limit Switch.

F. Low Flow Activation at 0.20 GPM.

2.2 ELECTRICAL CONNECTION

A. Per Division 26, Electrical Requirements.

B. Provide and Install any required Electrical components to satisfy (ANSI/ISEA Z358.1).

2.3 PLUMBING CONNECTION

A. Per Division 22, Plumbing Requirements.

B. Provide and Install any required Pressure and Temperature Relief Valves to satisfy (ANSI/ISEA Z358.1).

PART 3 – EXECUTION

3.1 EXAMINATION & SKETCH SUBMISSION

A. Examine areas to receive unit for compliance with requirements for installation tolerances and other conditions affecting performance.
B. Examine roughing-in for electrical and plumbing connections to verify actual locations before unit installation.
C. Proceed with installation only after unsatisfactory conditions have been corrected and approval of Sketch to be submitted to the COR for approval prior to mounting unit.

3.2 INSTALLATION

A. Install water heaters in accordance with manufacturer's written instructions.
B. Install water heaters level and plumb, according to layout drawings and referenced standards.
C. Maintain manufacturer's recommended clearance and access dimensions.

3.3 CONNECTIONS

A. Install water supply piping to each water heater, and from heater to fixture requiring hot water supply connection.
B. Install pressure and temperature safety relief valves on water heater. Run relief valve discharge lines as shown in manufacturer's instructions and as approved by the COR.
C. Connect wiring to Electric Panel and provide breaker according to Division 26 and Section 26 05 21 Low-Voltage Electrical Power Conductors and Cables.
D. Set field-adjustable temperature set point of temperature-actuated controls. Adjust set point within allowable temperature range.

3.4 CLEANUP AND RESTORATION

A. Clean unit surfaces, test fixtures, and leave in ready-to-use condition.
B. Repair wall and paint disturbed area as the result of installation work.

- - - END - - -

SECTION 23 05 11
HVAC IMPROVEMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section apply to all HVAC Improvements as shown on the Drawings and as outlined in this Contract.

1.2 RELATED WORK

A. Section 01 00 02, GENERAL REQUIREMENTS.
B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
C. Section 01 35 26, SAFETY REQUIREMENTS.
D. Section 07 92 22, JOINT SEALANTS-ELECTRICAL WORK.
F. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS
I. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.

1.3 QUALITY ASSURANCE

A. Mechanical, electrical and associated systems shall be safe, reliable, efficient, durable, easily and safely operable and maintainable, easily and safely accessible, and in compliance with applicable codes as specified. The systems shall be comprised of high quality institutional-class and industrial-class products of manufacturers that are experienced specialists in the required product lines.
B. All construction firms and personnel shall be experienced and qualified specialists in institutional HVAC construction and Start-Up Services.
C Flow Rate Tolerance for HVAC Equipment: Per Manufacturer Specifications.
D. Products Criteria:
   1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 5 years. The design, model and size of each item shall have been in satisfactory and efficient operation on at least three installations for approximately three years. However, digital electronics devices, software and systems such as controls, instruments, computer work station, shall be the current generation of technology and basic design that has a proven satisfactory service record of at least three years. See other specification sections for any exceptions.
   2. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.

3. Conform to codes and standards as required by the specifications. Conform to local codes, if required by local authorities such as the natural gas supplier, if the local codes are more stringent then those specified. Refer any conflicts to the Contracting Officers Representative (COR).
4. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer. For this Project, Air Handling Unit and Heat Pump shall be from the same Manufacturer.
5. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
6. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
7. Asbestos products or equipment or materials containing asbestos shall not be used.

E. Equipment Service Organizations:
1. HVAC: Products and systems shall be supported by service organizations that maintain a complete inventory of repair parts and are located reasonably close to the site.

F. HVAC Mechanical Systems Welding: Before any welding is performed, Contractor shall submit a certificate certifying that welders comply with the following requirements:
1. Qualify welding processes and operators for piping according to ASME Section IX, "Welding and Brazing Qualifications".
2. Certify that each welder has passed American Welding Society (AWS) qualification tests for the welding processes involved, and that certification is current.

H. Execution (Installation, Construction) Quality:
1. Apply and install all items in accordance with Manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract drawings and specifications to the COR for resolution. Provide written hard copies or pdf files of manufacturer’s installation instructions to the COR for submittal approval at least two weeks prior to commencing installation of any item. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations is a cause for rejection of the material.

2. All items that require access, such as for operating, cleaning, servicing, maintenance, and calibration, shall be easily and safely accessible by persons standing at floor level, or standing on permanent platforms, without the use of portable ladders. Examples of these items include, but are not limited to: all types of valves, filters and strainers, transmitters, control devices. Prior to commencing installation work, refer conflicts between this requirement and contract drawings to the COR for resolution.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, and with requirements in the individual specification sections.

B. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements.

C. If equipment is submitted which differs in arrangement from that shown, provide drawings that show the rearrangement of all associated systems. Approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.

D. Prior to submitting shop drawings for approval, contractor shall certify in writing that manufacturers of all major items of equipment have each reviewed drawings and specifications, and have jointly coordinated and properly integrated their equipment and controls to provide a complete and efficient installation.

E. Upon request by COR, provide lists of previous installations for selected items of equipment. Include contact persons who will serve as references, with telephone numbers and e-mail addresses.

F. Submittals and shop drawings for interdependent items, containing applicable descriptive information, shall be furnished together and complete in a group. Coordinate and properly integrate materials and equipment in each group to provide a completely compatible and efficient installation. Final review and approvals will be made only by groups.

G. Manufacturer's Literature and Data: Submit under the pertinent section rather than under this section.
   1. Submit belt drive with the driven equipment.
   2. Submit electric motor data and variable speed drive data with the driven equipment.
   3. Equipment and materials identification.
   4. Fire-stopping materials.

5. Hangers, inserts, supports and bracing.
6. Wall, floor, and ceiling plates.

H. HVAC Maintenance Data and Operating Instructions: Contractor shall provide Operating & Maintenance Manuals in accordance with Section 01 00 02, GENERAL REQUIREMENTS.

I. Provide copies of approved HVAC equipment submittals to the Testing, Adjusting and Balancing Subcontractor when required as part of the Scope of Work.

1.5 APPLICABLE PUBLICATIONS

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

B. Air Conditioning and Refrigeration Institute (ARI):
430-99 (R2002).....Central Station Air-Handling Units

C. Rubber Manufacturers Association (ANSI/RMA):
IP-20-2007.....Drives Using Classical V-Belts and Sheaves

D. Air Movement and Control Association (AMCA):
410-96.....Recommended Safety Practices for Air Moving Devices

E. American Society of Mechanical Engineers (ASME):
Boiler and Pressure Vessel Code (BPVC):
Section IX-2007.....Welding and Brazing Qualifications

F. American Society for Testing and Materials (ASTM):
A36/A36M-08.....Carbon Structural Steel
A575-96(2007).....Steel Bars, Carbon, Merchant Quality, M-Grades
E84-09.....Standard Test Method for Burning Characteristics of Building Materials
E119-08a.....Standard Test Method for Fire Tests of Building Construction and Materials

G. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc:
SP-58-2002.....Pipe Hangers and Supports-Materials, Design and Manufacture
SP 69-2003.....Pipe Hangers and Supports-Selection and Application
SP 127-2001.....Bracing for Piping Systems, Seismic – Wind – Dynamic, Design, Selection, Application

H. National Electrical Manufacturers Association (NEMA):
MG 1-2006.....Motors and Generators

I. National Fire Protection Association (NFPA):
70-08.....National Electrical Code
90A-09.....Installation of Air Conditioning and Ventilating Systems
101-09.....Life Safety Code

1.6 DELIVERY, STORAGE AND HANDLING

A. Protection of Equipment:
1. Equipment and material placed on the job site shall remain in the custody of the Contractor until phased acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage.
2. Place damaged equipment in first class, new operating condition; or, replace same as determined and directed by the RE/COTR. Such repair or replacement shall be at no additional cost to the Government.
3. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.
4. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.

B. Cleanliness of Piping and Equipment Systems:
1. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading and welding of piping.
2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
3. Clean interior of all tanks prior to delivery for beneficial use by the Government.
4. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

PART 2 - PRODUCTS

2.1 FACTORY-ASSEMBLED PRODUCTS

A. Provide maximum standardization of components.
B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.
1. In general, all components of an assembled unit need not be products of same manufacturer unless stated.

