

**PROJECT**  
**687-12-005**  
**Install Fiber Pathway**

**SECTION 01 00 00**  
**GENERAL REQUIREMENTS**

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**1.1 GENERAL INTENTION**

- A. SCOPE OF WORK: Contractor shall completely prepare site for building operations, including demolition and removal of existing structures, and furnish labor and materials and perform work for **installing a 4 inch conduit** as required by drawings and specifications.
- B. Visits to the site by Bidders may be made only by appointment with the Department of Veterans Affairs (VA) Medical Center Engineering Officer.
- C. All employees of general contractor and sub Contractor shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.
- D. Prior to commencing work, general 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 subthe Contractor are present.

**1.2 STATEMENT OF BID ITEM(S)**

**Item 1: Install 4 inch PVC-C conduit with three 1.25 inch innerducts**

**ALTERNATE BID ITEMS TO BE ADDED TO ITEM 1:**

**Item 2: None**

**1.3 AUTHORITY OF THE CONTRACTING OFFICER (CO) - Omit**

**1.4 AUTHORITY OF INSPECTORS**

Inspectors are authorized to inspect all work including the preparation, fabrication, or manufacture of material for the project. The inspector is not authorized to alter or waive contract requirements, issue instruction contrary to the contract, act as foreman or supervisor for the Contractor, or direct the Contractor's operations. The inspector has authority to identify nonconforming work until the issue can be referred to and decided by the CO. The inspector may take necessary action to prevent imminent and substantial risk of death or injury including stopping work.

## 1.5 SPECIFICATIONS AND DRAWINGS FOR THE CONTRACTOR

- A. Additional sets of drawings may be made by the Contractor, at Contractor's expense.

## 1.6 CONSTRUCTION SECURITY REQUIREMENTS

### A. Security Plan:

1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
2. The Contractor is responsible for assuring that all sub-the Contractor working on the project and their employees also comply with these regulations.

### B. Security Procedures:

1. The Contractor's employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
2. For working outside the "regular hours" as defined in the contract, The Contractor shall give 3 working days notice to the CO so that arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described in VA Specification Section 01 00 00 GENERAL REQUIREMENTS Article 1.7, Operations and Storage Areas, Paragraph I "*Utility Services*".
3. No photography of VA premises is allowed except as described in VA Specification Section 01 00 00 GENERAL REQUIREMENTS Article 1.29 "*Construction Photographs*".
4. VA reserves the right to close down or shut down the project site and order Contractor's employees off the premises in the event of a national emergency. The Contractor may return to the site only with the written approval of the CO.

## 1.7 FIRE SAFETY PRECAUTIONS

- A. Exits for VA occupied areas of a building including rooms, suites, corridors and floors shall not be blocked by the construction or by construction materials. Exits may be blocked temporarily if it is unavoidable and adequate alternate measures are provided such as signage, instructions to occupants, and a heat detection system.
- B. At the end of each workday, combustible packaging and crating materials for building products and equipment to be installed shall be removed from any VA occupied building.
- C. The necessary number and appropriate type of portable fire extinguishers per the latest edition of National Fire Protection Association NFPA® 10 Standard for Portable Fire Extinguishers and NFPA® 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations shall be provided in all construction areas.

- D. As required by the Joint Commission on Accreditation of Healthcare Organizations, smoking shall be prohibited in or adjacent to all construction areas in existing buildings. In totally separate buildings under construction, the contractor shall have a smoking policy which permits smoking only in designated areas and maintain a minimum of 20' away from any door or window that may allow for the smoke to gain entry into buildings on the station. These areas shall be provided with safe receptacles for smoking materials. Smoking shall be prohibited at or near and throughout demolition areas.
- E. Daily fire hazard inspections of the means of egress and weekly fire hazard surveillance inspections of the entire construction area shall be conducted by the contractor once construction starts and until the building or space is turned over to the government. A monthly summary report shall be provided to the CO documenting all inspections and listing all fire hazards identified and the corrective actions taken.
- F. A fire safety plan shall be prepared, prior to any construction, detailing all fire safety measures which will be addressed during the construction. The plan shall be provided to the CO for review and comment. A monthly status report shall also be provided during the entire construction detailing the status of each measure.
- G. Temporary structures, including trailers that are used for storage or offices, shall be a minimum of 9000 mm (30 feet) from any VA occupied building.
- H. All temporary heating equipment shall be installed in accordance with requirements of applicable NFPA Standards and manufacturers' instructions.
- I. All temporary electrical wiring and equipment used for construction shall be installed and used in accordance with pertinent provisions of the latest edition of NFPA Standard No. 70.
- J. Maintain construction site to permit access of fire department vehicles as necessary. Clear building construction areas of unnecessary obstructions so that all portions are accessible for fire department apparatus and permit emergency egress of construction and other personnel.
- K. Penetrations through fire rated barriers shall be sealed immediately with a material meeting the same fire resistive requirements of the barrier. All fire barrier sealing shall be installed by properly trained personnel. USE OF EXPANDABLE FOAM SEALANT IS PROHIBITED UNLESS APPROVED BY CO.

## 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 CO. The CO shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. Temporary buildings (e.g., storage sheds, shops, office) and utilities may be erected by the Contractor only with the approval of the CO and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed

by the Contractor at its expense upon completion of the work. With the written consent of the CO, the buildings and utilities may be abandoned and need not be removed.

- C. The Contractor shall, under regulations prescribed by the CO, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the CO. 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 curbs, sidewalks, or roads.
- D. Working space and space available for storing materials shall be determined by the CO.
- E. Workmen are subject to rules of Medical Center applicable to their conduct. Refer to VA Regulation 1.218(b), VA Form 0088 being posted in each building.
- F. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by CO where required by limited working space.

Normal working hours will be 8 a.m. to 4:30 p.m., Monday through Friday, excluding holidays. Any other working hours must be approved two weeks in advance by the CO.

- 1. Do not store materials and equipment in other than assigned areas.
  - 2. Provide unobstructed access to Medical Center areas required to remain in operation.
  - 3. Where access by Medical Center personnel to vacated portions of buildings is not required, storage of Contractor's materials and equipment will be permitted subject to fire and safety requirements.
- G. **Phasing:** To ensure such executions, Contractor shall furnish the CO with a schedule of approximate phasing dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the CO two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such phasing dates to ensure accomplishment of this work in successive phases mutually agreeable to CO and Contractor, as shown on the drawings.
  - H. Building No. 74 will be occupied during performance of work. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Center's operations will not be hindered. Contractor shall permit access to VA personnel and patients through construction areas

which serve as routes of access to such affected areas and equipment. Coordinate alteration work in areas occupied by the VA so that Medical Center operations will continue during the construction period.

- I. ***Utility Services:*** Maintain existing utility services for Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by CO.
1. 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 CO.
  2. Contractor shall submit a request to interrupt any such services to CO, in writing, 3 working days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
  3. Interruptions of any utility which will impact clinical operations must be requested by the Contractor, in writing, 10 working days in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
  4. 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 Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
  5. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the CO. Request shall state reason, date, exact time of, and approximate duration of such interruption.
  6. In case of a contract construction emergency, service will be interrupted on approval of CO. Such approval will be confirmed in writing as soon as practical.
- J. ***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. 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.
- K. To minimize interference of construction activities with flow of Medical Center traffic, the Contractor shall 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.
- L. Coordinate the work for this contract with other construction operations as directed by CO. This includes the scheduling of traffic and the use of roadways, as specified in VA

## 1.9 ALTERATIONS

- A. **Survey:** Before any work is started, the Contractor shall make a thorough survey with the CO of areas of buildings in which alterations occur and areas which are anticipated routes of access, and furnish a report, signed by both to the CO. This report shall list by rooms and spaces:
1. Existing condition and types of resilient flooring, doors, windows, walls, and other surfaces not required to be altered throughout affected areas of building.
  2. Existence and conditions of items such as plumbing fixtures and accessories, electrical fixtures, equipment, venetian blinds, shades, etc., required by drawings to be either reused or relocated, or both.
  3. Shall note any discrepancies between drawings and existing conditions at site.
  4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and CO.
- B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of CO to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled “*Differing Site Conditions*” (FAR 52.236-2) and “*Changes*” (FAR 52.243-4 and VAAR 852.236-88).
- C. **Re-Survey:** Thirty days before expected partial or final inspection date, the Contractor and CO together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of resilient flooring, doors, windows, walls, and other surfaces are compared with conditions of same as noted in first condition survey report.
- Re-survey report shall also list any damage caused by Contractor to such flooring and other surfaces, despite protection measures, and will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor’s workmen in executing work of this contract.
- D. **Protection:** Provide the following protective measures:
1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration. In case of leaks, they shall be repaired immediately upon discovery.
  2. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.

3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever work is performed, floor surfaces that are to remain in place shall be adequately protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.
  4. Dampen debris to keep down dust and provide temporary construction partitions in existing structures where directed by CO. Blank off ducts and diffusers to prevent circulation of dust into occupied areas during construction.
  5. Temporary Barriers – Refer to ATTACHMENT A, Walla Walla VAMC OSHA, SAFETY AND HEALTH REQUIREMENTS Article 2.7 “*Temporary Enclosures*”.
- E. ***Disposal and Retention:*** 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 identified by attached tags or noted on drawings or in specifications as items to be stored. Items which 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 in such location as directed by CO.
  2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.
  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 VA 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.

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 CO.
- B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting

from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the CO may have the necessary work performed and charge the cost to the Contractor. (FAR 52.236-9)

- C. Refer to VA Specification Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS, for additional requirements on protecting vegetation, soils and the environment. Refer to Articles, “Alterations”, “Restoration”, and “Operations and Storage Areas” for additional instructions concerning repair of damage to structures and site improvements.

