

**Project No. 640-17-112**  
**Department of Veterans Affairs (VA)**  
**Remediation of Contaminated Soil at MPD Campus**  
**VA Palo Alto Health Care System (VAPAHCS)**  
**Menlo Park Division (MPD)**  
**California**

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NOTE: The specifications from project 640-384, Seismic Correction of Building 323 and Infrastructure Enhancements are included in the contract documents as a Specification Appendix. These specifications are to be used to complete the Ball Field that is a part that contract that could not be completed due to the location of the contaminated soil that is being removed under this contract.

**SECTION 00 01 15  
LIST OF DRAWING SHEETS**

The drawings listed below accompanying this specification form a part of the contract.

<u>Drawing No.</u>	<u>Title</u>
01	SITE PLAN
02	HYDRAULIC PISTON SITE
03	GRAVEL PARKING LOCATION
04	ELEVATIONS
05	SIDEWALKS
06	L1.02 BALL FIELD IMPROVEMENTS
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**SECTION 01 00 00**  
**GENERAL REQUIREMENTS**

**1.1 GENERAL INTENTION**

- A. Contractor shall completely prepare site for construction operations, and furnish all labor, equipment and materials and perform work for the project, as required by the drawings and specifications.
- B. Visits to the VA Campus site by Bidders may be made only by appointment with the Contracting Officer's Representative.
- C. NOT USED
- D. Before placement and installation of work subject to tests by a testing laboratory, the Contractor shall notify the Contracting Officer's Representative in sufficient time to enable VA personnel to be present at the time for adequate oversight of the taking and testing of specimens and field activities. Such prior notice shall be not less than five work days unless otherwise designated by the Contracting Officer's Representative.
- E. All employees of the Contractor and subcontractors shall comply with the VA security management program and obtain permission for site entry from the VA police, be identified by project and employer, and be restricted from unauthorized access.
- F. The Contracting Officer's Representative will assign specific routes and times for pathways, corridors and elevators for transportation of personnel, materials and equipment. The Contractor will continually clean-up any dust, dirt or debris caused by their jobsite ingress/egress.
- G. Dust and fume control will be exercised during all construction operations. Workers will be careful not to operate any vehicles, gas or diesel engines, or to perform any fume or dust generating process near a building air intake system. Noise will be held to a minimum at all times. Jack-hammering, core drilling and other noisy or disturbing operations may have to be rescheduled or accomplished after hours to avoid interfering with surgery or patient care services.

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

- A. ITEM I, GENERAL CONSTRUCTION:

Work includes:

- 1. Remove soil to an offsite facility licenced to receive hazardous soil. There is approxamatly 3,250 Cubic Yards of contaminated soil.

2. Prepare site for and install sprinklers and landscaping where the soil was removed from, as per drawings and specification from project 640-384, Seismic Correction of Building 323 and Infrastructure Enhancements. (Appendix Specifications)
3. At the building 205 location, bore and test soil adjacent to a hydroilc elevator piston assembly for hydrolic oil soil contamination.
4. IF, the test results are positive for contamination, hire a licened Engineer that does contaminated soil remediation design to develop a remediation plan for the removal the contaminated soil and back fill the resulting excavation.
5. Remove and dispose of the elevator hydrolic cyclinder and pump/tank.
6. IF, no contamination is discovered, backfill the shaft that the hydroilic piston was removed and test bores from with clay.
7. Backfill the access hole to the elevator hydrolic piston with clean fill contractor provided soil to match the suroundinding soil elevation.
8. Compact and approamatly 50' x 200' area adjacent to the west entrance parking lot. Remove sprinlers from parking area. Install approamatly 6" of gravel and compact. Provide soil as need, grade and seed adjacent to gravel for a smoth transition and to eliminate tripping hazurds. Install or relocate sprinklers and needed.
9. Any other work required to accomplish above listed work items.

#### 1.3 ALTERNATIVE BID ITEM(S)

1. Remdiation removal plan provided by a Liceneced Engineer who does this type of work.
2. The cost per cubic yard to remove and dispose of soil contaminated with hydrolic oil.
3. Provide and install clay in elevator piston shaft and test bores then back fill as needed.

#### 1.4 SPECIFICATIONS AND DRAWINGS

- A. After award of contract, specifications and drawings will be available for download from a link provided by the Contracting Officer's Representative

- B. The Contractor shall maintain on the job site one (1) printed set of specifications, one (1) printed set of drawings, one (1) printed copy of all RFI's and any documents that modify the original specifications and drawings.

#### **1.4 ACCIDENT PREVENTION**

- A. Refer to 01 35 26 Safety Requirements Section 1.04

- B. (a) The Contractor shall provide and maintain work environments and procedures which will --

(1) Safeguard the public and Government personnel, property, materials, supplies, and equipment exposed to Contractor operations and activities;

(2) Avoid interruptions of Government operations and delays in project completion dates; and

(3) Control costs in the performance of this contract.

(b) For these purposes on contracts for construction or dismantling, demolition, or removal of improvements, the Contractor shall --

(1) Provide appropriate safety barricades, signs, and signal lights;

(2) Comply with the standards issued by the Secretary of Labor at 29 CFR Part 1926 and 29 CFR Part 1910; and

(3) Ensure that any additional measures the Contracting Officer determines to be reasonably necessary for the purposes are taken.

(e) The Contractor shall insert this clause, including this paragraph (e), with appropriate changes in the designation of the parties, in subcontracts.