2. Constituent parts that are alike shall be products of a single manufacturer.
3. Components shall be compatible with each other and with the total assembly for intended service.
4. Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.

C. Components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

D. Major items of equipment, which serve the same function, must be the same make and model. Exceptions will be permitted if performance requirements cannot be met.

2.2 COMPATIBILITY OF RELATED EQUIPMENT

A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational plant that conforms to contract requirements.

2.3 HEAT PUMP / AIR COMPRESSOR

A. The Heat Pump / Air Compressor shall work with existing 1 phase / 230 volt / 60 Hz. electrical service.

B. The new system shall provide a minimum 1.5 Ton nominal cooling capacity, maximum 30 Amp electric draw, and minimum 19 SEER rating.

C. Unit shall be ETL certified for the U.S. and Canada and ISO 9001 Registered Manufacturing Quality System.

D. Cabinet shall be Heavy-gauge steel construction with Pre-painted cabinet finish.

E. Unit shall have a variable-speed outdoor fan motor for quiet operation. Motor to be totally enclosed for maximum protection from weather, dust and corrosion. Sound levels shall not exceed 80 dB.

F. Copper tube coil construction. Coil shall be accessible for cleaning and factory tested under high pressure to insure leakproof construction.

G. Compressor lines to have High & Low Pressure switches.

H. Compressor motor shall be internally protected from excessive current and temperature. Motor to be installed in the unit on rubber mounts.

I. Refrigerant shall be Non-chlorine, ozone friendly, R-410A. Unit shall have factory pre-charged with refrigerant. Total system refrigerant

charge is dependent on outdoor unit size, indoor unit size and refrigerant line length.

J. Contractor shall provide submittals for approval prior to installation; and provide maintenance manuals at time of final start up.

K. Units shipped completely factory assembled, piped, and wired. Each unit shall be test operated at the factory insuring proper operation.

L. Compressor and Unit shall have a five-year warranty on all parts.

2.4 AIR HANDLER UNIT (AHU)

A. The Multi speed Air Handler with electric heat strip shall work with existing 1 phase / 230 volt / 60 Hz. electrical service and Horizontal installation.

B. The new system shall provide a minimum 800 CFM, minimum 10kw heat, and maximum 60 Amp electric draw.

C. Unit shall be ETL certified for the U.S. and Canada and ISO 9001 Registered Manufacturing Quality System.

D. Cabinet shall be Heavy-gauge steel construction with Pre-painted cabinet finish. Completely insulated with thick fiberglass insulation.

E. Two piece cabinets shall be provided with an air tight seal. Panels shall be removable to provide complete service access. Electrical inlets provided in sides and top of cabinet.

F. The unit shall have less than 2% air leakage and meet ANSI/ASHRAE Standard 193-2010 ***"Method of Test for Determining the Air Tightness of HVAC Equipment"***.

G. Unit shall have direct drive blower with a programmable high efficiency multi-speed blower motor. Blower motor shall be resiliently mounted to blower assembly and able to slide out of cabinet for servicing.

H. Electric Heat Coil shall be Helix wound nichrome heating elements that are exposed directly in air stream resulting in instant heat transfer, low element temperatures and long service life. Each element equipped with accurately located limit control with fixed temperature off setting and automatic reset.

I. Unit shall have Transformer and Blower Cooling Relay 24-volt transformer with in-line fuse and blower cooling relay furnished as standard.

J. Unit shall have a five-year warranty on all parts.

2.5 ELECTRIC MOTORS

A. Provide all electrical wiring, conduit, and devices necessary for the proper connection, protection and operation of the systems. Provide special energy efficient motors as scheduled.

B. Unless otherwise specified for an application use electric motors with the following requirements:
   1. Single-phase Motors: Capacitor-start type for hard starting applications. Motors for centrifugal fans and pumps may be split phase or permanent split capacitor (PSC).
   2. Poly-phase Motors: NEMA Design B, Squirrel cage, induction type. Each two-speed motor shall have two separate windings. Provide a time-delay (20 seconds minimum) relay for switching from high to low speed.
C. Rating: Continuous duty at 100 percent capacity in an ambient temperature of 40 degrees centigrade (104 degrees F); minimum horsepower as shown on drawings; maximum horsepower in normal operation not to exceed nameplate rating without service factor.

2.6 TOUCHSCREEN THERMOSTAT

A. Electronic 7-day, universal, multi-stage, programmable, touchscreen thermostat. 4 Heat/2 Cool. Auto-changeover.
B. Controls humidity during cooling mode. Offers enhanced capabilities including humidification / dehumidification / dew-point measurement and control.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION OF EQUIPMENT

A. If Unit is shipped in one piece it may be disassembled into two separate sections for ease of installation.
B. Coordinate location of piping, sleeves, inserts, hangers, ductwork and equipment.
C. Prepare equipment layout drawings to coordinate proper location and personnel access of all facilities. Submit the drawings to the COR for review. Follow manufacturer's published recommendations for installation methods not otherwise specified.
D. Select and arrange all equipment and systems to provide clear view and easy access, without use of portable ladders, for maintenance and operation of all devices.
E. Coordinate structural systems necessary for pipe and equipment support with pipe and equipment locations to permit proper installation.
F. Locate holes to avoid interference with structural members such as beams or grade beams. Do not penetrate membrane waterproofing.
G. Generally, electrical and pneumatic interconnections are not shown but must be provided.

H. Generally, small diameter pipe runs from drips and drains, water cooling, and other service are not shown but must be provided.
I. Electrical Interconnection of Controls and Instruments: This generally not shown but must be provided. This includes wiring, conduits, and electric panel breaker along with interconnections of sensors, transmitters, transducers, control devices, control and instrumentation panels, instruments and computer workstations. Comply with NFPA-70.
J. Contractor shall maintain HVAC either existing, new, or temporary to the existing buildings during the project.

3.2 COORDINATION, HANDLING, AND STORING OF EQUIPMENT

A. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation. Damaged or defective items in the opinion of the COR, shall be replaced.
B. Protect all finished parts of equipment, from rust prior to operation by means of protective grease coating and wrapping. Tightly cover and protect equipment against dirt, water chemical, or mechanical injury.

3.3 HEAT PUMP / AIR COMPRESSOR

A. Install per Manufacturer Requirements.
B. Install per the COR approved shop drawing submittals.
C. Installer must set heat pump, connect refrigerant lines, and make electrical connections to complete job.

3.4 AIR HANDLER UNIT (AHU)

A. Install per Manufacturer Requirements.
B. Install per the COR approved shop drawing submittals.
C. Replace Line sets between new AHU and new Heat Pump unit prior to Startup.

3.5 STARTUP AND TEMPORARY OPERATION

A. Startup equipment per manufacturer’s instructions.
B. Install, set-up, and program the touchscreen thermostat.
C. Make proper corrections, repairs or replacements, and repeat tests at no additional cost to the Government.

- - - E N D - - -

SECTION 23 82 39
UNIT HEATERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide Unit Heaters of type and size as outlined and as shown on the Drawings.

B. Unit Heaters for this Project will be electric type suitable for 1 Phase 240-volt electric service.

1.2 RELATED WORK

A. Section 01 00 02, General Requirements

B. Division 26, Electric Requirements

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain electric Unit Heaters through a single source from a single manufacturer.

B. Electrical Components: Listed and labeled per NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

C. Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that fail in materials or workmanship within five (5) year warranty period.

1.4 SUBMITTALS

A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

B. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated.

C. Buy American Act: Submit documentation certifying that products comply with provisions of the Buy American Act 41 U.S.C 10a – 10d.

D. Operation and maintenance data.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced.

B. National Electrical Manufacturer's Association (NEMA):

70-2008.....National Electrical Code

C. Underwriters Laboratories (UL):
UL 499.....Electric Heating Appliances

PART 2 - PRODUCTS

2.1 FAN FORCED WALL HEATERS

A. Surface mounted unit shall be fan forced Electric Heater to provide minimum 1500 watts with less than 15-amp draw.
B. Unit shall have built in adjustable thermostat with on / off switch.
C. Heating element shall be non-glowing Nickel-chromium heating wire, free from expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with fuses in terminal box for overcurrent protection and limit controls for high-temperature protection.
D. Fan and Motor Board shall be removable for maintenance and repair.
E. Fan Motor shall be impedance protected permanently lubricated, multispeed; resiliently mounted on motor board.
F. Surface mounting frame and front cover shall be heavy gauge steel that is phosphatized then completely painted for a finish white color.