#### 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, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the CO. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the CO before it is disturbed. Materials and workmanship used in restoration work shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.
- 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 indicated on drawings as well as any which may be discovered during execution of the contract and 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 PHYSICAL DATA – OMIT

#### 1.13 PROFESSIONAL SURVEYING SERVICES – OMIT

#### 1.14 SCHEDULE OF WORK

- A. All work is to be performed during the normal VA Medical Center business hours of 8:00 am to 4:30 pm, Monday through Friday or alternate schedule of 7:00 am to

**5:30 pm, Monday through Thursday with the exception of Federal Holidays.  
Schedules deviating from these times shall require prior approval from the CO.**

- B. Coordination of the work areas is to be scheduled with the CO working with the Department Line Manager.
- C. The Contractor is required to submit a planned schedule a minimum of one week prior to commencement of any work.
- D. Weekly coordination meetings will be held with all crafts as scheduled by the Contractor to provide the progress of the current and proposed schedule of events and to review and or approve of temporary outages and schedule of work, which may affect the functions of the individual departments.
- E. Road crossings shall allow continual traffic with temporary plating and nessesary traffic controls. Maximum road closures shall be 8 hours during non-business hours.

**1.15 AS- BUILT DRAWINGS**

- A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.
- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the Resident Engineer's review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built drawings to the Resident Engineer within 15 calendar days after each completed phase and after the acceptance of the project by the Resident Engineer.
- D. Paragraphs A, B, & C shall also apply to all shop drawings.

**1.16 USE OF ROADWAYS**

For hauling, use only established public roads and roads on Medical Center property and, when authorized by the CO, such temporary roads which are necessary in the performance of contract work. Temporary roads shall be constructed by the Contractor at Contractor's expense. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

**1.17 RESIDENT ENGINEER'S FIELD OFFICE – OMIT**

**1.18 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT - OMIT**

**1.19 TEMPORARY USE OF EXISTING ELEVATORS - N/A**

**1.20 TEMPORARY USE OF NEW ELEVATORS – OMIT**

**1.21 TEMPORARY TOILETS**

Contractor may have for use of Contractor's workmen, such toilet accommodations as may be assigned to Contractor by Medical Center. Contractor shall keep such places clean and be responsible for any damage done thereto by Contractor's workmen. Failure to maintain satisfactory condition in toilets will deprive Contractor of the privilege to use such toilets.

**1.22 AVAILABILITY AND USE OF UTILITY SERVICES**

- A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The Contractor shall carefully conserve any utilities furnished without charge.
- B. The Contractor, at Contractor's expense and in a workmanlike manner satisfactory to the CO, shall install and maintain all necessary temporary connections and distribution lines. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, and associated paraphernalia.
- C. Electricity (for construction and testing): Furnish all temporary electric services. Obtain electricity by connecting to the Medical Center electrical distribution system. Electricity for all other uses is available at no cost to the Contractor.
- D. Water (for construction and testing): Furnish temporary water service.
  - 1. Obtain water by connecting to the Medical Center water distribution system. Provide reduced pressure backflow preventer at each connection. Water is available at no cost to the Contractor.
  - 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 CO's discretion) of use of water from Medical Center's system.

**1.23 NEW TELEPHONE EQUIPMENT – OMIT**

**1.24 TESTS**

- A. Pre-test mechanical and electrical equipment and systems and make corrections required for proper operation of such systems before requesting final tests. Final test will not be conducted unless pre-tested.
- B. Conduct final tests required in various sections of specifications in presence of an authorized representative of the CO. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.

- C. Mechanical and electrical systems shall be balanced, controlled, and coordinated. A system is defined as the entire complex which must be coordinated to work together during normal operation to produce results for which the system is designed. For example, air conditioning supply air is only one part of entire system which provides comfort conditions for a building. Other related components are return air, exhaust air, steam, chilled water, refrigerant, hot water, controls and electricity, etc.

Another example of a complex which involves several components of different disciplines is a boiler installation. Efficient and acceptable boiler operation depends upon the coordination and proper operation of fuel, combustion air, controls, steam, feed water, condensate and other related components.

- D. All related components as defined above shall be functioning when any system component is tested. Tests shall be completed within a reasonably short period of time during which operating and environmental conditions remain reasonably constant.
- E. Individual test result of any component, where required, will only be accepted when submitted with the test results of related components and of the entire system.

#### 1.25 INSTRUCTIONS

- A. Contractor shall furnish Maintenance and Operating manuals and verbal instructions when required by the various sections of the specifications and as hereinafter specified.
- B. **Manuals:** Maintenance and operating manuals (four copies each) for each separate piece of equipment shall be delivered to the CO coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations.

Illustrations shall include “exploded” views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained.

All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.

- C. **Instructions:** Contractor shall provide qualified, factory-trained manufacturers’ representatives to give detailed instructions to assigned VA personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system shall be given in an integrated, progressive manner. All instructors for

every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed.

This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the CO and shall be considered concluded only when the CO is satisfied in regard to complete and thorough coverage. The VA reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the CO, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

**1.26 GOVERNMENT-FURNISHED PROPERTY – OMIT**

**1.27 RELOCATED EQUIPMENT AND ITEMS**

- A. Contractor shall disconnect, dismantle as necessary, remove and reinstall in new location, all existing equipment and items indicated by symbol “R” or otherwise shown to be relocated by the Contractor.
- B. Perform relocation of such equipment or items at such times and in such a manner as directed by the CO.
- C. Suitably cap existing service lines, such as steam, condensate return, water, drain, gas, air, vacuum and/or electrical, whenever such lines are disconnected from equipment to be relocated. Remove abandoned lines in finished areas and cap as specified herein. Refer to VA Specifications Section 01 00 00, GENERAL REQUIREMENTS Article 1.8, Operations and Storage Areas, Paragraph J “*Abandoned Lines*”.
- D. Provide all mechanical and electrical service connections, fittings, fastenings and any other materials necessary for assembly and installation of relocated equipment; and leave such equipment in proper operating condition.

**1.28 STORAGE SPACE FOR DEPARTMENT OF VETERANS AFFAIRS EQUIPMENT – OMIT**

**1.29 CONSTRUCTION SIGN**

Refer to ATTACHMENT A, Walla Walla VAMC OSHA, SAFETY AND HEALTH REQUIREMENTS Article 2.19 “*Signs*”.

**1.30 SAFETY SIGN**

Refer to ATTACHMENT A, Walla Walla VAMC OSHA, SAFETY AND HEALTH REQUIREMENTS Article 2.19 “*Signs*”.

**1.31 CONSTRUCTION DIGITAL IMAGES**

- A. Construction photographs may be used as a tool for recording existing conditions, progression of work, final installation, etc.
- B. Photographs taken on the VA Medical Center property by the Contractor or their representatives shall be limited to designated work areas and be applicable to the execution of the contract.
- C. When taking photographs, privacy and confidentiality of VA personnel, patients and visitors shall be maintained at all times. Care must be taken such that construction photographs shall not include images of VA personnel, patients, or visitors.

**1.32 FINAL ELEVATION DIGITAL IMAGES – OMIT**

**1.33 HISTORIC PRESERVATION**

Where the Contractor or any of the Contractor's employees, prior to, or during the construction work, are advised of or discover any possible archeological, historical and/or cultural resources, the Contractor shall immediately notify the CO verbally, and then with a written follow-up.

**1.34 CONSTRUCTION SAFETY**

Refer to ATTACHMENT A, Walla Walla VAMC OSHA, SAFETY AND HEALTH REQUIREMENTS

**1.35 ACCESS BADGES**

- A. Contact the CO for badges. The Contractor and all workmen on VA property for the execution of the contract shall be issued and wear a VA Contractor Badge at all times.
- B. Each individual will be asked to provide a State issued photo ID such as a Drivers License the first time they are issued a Contractor Badge. A photocopy of this ID will be kept on file by the VA along with a record of employer, badge number, and date of issue.
- C. The recipient of the Contractor Badge is responsible for the badge at all times. If a Contractor Badge is found to be missing, notify the CO for security, and re-issuance of a new badge. A person not wearing their Contractor Badge may be detained for verification of identity and employment.
- D. The Contractor shall be responsible to ensure that badges issued to ALL workmen are returned upon completion of work.

**1.36 KEY CONTROL**

Contact the CO for access to locked areas. Construction keys may be issued if required. All construction keys issued shall be accounted for and returned at completion of work.

1.37 **PARKING & MATERIAL DELIVERY**

- A. The Contractor's parking must be pre-arranged with the CO. All Contractors' vehicles shall be clearly labeled with the firm's name. All employees' personal vehicles shall be parked in accordance with the VA Medical Centers Memorandum 04-SA-31, Parking & Traffic Regulations. See Attachment.
- B. The Contractor shall be solely responsible for accepting delivery of contract related freight or construction materials. Delivery shall be made to the Contractor's designated staging area or temporary field office. All deliveries shall be pre-coordinated between the Contractor and the freight delivery agent. The delivery agent should be provided with contact information for the Contractor's representative and designated delivery points. The Contractor shall make freight delivery arrangements that do not impact the VA Warehouse as a delivery point. VA personnel will not accept responsibility for acceptance of or handling and storage of Contractor's freight or construction materials.

1.38 **RECYCLING AND WASTE MANAGEMENT**

- A. The Contractor shall be liable for all refuse generated from each construction project and the cost incurred thereof.
- B. The Government is required to exert all reasonable measures to recycle all construction materials, whether in construction, remodel or demolition projects. All surplus, excess, or reclaimed materials shall be disposed of in a manner to promote recycling, and to limit the amount of material delivered to landfills.
- C. The Contractor shall provide a monthly report itemizing the distribution of all refuse generated from the construction project. At a minimum, this report shall include the material type (i.e.: general waste, mixed metal, copper, aluminum, wood, concrete, etc.), place of disposal or salvage (i.e.: landfill, scrap metal dealer, composting, etc.), and weight of each type of refuse material.