- C. The Contractor shall insert the above clause with appropriate changes in the designation of the parties in subcontracts.

#### **1.5 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. for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted Security Plan.

2. The Contractor is responsible for assuring that all sub-Contractors working on the project and their employees also comply with these regulations.

B. Security Procedures:

1. Contractor and subcontractor employees shall not enter the project site without an appropriate badge. They will be subject to inspection of their personal effects when entering or leaving the project site.
2. The Contractor shall create an Employee Daily Log of all personnel working on the site. The Employee Daily Log shall contain the employee's (a) Full Name, (b) Employer/Company Name and (c) Occupation/Trade. The Employee Daily Log shall be submitted with the Contractor's Daily Work Report.
3. All work on the contract shall be performed between 7:00 am and 5:00 pm Monday through Friday, excluding National Holidays, unless approved in writing by the Contracting Officer. For working outside the these hours, the Contractor shall give two weeks' notice to the Contracting Officer's Representative so that oversight, security and escort arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this specification.
4. No photography of VA premises is allowed without written permission of the VA Public Affairs Officer. Submit request to the Contracting Officer's Representative.
5. The VA Police are Federal Police Officers with full authority to make arrests, investigate crimes and issue traffic citations. Citations issued require an appearance in the Federal District Court and/or payment of a fine. Speed limits and other driving and parking codes are strictly enforced. Any vehicle left unattended for more than a few minutes may be cited by the VA Police.
6. Sexual harassment is strictly prohibited. This includes deliberate or unsolicited verbal comments or gestures of a sexual nature, unwelcome sexual advances, requests for sexual favors and/or other unwelcome verbal or physical conduct of a sexual nature.
7. Possession or use of non-prescription drugs or alcohol, including beer and wine, on the Health Care System grounds is strictly prohibited. Possession of firearms, knives with blades over 4", ammunition, explosive devices and any item that may be considered an offensive weapon is strictly prohibited. This includes carrying such items in vehicles.

8. The Health Care System does not have the equipment, facilities, or personnel trained to handle serious injuries. Call 911 for emergency medical assistance and notify the Contracting Officer's Representative and the VA Police.
9. Vehicle authorization requests shall be required for any vehicle entering the site and such requests shall be submitted 24 hours before the date and time of access. Access shall be restricted to picking up and dropping off materials and supplies. Separate permits shall be issued for Contractor and subcontractor employees for parking in designated areas only.
10. VA reserves the right to shut down the project site and order Contractor's employees and subcontractors off the premises in the event of a national emergency or local disaster. The Contractor may return to the site only with the written approval of the Contracting Officer's Representative.

C. Guards: NOT USED

D. Key Control:

1. NOT USED

E. Document Control:

1. NOT USED

#### **1.5 FIRE SAFETY**

- A. Refer to 01 35 26 Safety Requirements Section 1.13
- B. When work requires removal of any ceiling tiles for more than 4 hours in a 24-hour period in areas protected by a fire sprinkler system where the sprinkler heads are made less effective by space above the ceiling exceeding 18 inches, temporary provision shall be made for supplemental heat detectors with annunciation capability to the building/campus fire alarm system. Programmed wireless heat detector sensors (Honeywell #5809 or equal) with associated receiver (Honeywell #5881 or equal) and control panel (Honeywell Vista-20P or equal) are acceptable. Tie-in of the control panel to the building/campus fire alarm system will be made by the VA. Fifteen (15) days advance notice shall be given to the VA for scheduling the tie-in.
- C. Hot Work: Any welding, cutting metal or other burning or spark producing operations will require a hot work permit. Welding and/or burning operations are allowed only during normal working hours. Coordinate with Contracting Officer's Representative to obtain permits from the Facility Safety Officer at least 24 hours in advance. Evidence

of training of all personnel assigned to be a fire watch shall be provided before Hot Work Permits will be issued. A fire watch is required for all hot work unless specified differently on the permit. The fire watch shall have fire extinguishing equipment readily available and be trained in its use and be familiar with facilities for sounding an alarm in the event of a fire. They shall watch for fires in all exposed areas, try to extinguish then otherwise sound the alarm. A fire watch shall be maintained for at least 30 minutes after completion of hot work.

- D. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily. Waste and debris will not be disposed of on station or in VA trash containers or dumpsters. The Contractor shall provide their own bin or dumpster, however, the use and location of such must be approved in writing by the Contracting Officer's Representative. Construction waste and debris will not be accumulated in corridors or other building areas where it might cause a fire or safety hazard.
- E. Smoke/fire Barrier Penetrations: Any penetrations to smoke or fire barrier walls, ceilings or floor slabs shall be properly sealed immediately with Hilti Fire Stop 601 or 635 for walls and ceilings and Hilti Fire Stop 657 for floor penetrations or approved equal.

#### **1.6 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 Contracting Officer's Representative. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.
- B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer's Representative 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 their expense upon completion of the work. With the written consent of the Contracting Officer's Representative, the buildings and utilities may be abandoned and need not be removed.
- C. The Contractor shall, as prescribed by the Contracting Officer's Representative, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the



Contracting Officer's Representative. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law, code 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 as determined by the Contracting Officer's Representative.
- E. Workmen are subject to rules of the VA Campus applicable to their conduct.
- F. Execute work so as to interfere as little as possible with normal functioning of the VA Campus as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others.
  - 1. Do not store materials and equipment in other than assigned areas.
  - 2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by the VA in quantities sufficient for not more than two work days. Provide unobstructed access to VA Campus areas required to remain in operation.
- G. Utilities Services: Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing pipes, electrical wires, conduits, cables, etc., of utility services, or of fire protection systems or communications systems, they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by Contracting Officer's Representative. All such actions shall be coordinated with any Utility Company involved:
- H. Construction Fence: Before construction operations begin, Contractor shall provide a chain link construction fence, six-foot minimum height, around the construction area, material storage areas and dumpsters/waste locations. Contractor shall provide and maintain visual screening fabric for all fencing. Contractor shall provide gates as required for access with necessary hardware including hasps and locks. All gates shall be locked when no workers are present. Contractor shall coordinate with the VA to assure VA access at any time. Contractor

shall remove the fence when directed by Contracting Officer's Representative.