2.2 FAN FORCED HANGING OVERHEAD HEATERS

A. Overhead unit shall be fan forced air Electric Heater to provide minimum 10KW with less than 50-amp draw. Minimum 600 CFM air delivery.
B. Heavy gauge die-formed steel housing with enclosed fan motor.
C. Aluminum-finned, copper clad steel sheath heating element.
D. 24V control transformer with 2-speed fan selector switch.
E. Heating Element shall heat up before fan cuts in and fan continues to distribute heat after element shuts off.
F. Unit shall have individually adjustable discharge louvers that provide a “rectangular coverage”.
G. Fan and Motor Board shall be removable for maintenance and repair.
H. Fan Motor shall not exceed 1600 RPM.
I. Unit shall meet all UL, NEC, and OSHA requirements.
J. Provide mounting bracket, thermostat, and all hardware for a complete installation.

2.3 ELECTRICAL CONNECTION

A. Per Division 26, Electrical Requirements.
B. Contractor shall replace electric wire and breaker for all units.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive overhead unit heater for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in for electrical connections to verify actual locations before unit heater installation.

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

3.2 INSTALLATION

A. Install in accordance with Manufacturer requirements.

B. Install unit heaters level and plumb by a qualified installer.

C. Suspend propeller unit heaters from structure with all-thread hanger rods and elastomeric hangers.

3.3 CONNECTIONS

A. Connect heater only to the voltage, amperage and frequency specified.

B. The ground wire should be connected before other connections are made. Ground electric convection heating units according to Section 26 05 26 Grounding and Bonding for Electrical Systems.

B. Connect wiring according to Section 26 05 21 Low-Voltage Electrical Power Conductors and Cables.

- - - END - - -

SECTION 26 05 11
REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, applies to all sections of Division 26.

B. Furnish and install electrical systems and accessories in accordance with the specifications and drawings.

1.2 MINIMUM REQUIREMENTS

A. References to the National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL) and National Fire Protection Association (NFPA) are minimum installation requirement standards.

B. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.

1.3 TEST STANDARDS

A. All materials and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc., standards where test standards have been established. Equipment and materials which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.

B. Definitions:

1. Listed; equipment or device of a kind mentioned which:
   a. Is published by a nationally recognized laboratory which makes periodic inspection of production of such equipment.
   b. States that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.
2. Labeled; equipment or device is when:
   a. It embodies a valid label, symbol, or other identifying mark of a nationally recognized testing laboratory such as Underwriters Laboratories, Inc.
   b. The laboratory makes periodic inspections of the production of such equipment.

c. The labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner.

3. Certified; equipment or product is which:
   a. Has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.
   b. Production of equipment or product is periodically inspected by a nationally recognized testing laboratory.
   c. Bears a label, tag, or other record of certification.
4. Nationally recognized testing laboratory; laboratory which is approved, in accordance with OSHA regulations, by the Secretary of Labor.

1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)

A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.

B. Product Qualification:
   1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
   2. The Government reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval.

1.5 MANUFACTURED PRODUCTS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.

B. When more than one unit of the same class of equipment is required, such units shall be the product of a single manufacturer.

C. Equipment Assemblies and Components:
   1. Components of an assembled unit need not be products of the same manufacturer.
   2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
   3. Components shall be compatible with each other and with the total assembly for the intended service.
   4. Constituent parts which are similar shall be the product of a single manufacturer.

D. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

E. When Factory Testing Is Specified:

1. The Government shall have the option of witnessing factory tests. The contractor shall notify the VA through the COTR/Resident Engineer a minimum of 15 working days prior to the manufacturers making the factory tests.
2. Four copies of certified test reports containing all test data shall be furnished to the Resident Engineer prior to final inspection and not more than 90 days after completion of the tests.
3. When equipment fails to meet factory test and re-inspection is required, the contractor shall be liable for all additional expenses, including expenses of the Government.

1.6 EQUIPMENT REQUIREMENTS

A. Where variations from the contract requirements are requested in accordance with Section 00 72 00, GENERAL CONDITIONS and Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

1.7 EQUIPMENT PROTECTION

A. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain:

1. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter; and be vacuum cleaned both inside and outside before testing and operating and repainting if required.
2. Damaged equipment shall be, as determined by the COTR/Resident Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
3. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
4. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.8 WORK PERFORMANCE

A. All electrical work must comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J, OSHA Part 1910 subpart S and OSHA Part 1910 subpart K in addition to other references required by contract.

B. Job site safety and worker safety is the responsibility of the contractor.

C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required work, the following requirements are mandatory:

1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.
2. Electricians must wear personal protective equipment while working on energized systems in accordance with NFPA 70E.
3. Before initiating any work, a job specific work plan must be developed by the contractor with a peer review conducted and documented by the COTR/Resident Engineer. The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used and exit pathways.

D. For work on existing stations, arrange, phase and perform work to assure electrical service for other buildings at all times. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.

E. New work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.

F. Coordinate location of equipment and conduit with other trades to minimize interferences. See Section 00 72 00, GENERAL CONDITIONS.

1.9 EQUIPMENT INSTALLATION AND REQUIREMENTS

A. Equipment location shall be as close as practical to locations shown on the drawings.

B. Working spaces shall not be less than specified in the NEC for all voltages specified.

C. Inaccessible Equipment:

1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Government.
2. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling

under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

1.10 EQUIPMENT IDENTIFICATION

A. In addition to the requirements of the NEC, install an identification sign which clearly indicates information required for use and maintenance of items such as panelboards, cabinets, motor controllers (starters), safety switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear, control devices and other significant equipment.

B. Nameplates shall be laminated black phenolic resin with a white core with engraved lettering, a minimum of 6 mm (1/4 inch) high. Secure nameplates with screws. Nameplates that are furnished by manufacturer as a standard catalog item, or where other method of identification is herein specified, are exceptions.

1.11 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. The Government's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.

C. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Government to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.

D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.

1. Mark the submittals, "SUBMITTED UNDER SECTION_____".
2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
3. Submit each section separately.

E. The submittals shall include the following:

1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.

- - - E N D - - -

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of the electrical conductors and cables for use in electrical systems rated 600 V and below, indicated as cable(s), conductor(s), wire, or wiring in this section.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for conductors and cables.

D. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Installation of conductors and cables in manholes and ducts.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:
   a. Submit sufficient calculations, cut-sheets, and related information to demonstrate compliance with Drawings and Specifications.
   b. Submit the following data for approval:
      1) Electrical ratings and insulation type for each conductor and cable.
      2) Splicing materials and pulling lubricant.

2. Certifications: One week prior to final inspection, the Contractor shall submit the following Certifications.
   a. Certification by a license Electrician in the state of where the work was performed stating that the conductors and cables conform to the requirements of the Drawings, Specifications, and Local and State Electrical Code Requirements.
   b. Certification by the Contractor that the conductors and cables have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by designation only.

B. American Society of Testing Material **(ASTM)**:

D2301-10.....Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

D2304-10.....Test Method for Thermal Endurance of Rigid Electrical Insulating Materials

D3005-10.....Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

C. National Electrical Manufacturers Association **(NEMA)**:

WC 70-09.....Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy

D. National Fire Protection Association **(NFPA)**:

70-17.....National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. **(UL)**:

44-14.....Thermoset-Insulated Wires and Cables

83-14.....Thermoplastic-Insulated Wires and Cables

467-13.....Grounding and Bonding Equipment

486A-486B-13.....Wire Connectors

486C-13.....Splicing Wire Connectors

486D-15.....Sealed Wire Connector Systems

486E-15.....Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors

493-07.....Thermoplastic-Insulated Underground Feeder and Branch Circuit Cables

514B-12.....Conduit, Tubing, and Cable Fittings

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Conductors and cables shall be in accordance with ASTM, NEMA, NFPA, UL, as specified herein, and as shown on the Drawings.

B. All conductors shall be copper.

C. Single Conductor and Cable:

1. No. 12 AWG: Minimum size, when supported by calculations.
2. No. 8 AWG and larger: Stranded.
3. No. 10 AWG and smaller: Solid; except shall be stranded for final connection to motors, transformers, and vibrating equipment.
4. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

D. Direct Burial Cable: Contractor shall use UF (Underground Feeder) cable for all underground installation where a conduit is not provided.