**ATTACHMENT A:  
Walla Walla VAMC  
OSHA, SAFETY AND HEALTH REQUIREMENTS**

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## **PART 1 - OSHA Requirements.**

### **1.1 GENERAL**

- A. The Contractor is required to comply with the Occupational Safety and Health Act of 1970. This will include the safety and health standard found in Code of Federal Regulations (CFR) 1910 and 1926. Copies of those standards can be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20420.
- B. In addition, the Contractor shall be required to comply with other applicable Medical Center policies and safety regulations. These policies and regulations will be presented to the Contractor at the pre-construction meeting. Each of the Contractor's employees will be required to read the statement of policies and regulations, and sign an acknowledgment that such policies and regulations are understood.
- C. The Contractor shall submit a copy of their Safety Plan to the Contracting Officer Technical Representative for review prior to the commencement of work, as it pertains to the general scope of work for this construction project. The Contractor involved with the removal, alteration or disturbance of asbestos-type insulation or materials or lead paint shall be required to comply strictly with the regulations found in CFR 1910.1001 and the appropriate Environmental Protection Agency (EPA) lead regulations regarding disposal of asbestos or lead paint. Assistance in identifying asbestos or lead can be requested from the Medical Center's Industrial Hygienist and the CO.
- D. The Contractor entering locations of asbestos contamination or lead paint residue (i.e., pipe, basements, walls, windows) shall be responsible for providing respiratory protection to their employees and ensuring respirators are worn in accordance with the Occupational Safety and Health Administration (OSHA) [CFR 1910.1001(g)]. Employees entering these areas will be medically evaluated and properly fit-tested for their respirators. Asbestos-or lead paint-contaminated areas shall be defined on project drawings. The minimum equipment requirements will be a half-mask air-purifying respirator equipped with high efficiency filters and disposable coveralls, or as determined by air monitoring results.
- E. The Contractor, along with other submittals and at least two weeks prior to bringing any materials on-site, shall submit a complete list of chemicals the Contractor will use and Material Safety Data Sheets (MSDS) for all hazardous materials as defined in OSHA 1910.1200(d), Hazard Determination. CO shall have final approval of all materials brought on site.
- F. The Contractor shall be held solely responsible for the safety and health of their employees. The contractor shall also be held responsible for protecting the health and safety of the VA Community (patients, staff, and visitors) from the unwanted effects of construction. VA staff will monitor the Contractor's performance in complying with all safety and health aspects of the project. Severe or constant violations may result in an immediate work stoppage or request for a Compliance Officer from the Occupational Safety and Health Administration.

- G. During all phases of demolition, construction and alterations, The Contractor shall understand and strictly follow the latest edition of National Fire Protection Association (NFPA) 241, Standard for Safeguarding Construction, Alteration and Demolition Operations. The Medical Center's Safety and Occupational Health Specialist or Industrial Hygienist will closely monitor the work area for compliance. Appropriate action will be taken for non-compliance.

**PART 2 - Specific VA Medical Center Fire and Safety Policies, Procedures and Regulations**

Also refer to VA Specifications Section 01 00 00 GENERAL REQUIREMENTS Article 1.7, *Fire Safety Precautions*.

**2.1 INTRODUCTION**

- A. The safety and fire protection of patients, employees, members of the public and government is one of continuous concern to this Medical Center.
- B. The Contractor, their supervisors and employees shall comply with Medical Center policies to ensure the occupational safety and health of all. Failure to comply may result in work stoppage.
- C. While working at this Medical Center, the Contractor is responsible for the occupational safety and health of their employees. The Contractor shall comply with the applicable OSHA standards found in 29 CFR 1910 for general industry and 29 CFR 1926 for construction. Failure to comply with these standards may result in work stoppage and a request to the Area Director of OSHA for a Compliance Officer to inspect your work site.
- D. The Contractor shall comply with the requirements found in the latest edition of National Fire Protection Association (NFPA) 241, Building Construction and Demolition Operation, and NFPA 51B, Fire Prevention in Use of Cutting and Welding Processes.
- E. Questions regarding occupational safety and health issues can be addressed to the Medical Center Safety and Occupational Health Specialist (509-240-6991).
- F. Smoking is not permitted in any interior areas of the Medical Center, including all interior stairwells, tunnels, construction and/or service/maintenance sites, nor within distance where the smoke may enter into a building through a window or doorway. *(Note: This includes interior posted patient smoking areas, if applicable)*. Compliance with this policy by your direct and subcontracted labor force is required and violations are subject to a federal fine by the VA Police.
- G. The Contractor shall appoint a Competent Person: (OSHA Definition) One who is capable of identifying existing or 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. The Contractor's Competent Person shall be directly responsible for the health and safety of their employees and the protection of the work environment, including sub-contractors. All contractor and subcontractor personnel are responsible for compliance with applicable local, state, federal and VA safety and health regulations.

- H. USE OF EXPANDABLE FOAM SEALANT IS PROHIBITED UNLESS APPROVED BY CO.
- I. The Contractor's and sub-contractor's workmen shall have attended a minimum of a 10 hour OSHA Construction Safety course, or equivalent to their specific trade. Exemptions may be made if approved by the CO.
  - 1. SUBMITTALS: Documentation of the Contractor safety training, names, dates, and type of course.

## 2.2 HAZARD COMMUNICATION

- A. The Contractor shall comply with OSHA Standard 29 CFR 1926.59, Hazard Communication.
- B. The Contractor shall submit to the VA Safety Officer, copies of MSDS covering all hazardous materials to which the Contractor and VA employees are exposed.
- C. The Contractor shall inform the Safety Officer of the hazards to which VA personnel and patients may be exposed.
- D. The Contractor shall have a written Hazard Communication Program available at the construction site, which details how the Contractor will comply with 29 CFR 1926.59.

## 2.3 FIRES

- A. All fires must be reported. In the event of a fire in your work area, use the nearest pull box station, and notify Medical Center staff in the immediate area.
- B. **Emergency notification can also be accomplished by dialing ext. 22222, from a station phone, be sure to give the exact location from where you are calling and the nature of the emergency.**
- C. If you use a cell phone to call 911, be sure to give Operator the exact location from where you are calling and the nature of the emergency.
- D. If the Contractor experiences a fire that was rapidly extinguished by their workmen, the Contractor still must notify the Safety Officer 509-240-6991 within one hour of the event so that an investigation of the fire can be accomplished.

## 2.4 FIRE ALARMS, SMOKE DETECTION AND SPRINKLER SYSTEM

- A. Existing fire protection systems including fire alarm systems, smoke detection systems, and sprinkler systems shall not be impaired during construction, except for devices in the immediate construction areas vacated by VA.
- B. Installation of sprinkler systems, standpipe systems, fire hydrants, and fire alarm systems, shall be given priority and placed into service as soon as practical.

- C. If the nature of your work requires the deactivation of the fire alarm, smoke detection or sprinkler system, you must notify the Safety Office. Written notification must be made 10 working days prior to deactivation to provide ample time to deactivate the system and provide alternative measures for fire protection.
- D. **Under no circumstance is the Contractor allowed to deactivate any of the fire protection systems in this Medical Center.**

## 2.5 SMOKE DETECTORS

- A. All necessary precautions shall be taken by the contractor to prevent accidental operation of any existing smoke detectors by minimizing the amount of dust generated in the vicinity of any smoke detectors. **False alarms will not be tolerated.** You are required to be familiar with the location of the smoke detectors in your work area.
- B. When performing cutting, burning or welding or any other operations that may cause smoke or dust, you must take steps to temporarily cover smoke detectors in order to prevent false alarms.
- C. Prior to covering the smoke detectors, the Contractor shall notify the Safety Officer, who will also be notified when the covers are removed.
- D. Failure to take the appropriate action will result in the CO assessing actual costs for government response for each false alarm that is preventable.

## 2.6 HOT WORK PERMIT

- A. Hot work is defined as operations including, but not limited to, cutting, welding, thermal welding, brazing, soldering, grinding, thermal spraying, thawing pipes or any similar situation. If such work is required, whenever possible the Contractor shall notify the CO no less than one day in advance of such work. The CO will inspect the work area and issue a Hot Work Permit, authorizing the performance of such work.
- B. All hot work will be performed in compliance with the Medical Center's policy regarding Hot Work Permits and the latest editions of NFPA 241, Safeguarding Construction, Alternation and Demolition Operations; and NFPA 51B, Fire Prevention in Use of Cutting and Welding Processes; and applicable OSHA standard. A hot work permit will only be issued to individuals familiar with these regulations.
- C. A Hot Work Permit will be issued only for the period necessary to perform such work. In the event the time necessary will exceed one day, a Hot Work Permit may be issued for the period needed; however, the Contractor Construction Superintendent shall inspect the area daily. The Hot Work Permit will apply only to the location identified on the permit. If additional areas involve hot work, then additional permits must be requested.
- D. The Contractor shall not be allowed to perform hot work processes without the appropriate permit.

- E. Any work involving the Medical Center's fire protection system will require 24 hour notification. Under no circumstance will the Contractor or employee attempt to alter or tamper with the existing fire protection system.
- F. The CO will be notified within 30 minutes of the completion of all hot work to perform an inspection of the area to confirm that sparks or drops of hot metal are not present.
- G. Precautions to be taken
  - 1. Sprinklers are in service where installed
  - 2. Cutting and welding equipment in good repair
  - 3. Within 10.5M (35 feet); floors swept clean of combustibles, no combustible material or flammable liquids, all wall and floor openings covered, and covers suspended beneath work to collect sparks
  - 4. When working on enclosed equipment and in confined space, equipment and area is free of flammable vapors
  - 5. Fire watch provided during and 30 minutes after operation (60 minutes for torch applied roofing operations)
  - 6. Portable fire extinguisher with adequate rating available in the immediate vicinity
  - 7. Standpipe system in service where installed
  - 8. Protection of any sprinkler heads when hot work is in close proximity
  - 9. Smoking prohibited in immediate vicinity
  - 10. Non-combustible shields provided when hot work is done near combustible walls, partitions, floors, roofs
  - 11. Prohibition of hot work on pipes contacting combustible walls
  - 12. Personnel trained in use of equipment including portable fire extinguishers and sounding a fire alarm
  - 13. Final check-up conducted after 30 minutes

## 2.7 TEMPORARY ENCLOSURES AND PARTITIONS

A partition is a rigid surface enclosure. A barrier is a non-rigid enclosure. Temporary construction partitions or barriers of noncombustible materials shall be installed as required to provide a separation between the areas that are described in phasing requirements and adjoining areas that are occupied by VA personnel or patients. Only non-combustible materials will be used to construct temporary enclosures or barriers at this Medical Center. Plastic materials and fabrics used to construct dust barriers must conform to the latest edition of NFPA 701, Standard Methods of Fire Tests for Flame-Resistant Textiles and Films. Partitions and barriers shall be sealed to existing building surface to prevent construction dust from entering adjoining non-constructions areas of buildings.