- I. Work areas will be vacated by Government and turned over to Contractor after date of Notice to Proceed and after all pre-construction activities have been completed and pre-construction submittals have been approved by the Contracting Officer's Representative.
- J. When a building is turned over to Contractor, Contractor shall accept entire responsibility therefore.
  - 1. Contractor shall make arrangements for pre-inspection of site with Fire Department (VA or municipal) whichever will be required to respond to an alarm from Contractor's employee or watchman.
- K. Utilities Services: Maintain existing utility services for the VA Campus at all times.
  - 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 Contracting Officer's Representative. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished, work on any energized circuits or equipment shall not commence without the Contracting Officer's Representative prior knowledge and written approval. Refer to specification Sections 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, 27 05 11 REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS and 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS for additional requirements.
  - 2. Contractor shall submit a request to interrupt any such services or systems to Contracting Officer's Representative, **in writing, four (4) weeks in advance of proposed interruption.** Request shall state reason, date, exact time of, and approximate duration of such interruption. Approved outage dates are not guaranteed and are subject to VA operational requirements.
  - 3. 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 the VA. Interruption time approved by Contracting Officer's Representative may occur at other than Contractor's normal working hours.

4. In case of a contract construction emergency, service will be interrupted on approval of Contracting Officer's Representative. Such approval will be confirmed in writing as soon as practical.
5. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service connection to the construction project, for such items as water, sewer, electricity or gas, payment of such fee shall be paid by the Contractor unless specifically relieved in writing by the Government.
- L. 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.
- M. To minimize interference of construction activities with flow of VA Campus traffic, comply with the following:
  1. The Contractor shall not block any road or street, walkway or building egress without requesting approval from the Contracting Officer's Representative. Submit written request five workdays prior to proposed blockage. 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. Wherever excavation for new work crosses existing roads, at least one lane must be open to traffic at all times.
  2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the Contracting Officer's Representative.
- N. Coordinate this contract with other construction operations as directed by Contracting Officer's Representative. This includes the scheduling of traffic and the use of roadways.

#### **1.7 ALTERATIONS**

- A. NOT USED

#### **1.8 INFECTION PREVENTION MEASURES**

- A. Refer to 01 35 26 Safety Requirements Section 1.12 & 1.13
- B. Implement the requirements of VA's Infection Control Risk Assessment (ICRA) team. ICRA Group may monitor dust in the vicinity of the

construction work and require the Contractor to take corrective action immediately if safe levels are exceeded.

- B. Establish and maintain a dust control program as part of the Contractor's infection preventive measures. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to Contracting Officer's Representative and Facility ICRA team for review for compliance with contract requirements.

#### **1.9 DISPOSAL AND RETENTION**

- A. Materials and equipment accruing from work removed 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 noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed from present locations in such a manner as to prevent damage. Store such items where directed by Contracting Officer's Representative.
2. Items not reserved shall become property of the Contractor and be removed by Contractor and legally disposed of.
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.
4. Contractor shall provide a monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling per SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT.

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

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

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

- 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 Contracting Officer's Representative may have the necessary work performed and charge the cost to the Contractor.

#### **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 Contracting Officer's Representative. Existing work to be altered or extended and that which is found to be defective in any way, shall be reported to the Contracting Officer's Representative before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.
- 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, computer network, etc.) which are indicated on drawings or

reasonably discovered during execution of the work and which are not scheduled for discontinuance or abandonment.

- D. Expense of repairs to such utilities and systems not shown on drawings for which locations are unknown and not reasonably discovered will be considered for 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**

- A. Data and information (test borings, hydrographic data, test pits, weather conditions, etc.) furnished or referred to is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor. (FAR 52.236-4)

#### **1.13 LAYOUT OF WORK**

- A. The Contractor shall lay out the work and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at Contractor's own expense, all templates, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines that may be established or indicated by the Contracting Officer's Representative. The Contractor shall also be responsible for maintaining and preserving all marks established by the Contracting Officer's Representative until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Contracting Officer's Representative may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor. (FAR 52.236-17)

#### **1.14 AS-BUILT DRAWINGS**

- A. NOT USED

#### **1.15 USE OF ROADWAYS**

- A. For hauling, use only established public roads and roads on the VA Campus and, when authorized by the Contracting Officer's Representative, 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 transitions.