E. Color Code:

1. No. 10 AWG and smaller: Solid color insulation or solid color coating.
2. No. 8 AWG and larger: Color-coded using one of the following methods:
   a. Solid color insulation or solid color coating.
   b. Stripes, bands, or hash marks of color specified.
   c. Color using 19 mm (0.75 inches) wide tape.
4. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.
5. Conductors shall be color-coded as follows:

208/120 V	Phase	480/277 V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray *
* or white with colored (other than green) tracer.		

6. Lighting circuit “switch legs”, and 3-way and 4-way switch “traveling wires,” shall have color coding that is unique and distinct (e.g., pink and purple) from the color coding indicated above. The unique color codes shall be solid and in accordance with the NEC. Coordinate color coding in the field with the COR.

7. Color code for isolated power system wiring shall be in accordance with the NEC.

2.2 SPLICES

A. Splices shall be in accordance with NEC and UL.

B. Above Ground Splices for No. 10 AWG and Smaller:
   1. Solderless, screw-on, reusable pressure cable type, with integral insulation, approved for copper and aluminum conductors.
   2. The integral insulator shall have a skirt to completely cover the stripped conductors.
   3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.

C. Above Ground Splices for No. 8 AWG to No. 4/0 AWG:
   1. Compression, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
   2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
   3. Splice and insulation shall be product of the same manufacturer.
   4. All bolts, nuts, and washers used with splices shall be hot dipped galvanized when exposed to the weather and zinc-plated when protected from the weather.

D. Above Ground Splices for 250 kcmil (MCM) and Larger:
   1. Long barrel “butt-splice” or “sleeve” type compression connectors, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.
   2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
   3. Splice and insulation shall be product of the same manufacturer.

E. Underground Splices for No. 10 AWG and Smaller:
   1. Solderless, screw-on, reusable pressure cable type, with integral insulation. Listed for wet locations, and approved for copper and aluminum conductors.
   2. The integral insulator shall have a skirt to completely cover the stripped conductors.

3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.

F. Underground Splices for No. 8 AWG and Larger:
1. Mechanical type, of high conductivity and corrosion-resistant material. Listed for wet locations, and approved for copper and aluminum conductors.
2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
3. Splice and insulation shall be product of the same manufacturer.

G. Plastic electrical insulating tape: Per ASTM D2304, flame-retardant, cold and weather resistant.

2.3 CONNECTORS AND TERMINATIONS

A. Mechanical type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.

B. Long barrel compression type of high conductivity and corrosion-resistant material, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.

C. All bolts, nuts, and washers used to connect connections and terminations to bus bars or other termination points shall be hot dipped galvanized when exposed to the weather and zinc-plated when protected from the weather.

2.4 CONTROL WIRING

A. Unless otherwise specified elsewhere in these specifications, control wiring shall be as specified herein, except that the minimum size shall be not less than No. 14 AWG.

B. Control wiring shall be sized such that the voltage drop under in-rush conditions does not adversely affect operation of the controls.

2.5 WIRE LUBRICATING COMPOUND

A. Lubricating compound shall be suitable for the wire insulation and conduit, and shall not harden or become adhesive.

B. Shall not be used on conductors for isolated power systems.

2.6 FIRE STOPPING SYSTEM

A. Firestopping system or devices used for penetrations by wire insulation, plastic pipe conduits, cables, or other non-metallic materials shall be suitable for use with the type of penetrating material.

B. Firestopping systems shall allow unrestricted cable changes without damage to the seal.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer’s instructions.

B. Install all conductors in raceway systems.

C. Splice conductors only in outlet boxes, junction boxes, pull boxes, manholes, or handholes.

D. Conductors of different systems (e.g., 120 V and 277 V) shall not be installed in the same raceway.

E. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.

F. In panelboards, cabinets, wireways, switches, enclosures, and equipment assemblies, neatly form, train, and tie the conductors with non-metallic ties.

G. For connections to motors, transformers, and vibrating equipment, stranded conductors shall be used only from the last fixed point of connection to the motors, transformers, or vibrating equipment.

H. Use expanding foam or non-hardening duct-seal to seal conduits entering a building, after installation of conductors.

I. Conductor and Cable Pulling:

1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling. Use lubricants approved for the cable.
2. Use nonmetallic pull ropes.
3. Attach pull ropes by means of either woven basket grips or pulling eyes attached directly to the conductors.
4. All conductors in a single conduit shall be pulled simultaneously.
5. Do not exceed manufacturer’s recommended maximum pulling tensions and sidewall pressure values.

J. No more than three branch circuits shall be installed in any one conduit.

K. When stripping stranded conductors, use a tool that does not damage the conductor or remove conductor strands.

3.2 INSTALLATION IN MANHOLES

A. Train the cables around the manhole walls, but do not bend to a radius less than six times the overall cable diameter.

B. Fireproofing:

1. Install fireproofing on low-voltage conductors where the low-voltage conductors are installed in the same manholes with medium-voltage conductors.
2. Use fireproofing tape as specified in Section 26 05 13, MEDIUM-VOLTAGE CABLES, and apply the tape in a single layer, half-lapped, or as recommended by the manufacturer. Install the tape with the coated side towards the cable and extend it not less than 25 mm (1 inch) into each duct.
3. Secure the fireproofing tape in place by a random wrap of glass cloth tape.

3.3 SPLICE AND TERMINATION INSTALLATION

A. Splices and terminations shall be mechanically and electrically secure, and tightened to manufacturer’s published torque values using a torque screwdriver or wrench.

B. Where the Government determines that unsatisfactory splices or terminations have been installed, replace the splices or terminations at no additional cost to the Government.

3.4 CONDUCTOR IDENTIFICATION

A. When using colored tape to identify phase, neutral, and ground conductors larger than No. 8 AWG, apply tape in half-overlapping turns for a minimum of 3 inches from terminal points, and in junction boxes, pull boxes, and manholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable, stating size and insulation type.

3.5 FEEDER CONDUCTOR IDENTIFICATION

A. In each interior pull box and each underground manhole and handhole, install brass tags on all feeder conductors to clearly designate their

circuit identification and voltage. The tags shall be the embossed type, 1-1/2 inches in diameter and 40 mils thick. Attach tags with plastic ties.

3.6 EXISTING CONDUCTORS

A. Unless specifically indicated on the Drawings, existing conductors shall not be reused.

3.7 CONTROL WIRING INSTALLATION

A. Unless otherwise specified in other sections, install control wiring and connect to equipment to perform the required functions as specified or as shown on the drawings.

B. Install a separate power supply circuit for each system, except where otherwise shown on the Drawings.

3.8 CONTROL WIRING IDENTIFICATION

A. Install a permanent wire marker on each wire at each termination.

B. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.

C. Wire markers shall retain their markings after cleaning.

D. In each manhole and handhole, install embossed brass tags to identify the system served and function.

3.9 DIRECT BURIAL CABLE INSTALLATION

A. Tops of the cables:

1. Below the finished grade: Minimum (24 inches) unless greater depth is required by Local / State Code.
2. Below road and other pavement surfaces: In conduit as specified, minimum 30 inches unless greater depth is required by Local / State Code.
3. Do not install cables under railroad tracks.

B. Under road and paved surfaces:

1. When depth of cover over top of conduit is 24 inches or less: Install cables in concrete-encased galvanized steel rigid conduits. Size shall be minimum 2-inch ID with bushings at each end of each conduit run.
2. When depth of cover over the top of the conduit is greater than 24 inches: Install minimum 3-inch PVC Schedule 40 conduit that extends a minimum of 5 feet beyond the edge of pavement or gravel shoulder.

3. Provide a Fiberglass Splice / Pull Box, meeting the specifications of Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS, at each end of the galvanized steel rigid or PVC Schedule 40 conduit.
4. Provide size of conduit required to accommodate cables plus one spare.

C. Work with extreme care near existing ducts, conduits, cables, and other utilities to prevent any damage.

D. Excavation and backfill is specified in Section 31 20 00, EARTH MOVING. In addition:
1. Place minimum of 3-inches of bedding sand in the trenches before installing the conduit or UF cable.
2. Place minimum of 3-inches of shading sand over the installed conduit or UF cable.