- A. The partitions shall be constructed of either gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of wood or steel studs. The partitions shall extend through suspended ceilings to the floor slab or roof above. The partitions shall be cut to fit around pipes, ducts, conduit, joists, etc. The penetrations shall be sealed with sealant, or mineral fiber insulation. Joints shall be taped and sealed. Doors in the partitions shall be solid core wood doors and shall be provided with self-closing devices. Clearance between the doors and frame or partition shall not exceed 3 mm (1/8 inch); door undercuts shall not exceed 19 mm (3/4 inch).

- B. When temporary partitions separating occupied areas from construction areas coincide with, or intersect with exit passageways, horizontal exits, stair shafts, exit enclosures, smoke barriers, fire barriers enclosing hazardous areas, or any other type of partition or assembly that is required by the latest edition of NFPA 101 to have a fire-resistance rating, the integrity of the existing fire-rated construction shall be maintained at all times during construction.
- C. When it is necessary to remove portions of, or an entire fire-rated assembly that is to remain as part of the completed project, the removed construction shall be replaced by an assembly with an equivalent or higher fire-resistance rating. Replacement shall be given priority over other construction features.
- D. Penetrations of existing fire-rated assemblies resulting from construction operations shall be sealed with a through-penetration firestop system which is listed for protection of the penetrating item and the type of barrier penetrated. **EXPANDABLE FOAM SHALL NOT BE USED FOR ANY WORK WITHOUT APPROVAL OF THE CO.**

## 2.8 **FLAMMABLE LIQUIDS**

All flammable liquids shall be handled, stored, and used in accordance with the latest edition of NFPA Standard No. 30. All flammable liquids will be kept in approved safety containers. Only the amount necessary for your immediate work will be allowed in the building. Flammable liquids must be removed from the building at the end of each day.

## 2.9 **COMPRESSED GAS CYLINDERS**

Compressed gas shall be secured in an upright position at all times. A suitable cylinder cart will be used to transport compressed gas cylinders. Only those compressed gas cylinders necessary for immediate work will be allowed in occupied buildings. All other compressed gas cylinders will be stored outside of buildings in a designated area. The Contractor shall comply with applicable standards compressed gas cylinders found in 29 CFR 1910 and 1926 (OSHA).

## 2.10 **INTERNAL COMBUSTION ENGINE-POWERED EQUIPMENT**

Equipment powered by an internal combustion engine (such as saws, compressors, generators, etc.) will not be used in an occupied building. Special consideration may be given for unoccupied buildings only if the OSHA and NFPA requirements have been met.

## 2.11 **POWDER-ACTIVATED TOOLS**

The operator of powder-activated tools shall be trained and certified to use them. Powder-activated tools will be kept secured at all times. When not in use, the tools will be locked up. When in use, the operator shall have the tool under his immediate control.

## 2.12 **TOOLS**

- A. Under no circumstances will equipment, tools and other items of work to be left unattended for any reason. All tools, equipment and items of work shall be under the immediate control of the Contractor employees.
- B. If for some reason a work area must be left unattended, then tools and other equipment must be placed in an appropriate box or container and locked. All tool boxes, containers or any other device used for the storage of tools and equipment will be provided with a latch and padlock, and shall be kept locked at all times, except for putting in and removing tools.
- C. All doors to work areas shall be closed and locked at all times. Failure to comply with this policy will be considered a violation of VA Regulations 1.218(b), Failure to comply with signs of a directive and restrictive nature posted for safety purposes, and subject to a \$50.00 fine. Subsequent similar violations may result in both imposition of such a fine as well as the CO taking action under the contract's Accident Prevention Clause [Federal Acquisition Regulation (FAR) 52.236-13] to suspend all contract work until violations may be satisfactorily resolved, or under FAR 52.236-5, Material and Workmanship Clause, to remove from the worksite any personnel deemed by the CO to be careless to the point of jeopardizing the welfare of facility patients or staff.
- D. You must report to the VA Police Department, 509-527-6135, any tools or equipment that are missing.
- E. Tools and equipment found unattended will be confiscated and removed from the work area.

2.13 **LADDERS**

Ladders shall not be left unattended in an upright position. Ladders shall be attended at all times or taken down, and chained securely to a stationary object.

2.14 **SCAFFOLDS**

All scaffolds shall be attended at all times. When not in use, an effective barricade (fence) shall be erected around the scaffold to prevent use by unauthorized personnel (Reference OSHA 1926, Subpart L).

2.15 **EXCAVATIONS**

The Contractor shall comply with OSHA 1926, Subpart P. An OSHA Competent Person must be on site during the excavation. The Contractor shall coordinate with the CO and utility companies prior to the excavation to identify underground utilities tanks, etc. All excavations left unattended shall be provided with a barricade suitable to prevent entry by unauthorized persons.



During demolition phases of the construction:

- A. The construction area shall be under negative pressure when required, ensuring there is an appreciable flow of clean air from the VA-occupied portion of the facility into the construction area. The airflow shall be sufficiently strong enough to draw in the plastic door flaps commonly located at the construction entrance or at the specific site within the construction area.
- B. Construction debris being transported through the VA-occupied portion of the facility shall be covered and/or wetted.
- C. Construction employees shall remove dust-laden clothing when leaving construction areas and before entering the VA-occupied portion of the facility.
- D. Carpet/sticky mats shall be placed at all construction entrances, and be satisfactorily maintained so as to minimize the tracking of dust into the VA-occupied portion of the facility.
- E. Dry sweeping of dust and debris is not to be performed.
- F. The following area(s) are classified as to the applicable infection control class. All appropriate measures listed shall be complied with.

For this Project, the Contractors representative will review with the CO and the Infection Control Practitioner, the **INFECTION CONTROL CONSTRUCTION, RISK ASSESSMENT AND COMPLIANCE MONITOR** matrix as is included as Attachment A at the end of this Section, to determine the scope and depth of safety, infection control, and security interventions appropriate for this construction.

The classifications for the Each area and phase of construction, will be determined and the Contractor will take all necessary steps for each of the independent classes as identified below

Bldg/Room	Infection Control Class
N/A	N/A

**Description of Required Infection Control Precautions by Class**

**Class I:**

- 1. Execute work by methods to minimize raising dust from construction operations.
- 2. Immediately replace a ceiling tile displaced for visual inspection.
- 3. Traffic: Decrease exposure of patients to construction.
- 4. Water: If necessary, schedule interruptions during low activity.

**Class II:** In addition to points for Class I:

- 1. Provide active means to prevent airborne dust from dispersing into the atmosphere.
- 2. Water mist work surfaces to control dust while cutting.

3. Seal unused doors with duct tape.
4. Block off and seal air vents.
5. Place walk-off mats at work areas. Mats must be kept wet with amended water during the work hours to prevent tracking of construction dust into surrounding areas.
6. Seal or isolate heating, ventilation and air conditioning (HVAC) system in areas where work is being performed.

**Class III:** In addition to points for Class I and II:

1. Complete all critical barriers, i.e., sheetrock, plywood, plastic, or implement the control cube method [cart with plastic covering and sealed connection to work site with high efficiency particulate air (HEPA) vacuum for cleaning prior to exit] to seal the area before construction begins.
2. Maintain negative air pressure within the work site utilizing HEPA-equipped air filtration units.
3. Contain construction waste before transport in tightly covered containers.
4. Cover transport receptacles or carts. Tape covering unless the cart has a solid lid.

**Class IV:** In addition to points for Class I, II and III:

1. Relocate patients away from construction areas.
2. Isolate HVAC system in area where work is being done to prevent contamination of the duct system.
3. Seal holes, pipes, conduits and punctures appropriately.
4. Construct anteroom and require all construction personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving the work site or they can wear cloth or paper coveralls that are removed each time they leave the work site.
5. Do not remove barriers from the work area until the completed project is inspected by the VA Safety Office and the Infection Control Coordinator, and thoroughly cleaned by Environmental Management.

2.22

### **CONFINED SPACE ENTRY**

- A. The Contractor will be informed that the workplace contains permit-required confined space, and that permit-space entry is allowed only through compliance with a permit space program meeting the requirements of 29 CFR 1910.146 and 1926.21(b)(6).
- B. The Contractor will be apprised of the elements including the hazards identified and the Medical Center's (last employer) experience with the space that makes the space in question a permit space.
- C. The Contractor will be apprised of any precautions or procedures that the Medical Center has implemented for the protection of employees in or near permit space where Contractor personnel will be working.
- D. Medical Center and the Contractor will coordinate entry operations when both Medical Center personnel and Contractor personnel will be working in or near permit spaces as required by 29 CFR 1910.146(d)(ii) and 1926.21(b)(6).
- E. The Contractor shall obtain any available information regarding permit space hazards and entry operation from the Medical Center.

- F. At the conclusion of the entry operations, the Medical Center and the Contractor will discuss any hazards confronted or created in permit spaces.
- G. The Contractor shall be responsible for complying with 29 CFR 1910.246(d) through (g) and 1926.21(b)(6). The Medical Center, upon request, will provide rescue and emergency services required by 29 CFR 1910.246(k) and 1926.21(b)(6).

--- END ---

**SECTION 26 05 11**  
**REQUIREMENTS FOR ELECTRICAL INSTALLATIONS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section applies to all sections of Division 26.
- B. Furnish and install electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Capacities and ratings of cable, conduit, pull boxes, and other items and arrangements for the specified items are shown on drawings.
- C. Wiring ampacities specified or shown on the drawings are based on copper and fiber optic conductors, with the conduit and raceways accordingly sized. Aluminum conductors are prohibited.