#### **1.16 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT**

- A. Use of new installed mechanical and electrical equipment to provide heat, ventilation, plumbing, light and power will be permitted subject to compliance with the following provisions:
1. Permission to use each unit or system must be given by Contracting Officer's Representative. If the equipment is not installed and maintained in accordance with the following provisions, the Contracting Officer's Representative will withdraw permission for use of the equipment.
  2. Electrical installations used by the equipment shall be completed in accordance with the drawings and specifications to prevent damage to the equipment and the electrical systems, i.e. transformers, relays, circuit breakers, fuses, conductors, motor controllers and their overload elements shall be properly sized, coordinated and adjusted. Voltage supplied to each item of equipment shall be verified to be correct and it shall be determined that motors are not overloaded. The electrical equipment shall be thoroughly cleaned before use and again immediately before final inspection including vacuum cleaning and wiping clean interior and exterior surfaces.
  3. Units shall be properly lubricated, balanced, and aligned. Vibrations must be eliminated.
  4. Automatic temperature control systems for preheat coils shall function properly and all safety controls shall function to prevent coil freeze-up damage.
  5. The air filtering system utilized shall be that which is designed for the system when complete, and all filter elements shall be replaced at completion of construction and prior to testing and balancing of system.
  6. All components of heat production and distribution system, metering equipment, condensate returns, and other auxiliary facilities used in temporary service shall be cleaned prior to use; maintained to prevent corrosion internally and externally during use; and cleaned, maintained and inspected prior to acceptance by the Government. Boilers, pumps, feedwater heaters and auxiliary equipment must be operated as a complete system and be fully maintained by operating personnel. Boiler water must be given complete and continuous chemical treatment.

B. Prior to final inspection, the equipment or parts used which show wear and tear beyond normal, shall be replaced with identical replacements, at no additional cost to the Government.

C. This paragraph shall not reduce the requirements of the mechanical and electrical specifications sections.

**1.17 EXCLUSIVE TEMPORARY USE OF EXISTING ELEVATORS**

A. NOT USED

**1.18 TEMPORARY TOILETS**

A. Provide where directed, (for use of all Contractor and subcontractor employees) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by Contracting Officer's Representative, provide suitable dry closets where directed. Keep such places clean and free from odor or flying insects, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

**1.19 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. If applicable, the amount to be paid by the Contractor for chargeable electrical services shall be the prevailing rates charged to the Government. 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 Contracting Officer's Representative, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of electricity used for the purpose of determining charges. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated equipment.
- C. Contractor shall install meters at Contractor's expense and furnish the Contracting Officer's Representative a monthly record of the Contractor's usage of electricity as required.
- D. Heat: Furnish temporary heat necessary to prevent injury to work and materials through dampness and cold. Use of open salamanders or any temporary heating devices which may be fire hazards or may smoke and damage finished work, will not be permitted. Maintain minimum temperatures as specified for various materials:



E. Electricity (for Construction and Testing): Furnish all temporary electric services.

1. Obtain electricity by connecting to the VA Campus electrical distribution system. The Contractor shall meter and pay for electricity required for electric cranes and hoisting devices, electrical welding devices and any electrical heating devices providing temporary heat. Electricity for all other uses is available at no cost to the Contractor.

F. Water (for Construction and Testing): Furnish temporary water service.

1. Obtain water by connecting to the VA Campus 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 Contracting Officer's Representative's discretion) of use of water from VA Campus system at no cost.

G. Fuel: Natural and LP gas and burner fuel oil required for boiler cleaning, normal initial boiler-burner setup and adjusting, and for performing the specified boiler tests will be furnished by the Government. Fuel required for prolonged boiler burner setup, adjustments, or modifications due to improper design or operation of boiler, burner, or control devices shall be furnished or reimbursed by the Contractor at Contractor's expense.

#### **1.20 NEW TELEPHONE EQUIPMENT**

A. NOT USED

- A. All testing required to complete this contract shall be paid for by the contractor.

#### **1.21 TESTS**

- A All testing required to complete this contract shall be paid for by the contractor.

B. Conduct final tests required in various sections of specifications in presence of the Contracting Officer's Representative. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests. Submit all test results in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

## **1.22 INSTRUCTIONS**

- A. NOT USED

## **1.23 GOVERNMENT-FURNISHED PROPERTY**

- A. Soil required to backfill the building 205 excavation is stored on the Menlo Park Campus. The contractor shall provide all equipment and convances to move the soil to the work site. The location of the soil shall be provided by the Contracting Officers Representative.

## **1.24 RELOCATED EQUIPMENT 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 Contracting Officer's Representative.
- C. 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.

## **1.25 CONSTRUCTION SIGN**

- A. Not Used.

## **1.26 SAFETY SIGN**

- A. Provide a Safety Sign where directed by Contracting Officer's Representative. Face of sign shall be 3/4 inch thick exterior grade plywood. Provide two four by four inch posts extending full height of sign and three feet into ground. Set bottom of sign level at four feet above ground.
- B. Paint all surfaces of Safety Sign and posts with one prime coat and two coats of white gloss paint. Letters and design shall be painted with gloss paint of colors noted and approved by Contracting Officer's Representative.
- C. Maintain sign and remove it when directed by Contracting Officer's Representative.
- D. Detailed drawing of a safety sign showing required legend and other characteristics of sign will be available from the Contracting Officer's Representative.
- E. Post the number of accident free days on a daily basis.

**1.27 PHOTOGRAPHIC DOCUMENTATION - NOT USED**

**1.28 FINAL ELEVATION DIGITAL IMAGES - NOT USED**

**1.29 HISTORIC PRESERVATION**

- A. 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 Contracting Officer's Representative verbally, and then with a written follow up.