E. Provide horizontal slack in the cables for cold weather contraction.

F. Install the cables in continuous lengths. Splices within cable runs shall not be accepted without the use of a Splice / Pull Box.

G. Connections and terminations shall be listed submersible-type designed for the cables being installed.

H. Warning tape shall be continuously placed 12 inches above the buried cables.

3.10 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
1. Visual Inspection and Tests: Inspect physical condition.
2. Electrical tests:
a. After installation but before connection to utilization devices, such as fixtures, motors, or appliances, test conductors phase-to-phase and phase-to-ground resistance with an insulation resistance tester. Existing conductors to be reused shall also be tested.
b. Applied voltage shall be 500 V DC for 300 V rated cable, and 1000 V DC for 600 V rated cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum insulation resistance values shall not be less than 25 megohms for 300 V rated cable and 100 megohms for 600 V rated cable.
c. Perform phase rotation test on all three-phase circuits.

---END---

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of grounding and bonding equipment, indicated as grounding equipment in this section.

B. “Grounding electrode system” refers to grounding electrode conductors and all electrodes required or allowed by NEC, as well as made, supplementary, and lightning protection system grounding electrodes.

C. The terms “connect” and “bond” are used interchangeably in this section and have the same meaning.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

D. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Item 1.12 SUBMITTALS provided for in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following additional requirements:

1. Shop Drawings:
   a. Submit sufficient information to demonstrate compliance with Drawings and Specifications.
   b. Submit for approval plans showing the location of system grounding electrodes and connections, and the routing of aboveground and underground grounding electrode conductors.
2. Test Reports: One week prior to the final inspection, submit ground resistance field test reports prepared by a licensed professional to the COR.

3. Certifications: Contractor shall submit a Certification document stating that the grounding equipment has been properly installed and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American Society for Testing and Materials **(ASTM)**:

B1-13.....Standard Specification for Hard-Drawn Copper Wire

B3-13.....Standard Specification for Soft or Annealed Copper Wire

B8-11.....Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

C. Institute of Electrical and Electronics Engineers, Inc. **(IEEE)**:

81-12.....IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part 1: Normal Measurements

D. National Fire Protection Association **(NFPA)**:

70-17.....National Electrical Code (NEC)

70E-15.....National Electrical Safety Code

99-15.....Health Care Facilities

E. Underwriters Laboratories, Inc. **(UL)**:

44-14 .....Thermoset-Insulated Wires and Cables

83-14 .....Thermoplastic-Insulated Wires and Cables

467-13 .....Grounding and Bonding Equipment

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment grounding conductors shall be insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be identified per NEC.

B. Bonding conductors shall be bare stranded copper, except that sizes No. 10 AWG and smaller shall be bare solid copper. Bonding conductors shall

be stranded for final connection to motors, transformers, and vibrating equipment.

C. Conductor sizes shall not be less than shown on the drawings, or not less than required by the NEC, whichever is greater.

D. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

2.2 GROUND RODS

A. Stainless steel, 19 mm (0.75 inch) diameter by 3 M (10 feet) long.

B. Quantity of rods shall be as shown on the Drawings, and as required to obtain the specified ground resistance.

2.3 CONCRETE ENCASED ELECTRODE

A. Concrete encased electrode shall be No. 4 AWG bare copper wire, installed per NEC.

2.4 GROUND CONNECTIONS

A. Below Grade and Inaccessible Locations: Exothermic-welded type connectors.

B. Above Grade:

1. Bonding Jumpers: Listed for use with aluminum and copper conductors. For wire sizes No. 8 AWG and larger, use compression-type connectors. For wire sizes, smaller than No. 8 AWG, use mechanical type lugs. Connectors or lugs shall use hot dipped galvanized bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
2. Connection to Building Steel: Exothermic-welded type connectors.
3. Connection to Grounding Bus Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with hot dipped galvanized bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.
4. Connection to Equipment Rack and Cabinet Ground Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with hot dipped galvanized bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.5 EQUIPMENT RACK AND CABINET GROUND BARS

A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks. Ground bars shall have

minimum dimensions of 6.3 mm (0.25 inch) thick x 19 mm (0.75 inch) wide, with length as required by Code or as shown on the Drawings.

B. Provide insulators and mounting brackets.

2.6 GROUND TERMINAL BLOCKS

A. At any equipment mounting location (e.g., backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide mechanical type lugs, with hot dipped galvanized bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.7 GROUNDING BUS BAR

A. Pre-drilled rectangular copper bar with stand-off insulators, minimum 6.3 mm (0.25 inch) thick x 100 mm (4 inches) high in cross-section, length as shown on the Drawings or per Code, with hole size, quantity, and spacing per detail shown on the Drawings or by Code. Provide insulators and mounting brackets.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer’s instructions.

B. System Grounding:

1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformer.
2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.

C. Equipment Grounding: Metallic piping, building structural steel, electrical enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

A. Make grounding connections, which are normally buried or otherwise inaccessible, by exothermic weld.

3.3 MEDIUM-VOLTAGE EQUIPMENT AND CIRCUITS (WHEN SHOWN ON DRAWINGS)

A. Switchgear: Provide a bare grounding electrode conductor from the switchgear ground bus to the grounding electrode system.

B. Duct Banks and Manholes: When shown on Drawings provide an insulated equipment grounding conductor in each duct containing medium-voltage conductors, sized per NEC except that minimum size shall be No. 2 AWG. Bond the equipment grounding conductors to the switchgear ground bus, to all manhole grounding provisions and hardware, to the cable shield grounding provisions of medium-voltage cable splices and terminations, and to equipment enclosures.

C. Pad-Mounted Transformers:
   1. Provide a driven ground rod and bond with a grounding electrode conductor to the transformer grounding pad.
   2. Ground the secondary neutral.

D. Lightning Arresters: Connect lightning arresters to the equipment ground bus or ground rods as applicable.

3.4 SECONDARY VOLTAGE EQUIPMENT AND CIRCUITS (WHEN SHOWN ON DRAWINGS)

A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.

B. Metallic Piping, Building Structural Steel, and Supplemental Electrode(s):
   1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water pipe systems, building structural steel, and supplemental or made electrodes. Provide jumpers across insulating joints in the metallic piping.
   2. Provide a supplemental ground electrode as shown on the drawings and bond to the grounding electrode system.

C. Switchgear, Switchboards, Unit Substations, Panelboards, Motor Control Centers, Engine-Generators, Automatic Transfer Switches, and other electrical equipment:
   1. Connect the equipment grounding conductors to the ground bus.
   2. Connect metallic conduits by grounding bushings and equipment grounding conductor to the equipment ground bus.

D. Transformers:
   1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
   2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide

a grounding electrode conductor from the transformer to the nearest component of the grounding electrode system.

3.5 RACEWAY

A. Conduit Systems:

1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
2. Non-metallic conduit systems, except non-metallic feeder conduits that carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment, shall contain an equipment grounding conductor.
3. Metallic conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.
4. Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with an equipment grounding conductor to the equipment ground bus.

B. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, and power and lighting branch circuits.

C. Boxes, Cabinets, Enclosures, and Panelboards:

1. Bond the equipment grounding conductor to each pull box, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
2. Provide lugs in each box and enclosure for equipment grounding conductor termination.

D. Wireway Systems:

1. Bond the metallic structures of wireway to provide electrical continuity throughout the wireway system, by connecting a No. 6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.
2. Install insulated No. 6 AWG bonding jumpers between the wireway system, bonded as required above, and the closest building ground at each end and approximately every 16 M (50 feet).
3. Use insulated No. 6 AWG bonding jumpers to ground or bond metallic wireway at each end for all intermediate metallic enclosures and across all section junctions.

4. Use insulated No. 6 AWG bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 15 M (49 feet).

E. Receptacles shall not be grounded through their mounting screws. Ground receptacles with a jumper from the receptacle green ground terminal to the device box ground screw and a jumper to the branch circuit equipment grounding conductor.

F. Ground lighting fixtures to the equipment grounding conductor of the wiring system. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

G. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

H. Raised Floors: Provide bonding for all raised floor components as shown on the drawings.

I. Panelboard Bonding in Patient Care Areas: The equipment grounding terminal buses of the normal and essential branch circuit panel boards serving the same individual patient vicinity shall be bonded together with an insulated continuous copper conductor not less than No. 10 AWG, installed in rigid metal conduit.