**1.2 MINIMUM REQUIREMENTS**

- A. References to the International Building Code (IBC), 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, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or

- services, that maintains periodic inspection of production or listed equipment or materials or periodic evaluation of services, and whose listing states that the equipment, material, or services either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
2. Labeled; Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
  3. Certified; equipment or product 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.
- C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of receipt

of notification that service is needed. Submit name and address of service organizations.

#### **1.5 APPLICABLE PUBLICATIONS**

Applicable publications listed in all Sections of Division are the latest issue, unless otherwise noted.

#### **1.6 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 or type 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 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.

#### **1.7 EQUIPMENT REQUIREMENTS**

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.

#### **1.8 EQUIPMENT PROTECTION**

- A. Equipment and materials shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.
  - 1. Store equipment indoors in clean dry space with uniform temperature to prevent condensation. Equipment shall include but not be limited to switchgear, switchboards, panelboards, transformers, motor control centers, motor controllers, uninterruptible power systems, enclosures, controllers, circuit protective devices, cables, wire, light fixtures, electronic equipment, and accessories.
  - 2. During installation, equipment shall be protected against entry of foreign matter; and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
  - 3. Damaged equipment shall be, as determined by the Resident Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
  - 4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
  - 5. 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.

#### **1.9 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 Resident Engineer and Medical Center staff. 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.
  4. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the Resident Engineer.
- 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, safely and professionally. 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.

#### **1.10 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 quickly for operation, maintenance, or inspections 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.

#### **1.11 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 switchboards and switchgear, panelboards, cabinets, motor controllers (starters), fused and unfused safety switches, automatic transfer switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear and motor control assemblies, control devices and other significant equipment.
- B. Nameplates for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Nameplates for Essential Electrical System (EES) equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 1/2 inch [12mm] high. Nameplates shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of EES power branch as applicable. Secure nameplates with screws.
- C. Install adhesive arc flash warning labels on all equipment as required by NFPA 70E. Label shall indicate the arc hazard boundary (inches), working distance (inches), arc flash incident energy at the working distance (calories/cm<sup>2</sup>), required PPE category and description including the glove rating, voltage rating of the equipment, limited approach distance (inches), restricted approach distance (inches), prohibited approach distance (inches), equipment/bus name, date prepared, and manufacturer name and address.

#### **1.12 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.
  2. Elementary and interconnection wiring diagrams for communication and signal systems, control systems and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
  4. Parts list which shall include those replacement parts recommended by the equipment manufacturer.
- F. Manuals: Submit in accordance with Section 01 00 00, GENERAL REQUIREMENTS.
1. Maintenance and Operation Manuals: Submit as required for systems and equipment specified in the technical sections. Furnish four copies, bound in hardback binders, (manufacturer's standard binders) or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test, and furnish the remaining manuals prior to contract completion.
  2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.
  3. Provide a "Table of Contents" and assemble the manual to conform to the table of contents, with tab sheets placed before instructions

covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.

4. The manuals shall include:
  - a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
  - b. A control sequence describing start-up, operation, and shutdown.
  - c. Description of the function of each principal item of equipment.
  - d. Installation instructions.
  - e. Safety precautions for operation and maintenance.
  - f. Diagrams and illustrations.
  - g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers and replacement frequencies.
  - h. Performance data.
  - i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
  - j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.
- G. Approvals will be based on complete submission of manuals together with shop drawings.
- H. After approval and prior to installation, furnish the Resident Engineer with one sample of each of the following:
  1. A 300 mm (12 inch) length of each type and size of wire and cable along with the tag from the coils of reels from which the samples were taken.
  2. Each type of conduit coupling, bushing and termination fitting.
  3. Conduit hangers, clamps and supports.
  4. Duct sealing compound.
  5. Each type of receptacle, toggle switch, occupancy sensor, outlet box, manual motor starter, device wall plate, engraved nameplate, wire and cable splicing and terminating material, and branch circuit single pole molded case circuit breaker.

#### **1.13 SINGULAR NUMBER**

Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this

reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

**1.14 OMIT**

**1.15 ACCEPTANCE CHECKS AND TESTS**

The contractor shall furnish the instruments, materials and labor for field tests.

**1.16 TRAINING**

- A. Training shall be provided in accordance with Article 1.25, INSTRUCTIONS, of Section 01 00 00, GENERAL REQUIREMENTS.
- B. Training shall be provided for the particular equipment or system as required in each associated specification.
- C. A training schedule shall be developed and submitted by the contractor and approved by the Resident Engineer at least 30 days prior to the planned training.

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**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 of the raceway types specified.

**1.2 RELATED WORK**

- A. Section 06 10 00, ROUGH CARPENTRY: Mounting board for telephone closets.
- B. Section 07 60 00, FLASHING AND SHEET METAL: Fabrications for the deflection of water away from the building envelope at penetrations.
- C. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire rated construction.
- D. Section 07 92 00, JOINT SEALANTS: Sealing around conduit penetrations through the building envelope to prevent moisture migration into the building.
- E. Section 09 91 00, PAINTING: Identification and painting of conduit and other devices.
- F. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- G. 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.
- H. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Underground conduits.
- I. Section 31 20 00, EARTH MOVING: Bedding of conduits.

**1.3 QUALITY ASSURANCE**

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.4 SUBMITTALS**

In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:

- A. Manufacturer's Literature and Data: Showing each cable type and rating. The specific item proposed and its area of application shall be identified on the catalog cuts.
- B. Shop Drawings:
  - 1. Size and location of main feeders.
  - 2. Size and location of panels and pull-boxes.
  - 3. Layout of required conduit penetrations through structural elements.
- C. Certifications:
  - 1. Two weeks prior to the final inspection, submit four copies of the following certifications to the Resident Engineer and COTR:
    - a. Certification by the manufacturer that the material conforms to the requirements of the drawings and specifications.
    - b. Certification by the contractor that the material has 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
- C. National Fire Protection Association (NFPA):
  - 70-08.....National Electrical Code (NEC)
- D. Underwriters Laboratories, Inc. (UL):
  - 1-05.....Flexible Metal Conduit
  - 5-04.....Surface Metal Raceway and Fittings
  - 6-07.....Electrical Rigid Metal Conduit - Steel
  - 50-95.....Enclosures for Electrical Equipment
  - 360-093.....Liquid-Tight Flexible Steel Conduit
  - 467-07.....Grounding and Bonding Equipment
  - 514A-04.....Metallic Outlet Boxes
  - 514B-04.....Conduit, Tubing, and Cable Fittings
  - 514C-96.....Nonmetallic Outlet Boxes, Flush-Device Boxes  
and Covers
  - 651-05.....Schedule 40 and 80 Rigid PVC Conduit and  
Fittings

- 651A-00.....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-2-03.....Electrical Polyvinyl Chloride (PVC) Tubing and  
Conduit
- TC-3-04.....PVC Fittings for Use with Rigid PVC Conduit and  
Tubing
- FB1-07.....Fittings, Cast Metal Boxes and Conduit Bodies  
for Conduit, Electrical Metallic Tubing and  
Cable

## **PART 2 - PRODUCTS**

### **2.1 MATERIAL**

- A. Conduit Size: In accordance with the NEC, but not less than 0.5 in [13 mm] unless otherwise shown. Where permitted by the NEC, 0.5 in [13 mm] flexible conduit may be used for tap connections to recessed lighting fixtures.
- B. Conduit:
1. Rigid steel: Shall conform to UL 6 and ANSI C80.1.
  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 4 in [105 mm] and shall be permitted only with cable rated 600 V or less.
  5. Flexible galvanized steel 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 IMC 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.
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.
  - 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 steel 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 0.75 in [19 mm] 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.
  4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.
- E. Outlet, Junction, and Pull Boxes:
1. UL-50 and UL-514A.
  2. Cast metal where required by the NEC or shown, and equipped with rustproof boxes.
  3. Sheet metal boxes: Galvanized steel, except where otherwise shown.
  4. 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.
- F. Wireways: Equip with hinged covers, except where removable covers are shown. 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 Resident Engineer and COTR 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 where permitted by the Resident Engineer and COTR as required by limited working space.

## 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 as specified in Section 07 84 00, FIRESTOPPING.

## C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight, as specified in Section 07 92 00, JOINT SEALANTS.

**3.2 INSTALLATION, GENERAL**

## A. In accordance with UL, NEC, as shown, and as specified herein.

## 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 undamaged material.
4. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
5. Cut square, ream, remove burrs, and draw up tight.
6. Independently support conduit at 8 ft [2.4 M] on centers. Do not use other supports, i.e., suspended ceilings, suspended ceiling supporting members, lighting fixtures, conduits, mechanical piping, or mechanical ducts.
7. Support within 12 in [300 mm] of changes of direction, and within 12 in [300 mm] of each enclosure to which connected.

8. Close ends of empty conduit with plugs or caps at the rough-in stage until wires are pulled in, to prevent entry of debris.
  9. Conduit installations under fume and vent hoods are prohibited.
  10. Secure conduits to cabinets, junction boxes, pull-boxes, and outlet boxes with bonding type locknuts. For rigid 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.
  11. Flashing of penetrations of the roof membrane is specified in Section 07 60 00, FLASHING AND SHEET METAL.
  12. Conduit bodies shall only be used for changes in direction, and shall not contain splices.
- 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 approved by the Resident Engineer and COTR.

### 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 Resident Engineer and COTR 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 3 in [75 mm] 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 0.75 in [19 mm] 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:
2. Conduit for conductors 600 V and below: Rigid steel, IMC, or EMT. Mixing different types of conduits indiscriminately 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 6 ft [1.8 M] of flexible metal conduit extending from a junction box to the fixture.
  5. Tightening setscrews with pliers is prohibited.

### 3.4 EXPOSED WORK INSTALLATION

- A. Unless otherwise indicated on the drawings, exposed conduit is only permitted in mechanical and electrical rooms.
- C. Conduit for Conductors 600 V and Below: Rigid steel, IMC, or EMT. Mixing different types of conduits indiscriminately 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 8 ft [2.4 M] intervals.
- G. Surface metal raceways: Use only where shown.
- 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 2 in [50 mm] high black numerals and letters, showing the cable voltage rating. Provide legends where conduits pass through walls and floors and at maximum 20 ft [6 M] 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, notwithstanding requirements otherwise specified in this or other sections of these specifications.
- 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. Unless otherwise shown, use conduits of rigid steel or IMC.
- 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. Unless otherwise shown, use rigid steel or IMC conduit within 5 ft [1.5 M] of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers. Conduit shall be half-lapped with 10 mil PVC tape before installation. After installation, completely recoat or retape any damaged areas of coating.