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**SECTION 01 32 16.15**  
**Project SCHEDULE**

## **PART 1- GENERAL**

### **1.1 DESCRIPTION**

- A. THE CONTRACTOR SHALL DEVELOP A PLAN AND SCHEDULE DEMONSTRATING FULFILLMENT OF THE CONTRACT REQUIREMENTS (APPROVED PROJECT SCHEDULE). THE CONTRACTOR SHALL KEEP TO THE APPROVED PROJECT SCHEDULE AND SHALL UTILIZE IT FOR SCHEDULING, COORDINATING AND MONITORING WORK UNDER THIS CONTRACT (INCLUDING ALL ACTIVITIES OF SUBCONTRACTORS, EQUIPMENT VENDORS AND SUPPLIERS).

### **1.2 CONTRACTOR'S REPRESENTATIVE**

- A. The Contractor shall designate an authorized representative responsible for the Project Schedule including preparation, review and progress reporting with and to the Contracting Officer's Representative.
- B. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the requirements of this contract.

### **1.3 SCHEDULES AND UPDATES**

- A. The contractor shall provide monthly, to the Contracting Officer's Representative a report of differences between the Official Project Schedule and the project's actual progress..
- B. The contractor shall be responsible for the correctness and timeliness of any updates related to the Approved Project Schedule and payment requests.

### **1.4 PROJECT SCHEDULE SUBMITTAL**

- A. The Project Schedule shall be submitted for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted Project Schedule. The submittal shall include project duration, phase completion dates, activities/events duration and activities/event allocated/loaded cost. Each activity/event on the schedule shall contain a name/number ID, description, duration, allocated cost, early start date, early finish date, late start date, late finish date and total float. The Project Schedule shall reflect the entire contract duration as defined in the contract. The Contractor shall provide written requests for time extensions as a result of contract changes/delays.
- C. The Project Schedule shall constitute the approved Official Project Schedule until subsequently revised.

D. The Project Schedule shall include all major work.

#### **1.5 WORK ACTIVITY/EVENT COST DATA**

- A. The Contractor shall cost load all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events shall equal the total 90% contract price. The remaining 10% will be held until all requirements of the contract have been completed. The Contractor shall prorate overhead, profit and general conditions on all work activities/events for the entire project length.
- D. The Contractor shall cost load activities/events for all work. Periodic payments shall be approved only for work activities that have been 100% completed and for equipment and material that has been delivered to the work site.

#### **1.6 PROJECT SCHEDULE REQUIREMENTS**

- A. Show on the Project Schedule the sequence of work activities/events required for complete performance of all items of work. The Contractor Shall:
1. Show activities/events such as:
    - a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
    - b. Contracting Officer's Representative's and Architect/Engineer's review and approval of shop drawings, equipment schedules, samples, templates, or similar items.
    - c. Interruption of VA Facilities utilities, delivery of Government furnished equipment, and rough-in drawings, project phasing and any other specification requirements.
    - d. Test, balance and adjustment of various systems and pieces of equipment, delivery of maintenance and operation manuals, instructions and maintenance tasks.
    - e. VA inspection and acceptance with a minimum duration of five work days at the end of each phase and immediately preceding any VA move required by the contract phasing for that phase.
  3. Break up the work into activities/events with a duration no longer than one reporting period, except as to non-construction activities/events and any activities/events for which the Contracting Officer's Representative may approve the showing of a longer duration. The duration for VA approval of any required

submittal, shop drawing, or other submittals will not be less than 14 work days.

4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion.

C. To the extent that the Project Schedule or any revised Project Schedule shows anything not jointly agreed upon, it shall not be deemed to have been approved by the Contracting Officer's Representative. Failure to include any element of work required for the performance of this contract shall not excuse the Contractor from completing all work required within any applicable completion date of each phase regardless of the Contracting Officer's Representative's approval of the Project Schedule.

#### **1.7 PAYMENT TO THE CONTRACTOR:**

- A. The Contractor shall be entitled to a monthly progress payment upon approval of costs as determined from the currently approved updated Project Schedule. Monthly payment requests/invoices shall include: a listing of all agreed upon project schedule changes and associated data and an updated Project Schedule. Waste Management reports must be submitted with the payment request or the request will not be processed.
- B. Approval of the Contractor's invoice shall be contingent on, among other factors, the submittal of a satisfactory monthly update of the Project Schedule.

#### **1.8 PAYMENT AND PROGRESS REPORTING**

- A. Monthly schedule update meetings will be held on dates mutually agreed to by the Contracting Officer's Representative and the Contractor. Contractor shall attend all monthly schedule update meetings. The Contractor shall accurately update the Project Schedule and all other data required and provide this information to the Contracting Officer's Representative three work days in advance of the scheduled update meeting.

#### **1.9 RESPONSIBILITY FOR COMPLETION**

- A. If it becomes apparent to the COR from Daliy Reports and Government observation that contract completion dates will not be met, the Contractor upon notification from the Contracting Officer shall execute some or all of the following remedial actions:
  - 1. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog of work.

2. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
3. Reschedule the work in conformance with the specification requirements.

#### **1.10 ADJUSTMENT OF CONTRACT COMPLETION**

- A. The contract completion time will be adjusted only for causes specified in this contract. Request for an extension of the contract completion date by the Contractor shall be supported with a justification, data and supporting evidence necessary for determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract. Submission of proof based on revised activity/event logic, durations (in work days) and costs is required for any approvals. The schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved in this request. The Contracting Officer's Representative's determination as to the total number of days of contract extension will be based upon the current Project Schedule for the time period in question and any other relevant information.
- B. Actual delays in activities/events which, according to the schedule, do not affect the extended and predicted contract completion date shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer's Representative will, within a reasonable time after receipt of a request with justification and supporting information, review the facts and advise the Contractor in writing of the Contracting Officer's Representative's decision.
- C. The Contractor shall submit each request for a change in the contract completion date to the Contracting Officer in accordance with the provisions specified under FAR 52.243-4 (Changes) and VAAR 852.236-88 (Changes - Supplemental). The Contractor shall include, as a part of each change request, a sketch showing all schedule logic revisions, duration changes, and cost changes for work in question and its relationship to other activities on the approved Project Schedule.