3.6 OUTDOOR METALLIC FENCES AROUND ELECTRICAL EQUIPMENT

A. Fences shall be grounded as shown on the Drawings.

B. Drive ground rods until the top is 300 mm (12 inches) below grade. Attach a No. 4 AWG copper conductor by exothermic weld to the ground rods, and extend underground to the immediate vicinity of fence post.

C. Lace the conductor vertically into 300 mm (12 inches) of fence mesh and fasten by two approved bronze compression fittings, one to bond the wire to post and the other to bond the wire to fence.

D. Each gate section shall be bonded to its gatepost by a 3 mm x 25 mm (0.375 inch x 1 inch) flexible, braided copper strap and ground post clamps. Clamps shall be of the anti-electrolysis type.

3.7 CORROSION INHIBITORS

A. When making grounding and bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.8 CONDUCTIVE PIPING

A. Bond all conductive piping systems, interior and exterior, to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

B. In operating rooms and at intensive care and coronary care type beds, bond the medical gas piping and medical vacuum piping at the outlets directly to the patient ground bus.

3.9 LIGHTNING PROTECTION SYSTEM

A. Bond the lightning protection system to the electrical grounding electrode system.

3.10 MAIN ELECTRICAL ROOM GROUNDING

A. Provide ground bus bar and mounting hardware at each main electrical room where incoming feeders are terminated, as shown on the Drawings.

B. Connect to pigtail extensions of the building grounding ring, as shown on the Drawings.

3.11 EXTERIOR LIGHT POLES

A. Provide 6.1 M (20 feet) of No. 4 AWG bare copper coiled at bottom of pole base excavation prior to pour, plus additional un-spliced length in and above foundation as required to reach pole ground stud.

3.12 GROUND RESISTANCE

A. Grounding system resistance to ground shall not exceed 5 ohms. Make any modifications or additions to the grounding electrode system necessary for compliance without additional cost to the Government. Final tests shall ensure that this requirement is met.

B. Grounding system resistance shall comply with the electric utility company ground resistance requirements.

3.13 GROUND ROD INSTALLATION

A. For outdoor installations, drive each rod vertically in the earth, until top of rod is 610 mm (24 inches) below final grade.

B. For indoor installations, leave 100 mm (4 inches) of each rod exposed.

C. Where buried or permanently concealed ground connections are required, make the connections by the exothermic process, to form solid metal

joints. Make accessible ground connections with mechanical pressure-type ground connectors.

D. Where rock or impenetrable soil prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified ground resistance.

3.14 ACCEPTANCE CHECKS AND TESTS

A. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized or connected to the electric utility company ground system, and shall be made in normally dry conditions not fewer than 48 hours after the last rainfall.

B. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

C. Below-grade connections shall be visually inspected by the COR prior to backfilling. The Contractor shall notify the COR 48 hours before the connections are ready for inspection.

---END---

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes, to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.

B. Definitions: The term **"Conduit"**, as used in this specification, shall mean any or all the raceway types specified.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

D. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION

E. Section 31 20 00, EARTHWORK: Bedding of conduits.

1.3 QUALITY ASSURANCE

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit four (4) copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1. Shop Drawings:
   a. Size and location of main feeders.
   b. Size and location of panels and pull-boxes.
   c. Layout of required conduit penetrations through structural elements.
   d. Submit the following data for approval:
      1) Raceway types and sizes.
      2) Conduit bodies, connectors and fittings.
      3) Junction and pull boxes, types and sizes.
2. Certifications: One week prior to final inspection, submit the following:

a. Certification by the licensed Electrician or Electrical Engineer that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment conform to the requirements of the drawings and specifications.
b. Certification by the Contractor that raceways, conduits, conduit bodies, connectors, fittings, junction and pull boxes, and all related equipment have been properly installed.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American National Standards Institute **(ANSI)**:

C80.1-05.....Electrical Rigid Steel Conduit
C80.3-05.....Steel Electrical Metal Tubing
C80.6-05.....Electrical Intermediate Metal Conduit
ANSI/SCTE 77-14.....Underground Enclosure Integrity

C. National Fire Protection Association **(NFPA)**:

70-11.....National Electrical Code **(NEC)**

D. Underwriters Laboratories, Inc. **(UL)**:

1-05.....Flexible Metal Conduit
5-11.....Surface Metal Raceway and Fittings
6-07.....Electrical Rigid Metal Conduit - Steel
50-15.....Enclosures for Electrical Equipment
360-13.....Liquid-Tight Flexible Steel Conduit
467-13.....Grounding and Bonding Equipment
514A-13.....Metallic Outlet Boxes
514B-12.....Conduit, Tubing, and Cable Fittings
514C-07.....Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers
651-11.....Schedule 40 and 80 Rigid PVC Conduit and Fittings
651A-11.....Type EB and A Rigid PVC Conduit and HDPE Conduit
797-07.....Electrical Metallic Tubing
1242-06.....Electrical Intermediate Metal Conduit - Steel

E. National Electrical Manufacturers Association **(NEMA)**:

TC-2-13.....Electrical Polyvinyl Chloride (PVC) Tubing and Conduit

TC-3-13.....PVC Fittings for Use with Rigid PVC Conduit and Tubing

FB1-12.....Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

FB2.10-13.....Selection and Installation Guidelines for Fittings for use with Non-Flexible Conduit or Tubing (Rigid Metal Conduit, Intermediate Metallic Conduit, and Electrical Metallic Tubing)

FB2.20-12.....Selection and Installation Guidelines for Fittings for use with Flexible Electrical Conduit and Cable

250-2014.....Enclosures for Electrical Equipment (1000 Volts Maximum)

F. American Iron and Steel Institute **(AISI)**:

S100-2007.....North American Specification for the Design of Cold-Formed Steel Structural Members

PART 2 - PRODUCTS

2.1 MATERIAL

A. Conduit Size: In accordance with the NEC, but not less than 13 mm (0.5-inch) unless otherwise shown. Where permitted by the NEC, 13 mm (0.5-inch) flexible conduit may be used for tap connections to recessed lighting fixtures.

B. Conduit Material:

1. Rigid Steel Conduit (RMC): Shall conform to UL 6 and ANSI C80.1.
2. Rigid Aluminum: Shall conform to UL 6A and ANSI C80.5.
3. Rigid Intermediate Steel Conduit (IMC): Shall conform to UL 1242 and ANSI C80.6.
4. Electrical Metallic Tubing (EMT): Shall conform to UL 797 and ANSI C80.3. Maximum size not to exceed 105 mm (4 inches) and shall be permitted only with cable rated 600 V or less.
5. Flexible Metal Conduit: Shall conform to UL 1.
6. Liquid-tight Flexible Metal Conduit: Shall conform to UL 360.

7. Direct Burial Plastic Conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high density polyethylene (PE).
8. Surface Metal Raceway: Shall conform to UL 5.

C. Conduit Fittings:
1. Rigid Steel and Intermediate Metallic Conduit Fittings:
   a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
   b. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
   c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
   d. Bushings: Metallic insulating type, consisting of an insulating insert, molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
   e. Erickson (Union-Type) and Set Screw Type Couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case-hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
   f. Sealing Fittings: Threaded cast iron type. Use continuous drain-type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.
2. Rigid Aluminum Conduit Fittings:
   a. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Malleable iron, steel or aluminum alloy materials; Zinc or cadmium plate iron or steel fittings. Aluminum fittings containing more than 0.4% copper are prohibited.
   b. Locknuts and Bushings: As specified for rigid steel and IMC conduit.
   c. Set Screw Fittings: Not permitted for use with aluminum conduit.
3. Electrical Metallic Tubing Fittings:
   a. Fittings and conduit bodies shall meet the requirements of UL 514B, ANSI C80.3, and NEMA FB1.
   b. Only steel or malleable iron materials are acceptable.

c. Compression Couplings and Connectors: Concrete-tight and rain-tight, with connectors having insulated throats for outdoor installation. Setscrews of case-hardened steel with hex head and cup point, to firmly seat in wall of conduit for positive grounding can be used in dry and dust free environments.

d. Indent-type connectors or couplings **are prohibited**.

e. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" **are prohibited**.

4. Flexible Metal Conduit Fittings:

a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.

b. Clamp-type, with insulated throat.

5. Liquid-tight Flexible Metal Conduit Fittings:

a. Fittings shall meet the requirements of UL 514B and NEMA FB1.

b. Only steel or malleable iron materials are acceptable.

c. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.