### 3.9 EXPANSION JOINTS

- A. Conduits 3 in [75 mm] 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 3 in [75 mm] with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 5 in [125 mm] vertical drop midway between the ends. Flexible conduit shall have a bonding jumper installed. In lieu of this flexible conduit, expansion and deflection couplings as specified above for conduits 15 in [375 mm] and larger are acceptable.
- C. Install expansion and deflection couplings where shown.

### 3.10 CONDUIT SUPPORTS, INSTALLATION

- 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 200 lbs [90 kg]. 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 0.25 in [6 mm] bolt size and not less than 1.125 in [28 mm] embedment.
    - b. Power set fasteners not less than 0.25 in [6 mm] diameter with depth of penetration not less than 3 in [75 mm].
    - c. Use vibration and shock-resistant anchors and fasteners for attaching to concrete ceilings.
- E. Hollow Masonry: Toggle bolts.
- F. Bolts supported only by plaster or gypsum wallboard are not acceptable.
- G. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
- H. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
- I. Chain, wire, or perforated strap shall not be used to support or fasten conduit.
- J. Spring steel type supports or fasteners are prohibited for all uses except horizontal and vertical supports/fasteners within walls.
- K. 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.

- C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
- D. Outlet boxes mounted back-to-back in the same wall are prohibited. A minimum 24 in [600 mm] center-to-center lateral spacing shall be maintained between boxes.
- E. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 4 in [100 mm] square x 2.125 in [55 mm] deep, with device covers for the wall material and thickness involved.
- F. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example "SIG-FA JB No. 1."
- G. On all branch circuit junction box covers, identify the circuits with black marker.

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**SECTION 26 05 41**  
**UNDERGROUND ELECTRICAL CONSTRUCTION**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installation, and connection of precast manholes and pullboxes with ducts to form a complete underground raceway system.
- B. "Duct" and "conduit," and "rigid metal conduit" and "rigid steel conduit" are used interchangeably in this specification.

**1.2 RELATED WORK**

- A. Section 07 92 00, JOINT SEALANTS: Sealing of conduit penetrations.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- C. 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.
- D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings and boxes for raceway systems.
- E. Section 31 20 11, EARTH MOVING (SHORT FORM): Trenching, backfill and compaction.

**1.3 QUALITY ASSURANCE**

- A. Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Coordinate layout and installation of ducts, manholes, pullboxes, and pull-boxes with final arrangement of other utilities, site grading, and surface features, as determined in the field.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Shop Drawings:
  - 1. Clearly present sufficient information to determine compliance with drawings and specifications.
  - 2. Include manholes, pullboxes, duct materials, and hardware. Submit plan and elevation drawings, showing openings, pulling irons, cable supports, cover, ladder, sump, and other accessories and details.
  - 3. Proposed deviations from details on the drawings shall be clearly marked on the submittals. If it is necessary to locate manholes or

pullboxes at locations other than shown on the drawings, show the proposed locations accurately on scaled site drawings, and submit four copies to the COTR for approval prior to construction.

- C. Certifications: Two weeks prior to the final inspection, submit four copies of the following certifications to the COTR:
1. Certification by the manufacturer that the materials conform to the requirements of the drawings and specifications.
  2. Certification by the contractor that the materials have been properly installed, connected, 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 Concrete Institute (ACI):
- Building Code Requirements for Structural Concrete  
318/318M-05.....Building Code Requirements for Structural  
Concrete & Commentary
- SP-66-04.....ACI Detailing Manual
- C. American National Standards Institute (ANSI):
- 77-07.....Underground Enclosure Integrity
- D. American Society for Testing and Materials (ASTM):
- C478-09.....Standard Specification for Precast Reinforced  
Concrete Manhole Sections
- C858-09.....Underground Precast Concrete Utility Structures
- C990-09.....Standard Specification for Joints for Concrete  
Pipe, Manholes and Precast Box Sections Using  
Preformed Flexible Joint Sealants.
- E. Institute of Electrical and Electronic Engineers (IEEE):
- C2-07 .....National Electrical Safety Code
- F. National Electrical Manufacturers Association (NEMA):
- TC 2-03.....Electrical Polyvinyl Chloride (PVC) Tubing And  
Conduit
- TC 3-2004.....PVC Fittings for Use With Rigid PVC Conduit And  
Tubing
- TC 6 & 8 2003.....PVC Plastic Utilities Duct For Underground  
Installations

TC 9-2004.....Fittings For PVC Plastic Utilities Duct For  
Underground Installation

G. National Fire Protection Association (NFPA):

70-08.....National Electrical Code (NEC)

H. Underwriters Laboratories, Inc. (UL):

6-07.....Electrical Rigid Metal Conduit-Steel

467-07.....Grounding and Bonding Equipment

651-05.....Schedule 40 and 80 Rigid PVC Conduit and  
Fittings

651A-00.....Type EB and A Rigid PVC Conduit and HDPE  
Conduit

651B-07.....Continuous Length HDPE Conduit

I. U.S. General Services Administration (GSA):

A-A-60005-1998.....Frames, Covers, Gratings, Steps, Sump and Catch  
Basin, Manhole

## 1.6 STORAGE

Lift and support pre-cast concrete structures only at designated  
lifting or supporting points.

## PART 2 - PRODUCTS

### 2.1 PRE-CAST CONCRETE MANHOLES AND HARDWARE OMIT

### 2.2 PULLBOXES

- A. General: Size as indicated on drawings. Provide pullboxes with weatherproof, non-skid covers with recessed hook eyes, secured with corrosion- and tamper-resistant hardware. Cover material shall be identical to pullbox material. Covers shall have molded lettering, SIGNAL as applicable. Pullboxes shall comply with the requirements of ANSI/SCTE 77 Tier 5 loading. Provide pulling irons, 0.875 in [22 mm] diameter galvanized steel bar with exposed triangular-shaped opening.
- B. Polymer Concrete Pullboxes: Shall be molded of sand, aggregate, and polymer resin, and reinforced with steel, fiberglass, or both. Pull box shall have sealed bottom.
- D. Concrete Pullboxes: Shall be monolithically-poured reinforced concrete.

### 2.3. DUCTS

- A. Number and sizes shall be as shown on drawings.
- B. Ducts (concrete-encased): OMIT

C. Ducts (direct-burial):

1. Plastic duct: PVC-C 4" inch with three 1.25" inch inner-duct
  - a. NEMA TC2 and TC3
  - b. UL 651, 651A, and 651B, Schedule 80 PVC or HDPE.
  - c. Duct shall be suitable for use with 167° F [75° C] rated conductors.
2. Rigid metal conduit: UL6 and NEMA RN1 galvanized rigid steel, threaded type, half-lapped with 10 mil PVC tape.

**2.4 GROUNDING**

- A. Rods: Per Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- B. Ground Wire: Stranded bare copper 6 AWG [16 mm<sup>2</sup>] minimum.

**2.5 WARNING TAPE**

Standard 4-mil polyethylene 3 in [76 mm] wide detectable tape, red with black letters, imprinted with "CAUTION - BURIED SIGNAL CABLE BELOW" or similar.

**2.6 PULL ROPE FOR SPARE DUCTS**

Plastic with 200 lb [890 N] minimum tensile strength.

**PART 3 - EXECUTION**

**3.1 MANHOLE AND PULLBOX INSTALLATION**

- A. Assembly and installation shall follow the printed instructions and recommendations of the manufacturer. Install manholes and pullboxes level and plumb.
  1. Units shall be installed on a 12 in [300 mm] level bed of 90% compacted granular fill, well-graded from the 1 in [25 mm] sieve to the No. 4 sieve. Granular fill shall be compacted with a minimum of four passes with a plate compactor.
  2. Seal duct terminations so they are watertight.
- B. Access: Ensure the top of frames and covers are flush with finished grade.
- C. Ground Rods in Manholes: Drive a ground rod into the earth, through the floor sleeve, after the manhole is set in place. Fill the sleeve with sealant to make a watertight seal. Rods shall protrude approximately 4 in [100 mm] above the manhole floor.
- D. Grounding in Manholes:

1. Install a No. 3/0 AWG [95 mm<sup>2</sup>] bare copper ring grounding conductor around the inside perimeter of the manhole and anchor to the walls with metallic cable clips.
2. Connect the ring grounding conductor to the ground rod by an exothermic welding process.
3. Bond the ring grounding conductor to the duct bank equipment grounding conductors, the exposed non-current carrying metal parts of racks, sump covers, and like items in the manholes with a minimum No. 6 AWG [16 mm<sup>2</sup>] bare copper jumper.

E. Manhole Lighting: OMIT

F. Sump Pump: OMIT

### **3.2 TRENCHING**

- A. Refer to Section 31 20 11 EARTH MOVING (SHORT FORM) for trenching, backfilling, and compaction.
- B. Before performing trenching work at existing facilities, the Ground Penetrating Radar Survey shall be carefully performed by certified technician to reveal all existing underground ducts, conduits, cables, and other utility systems.
- C. Work with extreme care near existing ducts, conduits, cables, and other utilities to avoid damaging them.
- D. Cut the trenches neatly and uniformly.
- E. For Concrete-Encased Ducts: N/A

### **3.3 DUCT INSTALLATION**

- A. General Requirements:
  1. Ducts shall be in accordance with the NEC and IEEE C2, as shown on the drawings, and as specified.
  2. Slope ducts to drain towards manholes and pullboxes, and away from building and equipment entrances. Pitch not less than 4 in [100 mm] in 100 ft [30 M].
  3. Underground conduit stub-ups and sweeps to equipment inside of buildings shall be taped galvanized rigid steel, and shall extend a minimum of 5 ft [1.5 M] outside the building foundation. Tops of conduits below building slab shall be minimum 24 in [610 mm] below bottom of slab.