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- 1-1. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.
- 1-2. For the purposes of this contract, samples (including laboratory samples to be tested), test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.
- 1-3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:
  - A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
  - B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
  - C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.
- 1-4. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals (including any laboratory samples to be tested) will not serve as a basis for extending contract time for completion.
- 1-5. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by Resident Engineer on behalf of the Contracting Officer.
- 1-6. Upon receipt of submittals, the Contracting Officers Representative will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.



- 1-7. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.
- 1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect-Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.
- 1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.
  - A. Submit other samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.
  - B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via E Mail, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
    1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
    2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.

3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
- C. In addition to complying with the applicable requirements specified in preceding Article 1.9, samples which are required to have Laboratory Tests (those preceded by symbol "LT" under the separate sections of the specification shall be tested, at the expense of Contractor, in a commercial laboratory approved by Contracting Officer.
1. Laboratory shall furnish Contracting Officer with a certificate stating that it is fully equipped and qualified to perform intended work, is fully acquainted with specification requirements and intended use of materials and is an independent establishment in no way connected with organization of Contractor or with manufacturer or supplier of materials to be tested.
  2. Certificates shall also set forth a list of comparable projects upon which laboratory has performed similar functions during past five years.
  3. Samples and laboratory tests shall be sent directly to approved commercial testing laboratory.
  4. Contractor shall send a copy of transmittal letter to both Resident Engineer and to Architect-Engineer simultaneously with submission of material to a commercial testing laboratory.
  5. Laboratory test reports shall be sent directly to Resident Engineer for appropriate action.
  6. Laboratory reports shall list contract specification test requirements and a comparative list of the laboratory test results. When tests show that the material meets specification requirements, the laboratory shall so certify on test report.
  7. Laboratory test reports shall also include a recommendation for approval or disapproval of tested item.
- D. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
- E. Approved samples will be kept on file by the Resident Engineer at the site until completion of contract, at which time such samples will be

delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.

- F. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
1. For each drawing required, submit one legible photographic paper or vellum reproducible.
  2. Reproducible shall be full size.
  3. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
  4. A space 120 mm by 125 mm (4-3/4 by 5 inches) shall be reserved on each drawing to accommodate approval or disapproval stamp.
  5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
  6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
  7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.
- 1-10. Samples (except laboratory samples), shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to the Contracting Officers Representative via E Mail.

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**SECTION 01 35 26**  
**SAFETY REQUIREMENTS**

## 1.01 APPLICABLE PUBLICATIONS

- A. Latest publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.
- B. American Society of Safety Engineers (ASSE):
  - A10.1-2011.....Pre-Project & Pre-Task Safety and Health Planning
  - A10.34-2012.....Protection of the Public on or Adjacent to Construction Sites
  - A10.38-2013.....Basic Elements of an Employer's Program to Provide a Safe and Healthful Work Environment American National Standard Construction and Demolition Operations
- C. American Society for Testing and Materials (ASTM):
  - E84-2014.....Surface Burning Characteristics of Building Materials
- D. The Facilities Guidelines Institute (FGI):
  - FGI Guidelines-2010Guidelines for Design and Construction of Healthcare Facilities
- E. National Fire Protection Association (NFPA):
  - 10-2013.....Standard for Portable Fire Extinguishers
  - 30-2012.....Flammable and Combustible Liquids Code
  - 51B-2014.....Standard for Fire Prevention During Welding, Cutting and Other Hot Work
  - 70-2014.....National Electrical Code
  - 70B-2013.....Recommended Practice for Electrical Equipment Maintenance
  - 70E-2012.....Standard for Electrical Safety in the Workplace
  - 99-2012.....Health Care Facilities Code
  - 241-2013.....Standard for Safeguarding Construction, Alteration, and Demolition Operations
- F. The Joint Commission (TJC)
  - TJC Manual ....Comprehensive Accreditation and Certification Manual
- G. U.S. Nuclear Regulatory Commission
  - 10 CFR 20.....Standards for Protection Against Radiation
- H. U.S. Occupational Safety and Health Administration (OSHA):
  - 29 CFR 1904 ...Reporting and Recording Injuries & Illnesses
  - 29 CFR 1910 ...Safety and Health Regulations for General Industry
  - 29 CFR 1926 ...Safety and Health Regulations for Construction Industry
  - CPL 2-0.124....Multi-Employer Citation Policy
- I. VHA Directive 2005-007

## 1.02 DEFINITIONS

- A. OSHA "Competent Person" (CP). One who is capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them (see 29 CFR 1926.32(f)).
- B. "Qualified Person" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

- C. High Visibility Accident. Any mishap which may generate publicity or high visibility.
- D. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even though provided by a physician or registered personnel.
- E. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:
  - 1. Death, regardless of the time between the injury and death, or the length of the illness;
  - 2. Days away from work (any time lost after day of injury/illness onset);
  - 3. Restricted work;
  - 4. Transfer to another job;
  - 5. Medical treatment beyond first aid;
  - 6. Loss of consciousness; or
  - 7. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

#### **1.03 REGULATORY REQUIREMENTS**

- A. In addition to the detailed requirements included in the provisions of this contract, comply with 29 CFR 1926, comply with 29 CFR 1910 as incorporated by reference within 29 CFR 1926, comply with ASSE A10.34, and all applicable [federal, state, and local] laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern except with specific approval and acceptance by the Contracting Officer.