6. Direct Burial Plastic Conduit Fittings: Fittings shall meet the requirements of UL 514C and NEMA TC3.

7. Surface Metal Raceway Fittings: As recommended by the raceway manufacturer. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, conduit entry fittings, accessories, and other fittings as required for complete system.

8. Expansion and Deflection Couplings:

a. Conform to UL 467 and UL 514B.

b. Accommodate a 19 mm (0.75-inch) deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.

c. Include internal flexible metal braid, sized to guarantee conduit ground continuity and a low-impedance path for fault currents, in accordance with UL 467 and the NEC tables for equipment grounding conductors.

d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat-resistant molded rubber material with stainless steel jacket clamps.

D. Conduit Supports:

1. Parts and Hardware: Zinc-coat or provide equivalent corrosion protection.
2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
3. Multiple Conduit (Trapeze) Hangers: Not less than 38 mm x 38 mm (1.5 x 1.5 inches), 12-gauge steel, cold-formed, lipped channels; with not less than 9 mm (0.375-inch) diameter steel hanger rods.
4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.

E. Outlet and Junction Boxes:
1. UL-50 and UL-514A.
2. Rustproof cast metal where required by the NEC or shown on drawings.
3. Sheet Metal Boxes: Galvanized steel, except where shown on drawings.

F. Pull Boxes and Enclosures:
1. UL-50, UL-50E, NEMA 250, ANSI/SCTE 77.
2. Indoor Enclosures shall be NEMA Type 12 or NEMA Type 13.
3. Outdoor Enclosures installed above grade shall be NEMA Type 4.
4. Outdoor Enclosures installed at grade shall be NEMA Type 4X.
5. Size for Enclosure installed at or below grade shall have a minimal nominal dimension of 12″ L x 12″ W x 12″ H.
6. Outdoor Enclosures subject to occasional non-deliberate heavy vehicular traffic shall be Tier 15 (15,000 lbs. vertical load).
7. Outdoor Enclosures subject to deliberate vehicular traffic applications shall be AASHTO H-20 rated.
8. All other Outdoor Enclosures not subject to vehicular traffic shall be Tier 5 (5,000 lbs. vertical load).
9. All outdoor Enclosure hardware shall be Stainless Steel Type 316.

G. Metal Wireways: Equip with hinged covers, except as shown on drawings. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for a complete system.

PART 3 - EXECUTION

3.1 PENETRATIONS

A. Cutting or Holes:

1. Cut holes in advance where they should be placed in the structural elements, such as ribs or beams. Obtain the approval of the COR prior to drilling through structural elements.
2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammers, impact electric, hand, or manual hammer-type drills are not allowed, except when permitted by the COR where working space is limited.

B. Firestop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases.

C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal the gap around conduit to render it watertight.

3.2 INSTALLATION, GENERAL

A. In accordance with UL, NEC, NEMA, as shown on drawings, and as specified herein.

B. Raceway systems used for Essential Electrical Systems (EES) shall be entirely independent of other raceway systems.

C. Install conduit as follows:
1. In complete mechanically and electrically continuous runs before pulling in cables or wires.
2. Unless otherwise indicated on the drawings or specified herein, installation of all conduits shall be concealed within finished walls, floors, and ceilings.
3. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new conduits.
4. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
5. Cut conduits square, ream, remove burrs, and draw up tight.
6. Independently support conduit at 2.4 M (8 feet) on centers with specified materials and as shown on drawings.
7. Do not use suspended ceilings, suspended ceiling supporting members, lighting fixtures, other conduits, cable tray, boxes, piping, or ducts to support conduits and conduit runs.
8. Support within 300 mm (12 inches) of changes of direction, and within 300 mm (12 inches) of each enclosure to which connected.

9. Close ends of empty conduits with plugs or caps at the rough-in stage until wires are pulled in, to prevent entry of debris.
10. Conduit installations under fume and vent hoods are prohibited.
11. Secure conduits to cabinets, junction boxes, pull-boxes, and outlet boxes with bonding type locknuts. For rigid steel and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
12. Flashing of penetrations of the roof membrane is specified in Section 07 60 00, FLASHING AND SHEET METAL.
13. Conduit bodies shall only be used for changes in direction, and shall not contain splices.
14. Do not use aluminum conduits in wet locations.

D. Conduit Bends:
1. Make bends with standard conduit bending machines.
2. Conduit hickey may be used for slight offsets and for straightening stubbed out conduits.
3. Bending of conduits with a pipe tee or vise is prohibited.

E. Layout and Homeruns:
1. Install conduit with wiring, including homeruns, as shown on drawings.
2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted and approved by the COR.

3.3 CONCEALED WORK INSTALLATION

A. In Concrete:
1. Conduit: Rigid steel, IMC, or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel, or vapor barriers.
2. Align and run conduit in direct lines.
3. Install conduit through concrete beams only:
   a. Where shown on the structural drawings.
   b. As approved by the COR prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
4. Installation of conduit in concrete that is less than 75 mm (3 inches) thick is prohibited.
   a. Conduit outside diameter larger than one-third of the slab thickness is prohibited.

b. Space between conduits in slabs: Approximately six conduit diameters apart, and one conduit diameter at conduit crossings.

c. Install conduits approximately in the center of the slab so that there will be a minimum of 19 mm (0.75-inch) of concrete around the conduits.

5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to ensure low resistance ground continuity through the conduits. Tightening setscrews with pliers is prohibited.

B. Above Furred or Suspended Ceilings and in Walls:

1. Conduit for Conductors Above 600 V: Rigid steel or rigid aluminum. Mixing different types of conduits in the same system is prohibited.
2. Conduit for Conductors 600 V and Below: Rigid steel, IMC, rigid aluminum, or EMT. Mixing different types of conduits in the same system is prohibited.
3. Align and run conduit parallel or perpendicular to the building lines.
4. Connect recessed lighting fixtures to conduit runs with maximum 1.8 M (6 feet) of flexible metal conduit extending from a junction box to the fixture.
5. Tightening set screws with pliers is prohibited.
6. For conduits running through metal studs, limit field cut holes to no more than 70% of web depth. Spacing between holes shall be at least 457 mm (18 inches). Cuts or notches in flanges or return lips shall not be permitted.

3.4 EXPOSED WORK INSTALLATION

A. Unless otherwise indicated on drawings, exposed conduit is only permitted in mechanical and electrical rooms.

B. Conduit for Conductors Above 600 V: Rigid steel or rigid aluminum. Mixing different types of conduits in the system is prohibited.

C. Conduit for Conductors 600 V and Below: Rigid steel, IMC, rigid aluminum, or EMT. Mixing different types of conduits in the system is prohibited.

D. Align and run conduit parallel or perpendicular to the building lines.

E. Install horizontal runs close to the ceiling or beams and secure with conduit straps.

F. Support horizontal or vertical runs at not over 2.4 M (8 feet) intervals.

G. Surface Metal Raceways: Use only where shown on Drawings.

H. Painting:
   1. Paint exposed conduit as specified in Section 09 91 00, PAINTING.
   2. Paint all conduits containing cables rated over 600 V safety orange. Refer to Section 09 91 00, PAINTING for preparation, paint type, and exact color. In addition, paint legends, using 50 mm (2 inch) high black numerals and letters, showing the cable voltage rating. Provide legends where conduits pass through walls and floors and at maximum 6 M (20 feet) intervals in between.

3.5 DIRECT BURIAL INSTALLATION

Refer to Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION.

3.6 HAZARDOUS LOCATIONS

A. Use rigid steel conduit only.
B. Install UL approved sealing fittings that prevent passage of explosive vapors in hazardous areas equipped with explosion-proof lighting fixtures, switches, and receptacles, as required by the NEC.

3.7 WET OR DAMP LOCATIONS

A. Use rigid steel or IMC conduits unless as shown on drawings.
B. Provide sealing fittings to prevent passage of water vapor where conduits pass from warm to cold locations, i.e., refrigerated spaces, constant-temperature rooms, air-conditioned spaces, building exterior walls, roofs, or similar spaces.
C. Use rigid steel or IMC conduit within 1.5 M (5 feet) of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers, unless as shown on drawings. Conduit shall be half-lapped with 10 mil PVC tape before installation. After installation, completely recoat or re-tape any damaged areas of coating.
D. Conduits run on roof shall be supported with integral galvanized lipped steel channel, attached to UV-inhibited polycarbonate or polypropylene blocks every 2.4 M (8 feet) with 9 mm (3/8-inch) galvanized threaded rods, square washer and locknut. Conduits shall be attached to steel channel with conduit clamps.