4. Stub-ups, sweeps, and risers to equipment mounted on outdoor concrete slabs shall be taped galvanized rigid steel, and shall extend a minimum of 5 ft [1.5 M] away from the edge of slab.
5. Install insulated grounding bushings on the terminations.
6. Radius for turns of direction shall be sufficient to accomplish pulls without damage. Minimum radius shall be six times conduit diameter. Use manufactured long sweep bends.
7. Additional burial depth shall be required in order to accomplish NEC-required minimum bend radius of ducts.
8. All multiple conduit runs shall have conduit spacers. Spacers shall securely support and maintain uniform spacing of the duct assembly a minimum of 3 in [75 mm] above the bottom of the trench during the concrete pour. Spacer spacing shall not exceed 5 ft [1.5 M]. Secure spacers to ducts and earth to prevent floating during concrete pour. Provide nonferrous tie wires to prevent displacement of the ducts during pouring of concrete. Tie wires shall not act as substitute for spacers.
9. Duct lines shall be installed no less than 12 in [300 mm] from other utility systems, such as water, sewer, and chilled water.
10. Clearances between individual ducts:
  - a. For like services, not less than 3 in [75 mm].
  - b. For power and signal services, not less than 6 in [150 mm].
11. Duct lines shall terminate at window openings in manhole walls as shown on the drawings. All ducts shall be fitted with end bells.
12. Couple the ducts with proper couplings. Stagger couplings in rows and layers to ensure maximum strength and rigidity of the duct bank.
13. Keep ducts clean of earth, sand, or gravel, and seal with tapered plugs upon completion of each portion of the work.
14. Seal conduits, including spare conduits, at building entrances and at outdoor equipment terminations with a suitable compound to prevent entrance of moisture and gases.

B. Concrete-Encased Ducts and Conduits: OMIT

C. Direct-Burial Duct and Conduits:

1. Install direct-burial ducts and conduits only where shown on the drawings. Provide direct-burial ducts only for low-voltage systems.

2. Join and terminate ducts and conduits with fittings recommended by the conduit manufacturer.
  3. Tops of ducts and conduits shall be:
    - a. Not less than 24 in [600 mm] and not less than shown on the drawings, below finished grade.
    - b. Not less than 30 in [750 mm] and not less than shown on the drawings, below roads and other paved surfaces.
  4. Do not kink the ducts or conduits. Compaction shall not deform the ducts.
- D. Direct-Burial Duct and Conduit Identification: Place continuous strip of warning tape approximately 12 in [300 mm] above ducts or conduits before backfilling trenches. Warning tape shall be preprinted with proper identification.
- E. Spare Ducts and Conduits: Where spare ducts are shown, they shall have a nylon pull rope installed. They shall be capped at each end and labeled as to location of the other end.
- F. Duct and Conduit Cleaning:
1. Upon completion of the duct installation, a standard flexible mandrel shall be pulled through each duct to loosen particles of earth, sand, or foreign material left in the duct. The mandrel shall be not less than 12 in [3600 mm] long, and shall have a diameter not less than 0.5 in [13 mm] less than the inside diameter of the duct. A brush with stiff bristles shall then be pulled through each duct to remove the loosened particles. The diameter of the brush shall be the same as, or slightly larger than, the diameter of the duct.
  2. Mandrel pulls shall be witnessed by the Resident Engineer and COTR
- G. Duct and Conduit Sealing: Seal the ducts and conduits at building entrances, and at outdoor terminations for equipment, with a suitable non-hardening compound to prevent the entrance of moisture and gases.

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**SECTION 31 20 11  
EARTH MOVING (SHORT FORM)**

**PART 1 - GENERAL**

**1.1:DESCRIPTION:**

This section specifies the requirements for furnishing all equipment, materials, labor and techniques for earthwork including excavation, fill, backfill and site restoration utilizing fertilizer, seed and/or sod.

**1.2 DEFINITIONS:**

A. Unsuitable Materials:

1. Fills: Topsoil, frozen materials; construction materials and materials subject to decomposition; clods of clay and stones larger than 75 mm (3 inches); organic materials, including silts, which are unstable; and inorganic materials, including silts, too wet to be stable.
2. Existing Subgrade (except footings): Same materials as above paragraph, that are not capable of direct support of slabs, pavement, and similar items, with the possible exception of improvement by compaction, proofrolling, or similar methods of improvement.
3. Existing Subgrade (footings only): Same as Paragraph 1, but no fill or backfill. If materials differ from design requirements, excavate to acceptable strata subject to Resident Engineer's approval.

B. Earthwork: Earthwork operations required within the new construction area. It also includes earthwork required for auxiliary structures and buildings and sewer and other trenchwork throughout the job site.

C. Degree of Compaction: Degree of compaction is expressed as a percentage of maximum density obtained by the test procedure presented in ASTM

D. The term fill means fill or backfill as appropriate.

**1.3 RELATED WORK:**

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

B. Safety Requirements Section 00 72 00, GENERAL CONDITIONS, Article, ACCIDENT PREVENTION.

C. Protection of existing utilities, fire protection services, existing equipment, roads, and pavements: Section 01 00 00, GENERAL REQUIREMENTS.

D. Subsurface Investigation: Section 01 00 00, GENERAL REQUIREMENTS, Article, PHYSICAL DATA.

**1.4 CLASSIFICATION OF EXCAVATION:**

- A. Unclassified Excavation: Removal and disposal of pavements and other man-made obstructions visible on the surface; utilities, and other items including underground structures indicated to be demolished and removed; together with any type of materials regardless of character of material and obstructions encountered.
- B. Classified Excavation: Removal and disposal of all material not defined as rock.

**1.6 SUBMITTALS:**

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

**1.7 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. American Nursery and Landscape Association (ANLA):  
2004.....American Standard for Nursery Stock
- C. American Association of State Highway and Transportation Officials (AASHTO):  
T99-01 (R2004).....Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305 mm (12 inch) Drop  
T180-01 (2004).....Moisture-Density Relations of Soils Using a 4.54-kg [10 lb] Rammer and a 457 mm (18 inch) Drop
- D. American Society for Testing and Materials (ASTM):  
D698-07.....Laboratory Compaction Characteristics of Soil Using Standard Effort  
D1557-02.....Laboratory Compaction Characteristics of Soil Using Modified Effort
- E. Standard Specifications of (Insert name of local state) State Department of Transportation, latest revision.

**PART 2 - PRODUCTS**

**2.1 MATERIALS:**

- A. Fills: Materials approved from on site and off site sources having a minimum dry density of 1760 kg/m<sup>3</sup> (110 pcf), a maximum Plasticity Index of 6, and a maximum Liquid Limit of 30.
- B. Granular Fill:
  - 1. Under concrete slab, crushed stone or gravel graded from 25 mm (1 inch) to 4.75 mm (No. 4).
- C. Fertilizer: (5-10-5) delivered to site in unopened containers that clearly display the manufacturer's label, indicating the analysis of the contents.
- D. Seed: Grass mixture comparable to existing turf delivered to site in unopened containers that clearly display the manufacturer's label, indicating the analysis of the contents.
- E. Sod: Comparable species with existing turf. Use State Certified or State Approved sod when available. Deliver sod to site immediately after cutting and in a moist condition. Thickness of cut must be 19 mm to 32 mm (3/4 inch to 1 1/4 inches) excluding top growth. There shall be no broken pads and torn or uneven ends.

### **PART 3 - EXECUTION**

#### **3.1 SITE PREPARATION:**

- A. Clearing: Clearing within the limits of earthwork operations as described or designated by the Resident Engineer. Work includes removal of trees, shrubs, fences, foundations, incidental structures, paving, debris, trash and any other obstructions. Remove materials from the Medical Center Property.
- B. Grubbing: Remove stumps and roots 75 mm (3 inches) and larger diameter. Undisturbed sound stumps, roots up to 75 mm (3 inches) diameter, and nonperishable solid objects which will be a minimum of 900 mm (3 feet) below subgrade or finished embankment may be left.
- C. Trees and Shrubs: Trees and shrubs, not shown for removal, may be removed from the areas within 4500 mm (15 feet) of new construction and 2250 mm (7'-6") of utility lines if such removal is approved in advance by the Resident Engineer. Remove materials from the Medical Center Trees and shrubs, shown to be transplanted, shall be dug with a ball of earth and burlapped in accordance with the latest issue of the, "American Standard for Nursery Stock", of the American Association of Nurserymen, Inc. Transplant trees and shrubs to a permanent or temporary position within two hours after digging. Maintain trees and

shrubs held in temporary locations by watering as necessary and feeding semi-annually with liquid fertilizer with a minimum analysis of 5 percent nitrogen, 10 percent phosphorus and 5 percent potash. Maintain plants moved to permanent positions as specified for plants in temporary locations until the conclusion of the contract. Box, and otherwise protect from damage, existing trees and shrubs which are not shown to be removed in the construction area. Repair immediately damage to existing trees and shrubs by trimming, cleaning and painting damaged areas, including the roots, in accordance with standard industry horticultural practice for the geographic area and plant species. Building materials shall not be stored closer to trees and shrubs, that are to remain, than the farthest extension of their limbs.

- D. Stripping Topsoil: Unless otherwise indicated on the drawings, the limits of earthwork operations shall extend anywhere the existing grade is filled or cut or where construction operations have compacted or otherwise disturbed the existing grade or turf. Strip topsoil as defined herein, or as indicated in the geotechnical report, from within the limits of earthwork operations as specified above unless specifically indicated or specified elsewhere in the specifications or shown on the drawings. Topsoil shall be fertile, friable, natural topsoil of loamy character and characteristic of the locality. Topsoil shall be capable of growing healthy horticultural crops of grasses. Stockpile topsoil and protect as directed by the Resident Engineer. Eliminate foreign material, such as weeds, roots, stones, subsoil, frozen clods, and similar foreign materials, larger than 0.014 m<sup>3</sup> (1/2 cubic foot) in volume, from soil as it is stockpiled. Retain topsoil on the station. Remove foreign materials larger than 50 mm (2 inches) in any dimension from topsoil used in final grading. Topsoil work, such as stripping, stockpiling, and similar topsoil work, shall not, under any circumstances, be carried out when the soil is wet so that the tilth of the soil will be destroyed.