#### **1.04 ACCIDENT PREVENTION PLAN (APP)**

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

found in ASSE A10.33). Specifically articulating the safety requirements found within these VA contract safety specifications.

2. Address both the Prime Contractors and the subcontractors work operations.
3. State measures to be taken to control hazards associated with materials, services, or equipment provided by suppliers.
4. Address all the elements/sub-elements and in order as follows:
  - a. **SIGNATURE SHEET.** Title, signature, and phone number of the following:
    - i. Plan preparer (Qualified Person such as corporate safety staff person or contracted Certified Safety Professional with construction safety experience);
    - ii. Plan approver (company/corporate officers authorized to obligate the company);
    - iii. Plan concurrence (e.g., Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, project manager or superintendent, project safety professional). Provide concurrence of other applicable corporate and project personnel (Contractor).
  - b. **BACKGROUND INFORMATION.** List the following:
    - i. Contractor;
    - ii. Contract number;
    - iii. Project name;
    - iv. Brief project description, description of work to be performed, and location; phases of work anticipated (these will require an AHA).
  - c. **STATEMENT OF SAFETY AND HEALTH POLICY.** Provide a copy of current corporate/company Safety and Health Policy Statement, detailing commitment to providing a safe and healthful workplace for all employees. The Contractor's written safety program goals, objectives, and accident experience goals for this contract should be provided.
  - d. **RESPONSIBILITIES AND LINES OF AUTHORITIES.** Provide the following:
    - i. A statement of the employer's ultimate responsibility for the implementation of his SOH program;
    - ii. Identification and accountability of personnel responsible for safety at both corporate and project level. Contracts specifically requiring safety or industrial hygiene personnel shall include a copy of their resumes.
    - iii. The names of Competent and/or Qualified Person(s) and proof of competency/qualification to meet specific OSHA Competent/Qualified Person(s) requirements must be attached;
    - iv. Requirements that no work shall be performed unless a designated competent person is present on the job site;
    - v. Requirements for pre-task Activity Hazard Analysis (AHAs);

- vi. Lines of authority;
- vii. Policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified;
- e. **SUBCONTRACTORS AND SUPPLIERS.** If applicable, provide procedures for coordinating SOH activities with other employers on the job site:
  - i. Identification of subcontractors and suppliers (if known);
  - ii. Safety responsibilities of subcontractors and suppliers.
- f. **TRAINING.**
  - i. Site-specific SOH orientation training at the time of initial hire or assignment to the project for every employee before working on the project site is required.
  - ii. Mandatory training and certifications that are applicable to this project (e.g., explosive actuated tools, crane operator, rigger, crane signal person, fall protection, electrical lockout/NFPA 70E, machine/equipment lockout, confined space, etc...) and any requirements for periodic retraining/recertification are required.
  - iii. Procedures for ongoing safety and health training for supervisors and employees shall be established to address changes in site hazards/conditions.
  - iv. OSHA 10-hour training is required for all workers on site and the OSHA 30-hour training is required for Trade Competent Persons (CPs)
- g. **SAFETY AND HEALTH INSPECTIONS.**
  - i. Specific assignment of responsibilities for a minimum daily job site safety and health inspection during periods of work activity: Who will conduct (e.g., "Site Safety and Health CP"), proof of inspector's training/qualifications, when inspections will be conducted, procedures for documentation, deficiency tracking system, and follow-up procedures.
  - ii. Any external inspections/certifications that may be required (e.g., contracted CSP or CSHT)
- h. **ACCIDENT INVESTIGATION & REPORTING.** The Contractor shall conduct mishap investigations of all OSHA Recordable Incidents. The APP shall include accident/incident investigation procedure & identify person(s) responsible to provide the following to the Contracting Officer Representative:
  - i. Exposure data (man-hours worked);
  - ii. Accident investigations, reports, and logs.
- i. **PLANS (PROGRAMS, PROCEDURES) REQUIRED.** Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational risks in site-specific compliance and accident prevention

plans. These Plans shall include but are not be limited to procedures for addressing the risks associates with the following:

- i. Emergency response ;
- ii. Contingency for severe weather;
- iii. Fire Prevention ;
- iv. Medical Support;
- v. Posting of emergency telephone numbers;
- vi. Prevention of alcohol and drug abuse;
- vii. Site sanitation (housekeeping, drinking water, toilets);
- viii. Night operations and lighting ;
- ix. Hazard communication program;
- x. Welding/Cutting "Hot" work ;
- xi. Electrical Safe Work Practices (Electrical LOTO/NFPA 70E);
- xii. General Electrical Safety
- xiii. Hazardous energy control (Machine LOTO);
- xiv. Site-Specific Fall Protection & Prevention;
- xv. Excavation/trenching;
- xvi. Asbestos abatement;
- xvii. Lead abatement;
- xviii. Crane Criticallift;
- xix. Respiratory protection;
- xx. Health hazard control program;
- xxi. Radiation Safety Program;
- xxii. Abrasive blasting;
- xxiii. Heat/Cold Stress Monitoring;
- xxiv. Crystalline Silica Monitoring (Assessment);
- xxv. Demolition plan (to include engineering survey);
- xxvi. Formwork and shoring erection and removal;
- xxvii. PreCast Concrete.