3.8 MOTORS AND VIBRATING EQUIPMENT

A. Use flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.

B. Use liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, inside airstream of HVAC units, and locations subject to seepage or dripping of oil, grease, or water.

C. Provide a green equipment grounding conductor with flexible and liquid-tight flexible metal conduit.

3.9 EXPANSION JOINTS

A. Conduits 75 mm (3 inch) and larger that are secured to the building structure on opposite sides of a building expansion joint require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.

B. Provide conduits smaller than 75 mm (3 inch) with junction boxes on both sides of the expansion joint. Connect flexible metal conduits to junction boxes with sufficient slack to produce a 125 mm (5 inch) vertical drop midway between the ends of the flexible metal conduit. Flexible metal conduit shall have a green insulated copper bonding jumper installed. In lieu of this flexible metal conduit, expansion and deflection couplings as specified above are acceptable.

C. Install expansion and deflection couplings as shown or Drawings or as required by Local / State Code.

3.10 CONDUIT SUPPORTS

A. Safe working load shall not exceed one-quarter of proof test load of fastening devices.

B. Use pipe straps or individual conduit hangers for supporting individual conduits.

C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and an additional 90 kg (200 lbs.). Attach each conduit with U-bolts or other approved fasteners.

D. Support conduit independently of junction boxes, pull-boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.

E. Fasteners and Supports in Solid Masonry and Concrete:
   1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
   2. Existing Construction:
      a. Steel expansion anchors not less than 6 mm (0.25-inch) bolt size and not less than 28 mm (1.125 inch) in embedment.
      b. Power set fasteners not less than 6 mm (0.25-inch) diameter with depth of penetration not less than 75 mm (3 inch).
      c. Use vibration and shock-resistant anchors and fasteners for attaching to concrete ceilings.
F. Hollow Masonry: Toggle bolts.
G. Bolts supported only by plaster or gypsum wallboard are not acceptable.
H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
I. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
J. Chain, wire, or perforated strap shall not be used to support or fasten conduit.
K. Spring steel type supports or fasteners are prohibited for all uses except horizontal and vertical supports/fasteners within walls.
L. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.11 BOX INSTALLATION

A. Boxes for Concealed Conduits:
   1. Flush-mounted.
   2. Provide raised covers for boxes to suit the wall or ceiling, construction, and finish.
B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operations or where more than the equivalent of 4-90 degree bends are necessary.
C. Locate pull boxes so that covers are accessible and easily removed. Coordinate locations with piping and ductwork where installed above ceilings.
D. Remove only knockouts as required. Plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.

E. Outlet boxes mounted back-to-back in the same wall are prohibited. A minimum 600 mm (24 inch) center-to-center lateral spacing shall be maintained between boxes.

F. Flush-mounted wall or ceiling boxes shall be installed with raised covers so that the front face of raised cover is flush with the wall. Surface-mounted wall or ceiling boxes shall be installed with surface-style flat or raised covers.

G. Minimum size of outlet boxes for ground fault circuit interrupter (GFCI) receptacles is 100 mm (4 inches) square x 55 mm (2.125 inches) deep, with device covers for the wall material and thickness involved.

H. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams when shown on Drawings; for example, "SIG-FA JB No. 1."

I. On all branch circuit junction box covers, identify the circuits with black marker.

- - - E N D - - -

SECTION 26 56 10
LED EXTERIOR LIGHTING & CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies demolition and removal of existing light fixtures, furnishing, installation, and connection of exterior LED luminaries, timer controls, electrical conduits, and related electrical improvements as described and as shown on the Drawings.

B. The work includes all electrical improvements, submittals, labor, materials, and equipment for a complete project.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

B. Section 26 05 19, LOW-VOLTAGE ELECTRIC POWER CONDUCTORS AND CABLES.

C. SECTION 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications. Include electrical ratings, dimensions, mounting, details, materials, required clearances, terminations, wiring and connection diagrams, luminaries, lamps and controls and Product Warranties.

C. Manuals: Two weeks prior to final inspection, submit four copies of operating and maintenance manuals to the COR. Include technical data sheets, wiring and connection diagrams, and information for ordering replacement parts.

D. Certifications: Two weeks prior to final inspection, submit two copies of the following to the COR:

1. Certification that the materials are in accordance with the drawings and specifications.
2. Certification, by the Contractor, that the complete installation has been properly installed and tested.

1.4 APPLICABLE PUBLICATIONS

Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

A. Aluminum Association Inc. (AA):

AAH35.1-2006 .....Alloy and Temper Designation Systems for Aluminum

B. National Electrical Manufacturers Association (NEMA):

C81.61-2005 .....Electrical Lamp Bases

ICS 2-2008 .....Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts

ICS 6-2006 .....Industrial Control and Systems Enclosures

C. National Fire Protection Association (NFPA):

70-2008 .....National Electrical Code (NEC)

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with manufacturer’s instructions.

B. Store in locations on site that are approved by the Cemetery Director.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment shall be in accordance with NEC, UL, ANSI, and as shown on the drawings and specified.

B. Obtain Submittal approval from the COR on all Products and related Submittals prior to any fabrication or delivery of any product.

2.2 LED WALL MOUNTED SECURITY LIGHTS

A. The Contractor shall make building security light improvements in conformance with the technical specifications including Division 1 – “General Requirements” and Division 26 – “Electrical” Requirements.

B. The Contractor shall replace existing flood lights located on the east and west side of the Service Building with wall flush mounted security lights with specified fixture and LED bulb.

C. Fixtures shall be maximum 75W consumption, minimum 300W equivalent output, minimum 5000 lumens, outdoor rated, waterproof, UL listed, and American made.
D. Unit shall have corrosion resistant polyester powder painted, minimum 2.0 mil. thickness, color white.
E. LED Security Lights will be controlled by one Electromechanical Time Switch (ETS)to be provided and installed by the Contractor in location shown on the Drawing or approved by the COR. No Photocell required.

2.3 SITE LIGHTING CONTROLS

A. All exterior LED Wall Mounted Building Lights and the Flag Pole Lights shall be controlled by one heavy duty Electromechanical Time Switch (ETS). ETS shall be located Maintenance Shop area of the Service Building to replace existing timer unit.
B. The Electromechanical Time Switch shall provide for direct 24-hour control with a minimum one (1) hour ON / OFF times; minimum four (4) ON / OFF operations per day; control electrical loads of up to 30 Amps at 120 VAC; and have manual override.
C. Provide to COR as part of Submittals the Product information for the Electromechanical Time Switch.
D. The time switch motor shall be a synchronous motor, which shall be designed to withstand a minimum of 6000 volt transients. The time switch motor shall be connected to the supply terminals with ring-type connectors and shall not require more than 5 Watts to operate.
E. The ETS enclosure shall be a Type 1 steel with lockable enclosure. The enclosure shall have a nonremovable cover, which shall swing open a full 180 degrees.
F. The ETS contact blades shall be a one-piece design with welded silver alloy contacts and shall be designed to provide wiping action on contacts during operation to ensure reliable load switching.
G. Terminal connections shall be made using teeter-type terminal screws to provide secure connections for wire sizes up to #8 AWG.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lighting in accordance with the NEC, as shown on the drawings, and in accordance with manufacturer’s recommendations.

B. Install in accordance with Manufacturer requirements.
C. Examine areas to receive units for compliance with requirements for installation tolerances and other conditions affecting performance.
D. Examine roughing-in for electrical connections to verify actual locations before units are installed.
E. Proceed with installation only after unsatisfactory conditions have been corrected.
F. Provide and connect wiring to Electric Panel and provide breaker according to Division 26 and Section 26 05 21 Low-Voltage Electrical Power Conductors and Cables.

3.2 GROUNDING

A. The ground wire should be connected before other connections are made.
B. Ground noncurrent-carrying parts of equipment including metal poles, luminaries, mounting arms, brackets, and metallic enclosures as specified in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

3.3 CLEANUP AND RESTORATION

A. Clean unit surfaces, test fixtures, and leave in ready-to-use condition.
B. Repair walls and paint disturbed area as the result of installation work.

- - - E N D - - -