2. Concrete Slabs and Paving: Score deeply or saw cut to insure a neat, straight cut, sections of existing concrete slabs and paving to be removed where excavation or trenching occurs. Extend pavement section to be removed a minimum of 300 mm (12 inches) on each side of widest part of trench excavation and insure final score lines are approximately parallel unless otherwise indicated. Remove material from the Medical Center.

- E. Disposal: All materials removed from the property shall be disposed of at a legally approved site, for the specific materials, and all removals shall be in accordance with all applicable Federal, State and local regulations. No burning of materials is permitted onsite.

### **3.2 EXCAVATION:**

- A. Shoring, Sheet piling and Bracing: Shore, brace, or slope to its angle of repose banks of excavations to protect workmen, banks, adjacent paving, structures, and utilities, in compliance with OSHA requirements.
  - 1. Extend shoring and bracing to the bottom of the excavation. Shore excavations that are carried below the elevations of adjacent existing foundations.
  - 2. If the bearing of any foundation is disturbed by excavating, improper shoring or removal of shoring, placing of backfill, and similar operations, provide a concrete fill support under disturbed foundations, as directed by Resident Engineer, at no additional cost to the Government. Do not remove shoring until permanent work in excavation has been inspected and approved by Resident Engineer.
- B. Excavation Drainage: Operate pumping equipment, and/or provide other materials, means and equipment as required, to keep excavations free of water and subgrades dry, firm, and undisturbed until approval of permanent work has been received from Resident Engineer. Approval by the Resident Engineer is also required before placement of the permanent work on all subgrades. When subgrade for foundations has been disturbed by water, remove the disturbed material to firm undisturbed material after the water is brought under control. Replace disturbed subgrade in trenches by mechanically tamped sand or gravel. When removed disturbed material is located where it is not possible to install and properly compact disturbed subgrade material with mechanically compacted sand or gravel, the Resident Engineer should be contacted to consider the use of flowable fill.
- C. Blasting: Blasting shall not be permitted.
- D. Building Earthwork:
  - 1. Excavation shall be accomplished as required by drawings and specifications.
  - 2. Excavate foundation excavations to solid undisturbed subgrade.
  - 3. Remove loose or soft material to solid bottom.

4. Fill excess cut under footings or foundations with 25 MPa (3000 psi) concrete, poured separately from the footings.
3. Do not tamp earth for backfilling in footing bottoms, except as specified.

E. Trench Earthwork:

1. Utility trenches (except sanitary and storm sewer):
  - a. Excavate to a width as necessary for sheeting and bracing and proper performance of the work.
  - b. Grade bottom of trenches with bell-holes, scooped-out to provide a uniform bearing.
  - c. Support piping on undisturbed earth unless a mechanical support is shown.
  - d. The length of open trench in advance of pipe laying shall not be greater than is authorized by the Resident Engineer.
2. Sanitary and storm sewer trenches:
  - a. Trench width below a point 150 mm (6 inches) above top of the pipe shall be 600 mm (24 inches) for up to and including 300 mm (12 inches) diameter and four-thirds diameter of pipe plus 200 mm (8 inches) for pipe larger than 300 mm (12 inches). Width of trench above that level shall be as necessary for sheeting and bracing and proper performance of the work.
  - b. The bottom quadrant of the pipe shall be bedded on undisturbed soil or granular fill.
    - 1) Undisturbed: Bell holes shall be no larger than necessary for jointing. Backfill up to a point 300 mm (12 inches) above top of pipe shall be clean earth placed and tamped by hand.
    - 2) Granular Fill: Depth of fill shall be a minimum of 75 mm (3 inches) plus one-sixth of pipe diameter below the pipe of 300 mm (12 inches) above top of pipe. Place and tamp fill material by hand.
  - c. Place and compact as specified the remainder of backfill using acceptable excavated materials. Do not use unsuitable materials.
  - d. Use granular fill for bedding where rock or rocky materials are excavated.

- F. Site Earthwork: Excavation shall be accomplished as required by drawings and specifications. Remove subgrade materials, that are

determined by the Resident Engineer as unsuitable, and replace with acceptable material.

G. Finished elevation of subgrade shall be as follows:

1. Pavement Areas - bottom of the pavement or base course as applicable.
2. Planting and Lawn Areas - 100 mm (4 inches) below the finished grade, unless otherwise specified or indicated on the drawings.

### **3.3 FILLING AND BACKFILLING:**

- A. General: Do not fill or backfill until all debris, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from the excavation. Proof-roll exposed subgrades with a fully loaded dump truck. Use excavated materials or borrow for fill and backfill, as applicable. Do not use unsuitable excavated materials. Do not backfill until foundation walls have been completed above grade and adequately braced, waterproofing or dampproofing applied, and pipes coming in contact with backfill have been installed, and inspected and approved by Resident Engineer.
- B. Proof-rolling Existing Subgrade: Proof-roll with a fully loaded dump truck. Make a minimum of one pass in each direction. Remove unstable uncompactable material and replace with granular fill material completed to mix requirements specified.
- C. Placing: Place material in horizontal layers not exceeding 200 mm (8 inches) in loose depth and then compacted. Do not place material on surfaces that are muddy, frozen, or contain frost.
- D. Compaction: Use approved equipment (hand or mechanical) well suited to the type of material being compacted. Do not operate mechanized vibratory compaction equipment within 3000 mm (10 feet) of new or existing building walls without the prior approval of the Resident Engineer. Moisten or aerate material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Compact each layer to not less than 95 percent of the maximum density determined in accordance with the following test method ASTM.

### **3.4 GRADING:**

- A. General: Uniformly grade the areas within the limits of this section, including adjacent transition areas. Smooth the finished surface within specified tolerance. Provide uniform levels or slopes between points

where elevations are indicated, or between such points and existing finished grades. Provide a smooth transition between abrupt changes in slope.

- B. Cut rough or sloping rock to level beds for foundations. In unfinished areas fill low spots and level off with coarse sand or fine gravel.
- C. Slope backfill outside the building away from the building walls for a minimum distance of 3048 mm (10 feet) at a minimum five percent (5%) slope.
- D. The finished grade shall be 150 mm (6 inches) below bottom line of windows or other building wall openings unless greater depth is shown.
- E. Place crushed stone or gravel fill under concrete slabs on grade tamped and leveled. The thickness of the fill shall be 150 mm (6 inches), unless otherwise indicated.
- F. Finish subgrade in a condition acceptable to the Resident Engineer at least one day in advance of the paving operations. Maintain finished subgrade in a smooth and compacted condition until the succeeding operation has been accomplished. Scarify, compact, and grade the subgrade prior to further construction when approved compacted subgrade is disturbed by contractor's subsequent operations or adverse weather.
- G. Grading for Paved Areas: Provide final grades for both subgrade and base course to +/- 6 mm (0.25 inches) of indicated grades.

### **3.5 LAWN AREAS:**

- A. General: Harrow and till to a depth of 100 mm (4 inches), new or existing lawn areas to remain, which are disturbed during construction. Establish existing or design grades by dragging or similar operations. Do not carry out lawn areas earthwork out when the soil is wet so that the tilth of the soil will be destroyed. Plant bed must be approved by Resident Engineer before seeding or sodding operation begins.
- B. Finished Grading: Begin finish grading after rough grading has had sufficient time for settlement. Scarify subgrade surface in lawn areas to a depth of 100 mm (4 inches). Apply topsoil so that after normal compaction, dragging and raking operations (to bring surface to indicated finish grades) there will be a minimum of 100 mm (4 inches) of topsoil over all lawn areas; make smooth, even surface and true grades, which will not allow water to stand at any point. Shape top and bottom of banks to form reverse curves in section; make junctions with undisturbed areas to conform to existing topography. Solid lines within

grading limits indicate finished contours. Existing contours, indicated by broken lines are believed approximately correct but are not guaranteed.

- C. Fertilizing: Incorporate fertilizer into the soil to a depth of 100 mm (4 inches) at a rate of 12 kg/100 m<sup>2</sup> (25 pounds per 1000 square feet).
- D. Seeding: Seed at a rate of 2 kg/100 m<sup>2</sup> (4 pounds per 1000 square feet) and accomplished only during periods when uniform distribution may be assured. Lightly rake seed into bed immediately after seeding. Roll seeded area immediately with a roller not to exceed 225 kg/m (150 pounds per foot) of roller width.
- E. Sodding: Topsoil shall be firmed by rolling and during periods of high temperature the topsoil shall be watered lightly immediately prior to laying sod. Sod strips shall be tightly butted at the ends and staggered in a running bond fashion. Placement on slopes shall be from the bottom to top of slope with sod strips running across slope. Secure sodded slopes by pegging or other approved methods. Roll sodded area with a roller not to exceed 225 kg/m (150 pounds per foot) of the roller width to improve contact of sod with the soil.
- F. Watering: The Resident Engineer is responsible for having adequate water available at the site. As sodding is completed in any one section, the entire sodded area shall be thoroughly irrigated by the contractor, to a sufficient depth, that the underside of the new sod pad and soil, immediately below sod, is thoroughly wet. Resident Engineer will be responsible for sod after installation and acceptance.

### **3.6 DISPOSAL OF UNSUITABLE AND EXCESS EXCAVATED MATERIAL:**

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Medical Center property.
- B. Place excess excavated materials suitable for fill and/or backfill on site where directed.
- C. Remove from site and dispose of any excess excavated materials after all fill and backfill operations have been completed.
- D. Segregate all excavated contaminated soil designated by the Resident Engineer from all other excavated soils, and stockpile on site on two 0.15 mm (6 mil) polyethylene sheets with a polyethylene cover. A designated area shall be selected for this purpose. Dispose of excavated contaminated material in accordance with State and Local requirements.

**3.6 CLEAN-UP:**

Upon completion of earthwork operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for subsequent construction operations. Remove debris, rubbish, and excess material from the Medical Center.

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