- C. Submit the APP to the Contracting Officer Representative for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.
- D. Once accepted by the Contracting Officer Representative, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.
- E. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Project Manager, project overall designated OSHA Competent Person, and Contracting Officer Representative. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34) and the environment.



**1.05 ACTIVITY HAZARD ANALYSES (AHAS)**

- A. NOT USED

**1.06 PRECONSTRUCTION CONFERENCE**

- A. Contractor representatives who have a responsibility or significant role in implementation of the accident prevention program, as required by 29 CFR 1926.20(b)(1), on the project shall attend the preconstruction conference to gain a mutual understanding of its implementation. This includes the project superintendent, subcontractor superintendents, and any other assigned safety and health professionals.
- B. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.
- C. Deficiencies in the submitted APP will be brought to the attention of the Contractor within 14 days of submittal, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

**1.07 "SITE SAFETY AND HEALTH OFFICER" (SSHO) AND "COMPETENT PERSON" (CP)**

- A. The Prime Contractor shall designate a minimum of one SSHO at each project site that will be identified as the SSHO to administer the Contractor's safety program and government-accepted Accident Prevention Plan. Each subcontractor shall designate a minimum of one CP in compliance with 29 CFR 1926.20 (b)(2) that will be identified as a CP to administer their individual safety programs.
- B. Further, all specialized Competent Persons for the work crews will be supplied by the respective contractor as required by 29 CFR 1926 (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).
- C. These Competent Persons can have collateral duties as the subcontractor's superintendent and/or work crew lead persons as well as fill more than one specialized CP role (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).
- D. The SSHO or an equally-qualified Designated Representative/alternate will maintain a presence on the site during construction operations in accordance with FAR Clause 52.236-6: *Superintendence by the Contractor*. CPs will maintain presence during their construction activities in accordance with

above mentioned clause. A listing of the designated SSHO and all known CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.

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

#### 1.08 TRAINING

- A. The designated Prime Contractor SSHO must meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State and local requirements are met for the project. As a minimum the SSHO must have completed the OSHA 30-hour Construction Safety class and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.
- B. All designated CPs shall have completed the OSHA 30-hour Construction Safety course within the past 5 years.
- C. In addition to the OSHA 30 Hour Construction Safety Course, all CPs with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition & control associated with those high hazard work operations. Documented "repeat" deficiencies in the execution of safety requirements will require retaking the requisite formal course.
- D. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment.
- E. Submit training records associated with the above training requirements to the Contracting Officer Representative for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance.
- F. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing shall include information on the site-specific hazards, construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC

equipment, emergency procedures, accident reporting etc... Documentation shall be provided to the Contracting Officer's Representative that individuals have undergone contractor's safety briefing.

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

#### **1.09 INSPECTIONS**

- A. The SSHO shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs shall conduct frequent and regular safety inspections (daily) of the their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO shall conduct a formal documented inspection of the entire construction areas with the subcontractors' "Trade Safety and Health CPs" present in their work areas. Coordinate with, and report findings and corrective actions weekly to Contracting Officer Representative.
- B. A Certified Safety Professional (CSP) with specialized knowledge in construction safety or a certified Construction Safety and Health Technician (CSHT) shall randomly conduct a monthly site safety inspection. The CSP or CSHT can be a corporate safety professional or independently contracted. The CSP or CSHT will provide their certificate number on the required report for verification as necessary.
1. Results of the inspection will be documented with tracking of the identified hazards to abatement.
  2. The Contracting Officer Representative will be notified immediately prior to start of the inspection and invited to accompany the inspection.
  3. Identified hazard and controls will be discussed to come to a mutual understanding to ensure abatement and prevent future reoccurrence.
  4. A report of the inspection findings with status of abatement will be provided to the Contracting Officer Representative within one week of the onsite inspection.
- C. The VA maintains on its staff a Certified Safety Professional. This individual speaks for the Contracting Officer (CO) and the Contracting Officers Representative (COR) on issues of safety on the project site.

#### **1.10 ACCIDENTS, OSHA 300 LOGS, AND MAN-HOURS**

- C. The VA maintains on its staff a Certified Safety Professional. This individual speaks for the Contracting Officer (CO) and the Contracting Officers Representative (COR) on issues of safety on the project site. Safety concerns cited by this individual is to be considered as coming from the CO and the COR.

- A. Notify the Contracting Officer Representative as soon as practical, but no more than four hours after any accident meeting the definition of OSHA Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than \$5,000, or any weight handling equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Contracting Officer Representative determine whether a government investigation will be conducted.
- B. Conduct an accident investigation for recordable injuries and illnesses, for Medical Treatment defined in paragraph DEFINITIONS, and property damage accidents resulting in at least \$20,000 in damages, to establish the root cause(s) of the accident. Complete the VA Form 2162, and provide the report to the Contracting Officer Representative within 5 calendar days of the accident. The Contracting Officer Representative will provide copies of any required or special forms.
- C. A summation of all man-hours worked by the contractor and associated sub-contractors for each month will be reported to the Contracting Officer Representative monthly.
- D. A summation of all OSHA recordable accidents experienced on site by the contractor and associated sub-contractors for each month will be provided to the Contracting Officer Representative monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the Contracting Officer Representative as requested.

#### **1.11 PERSONAL PROTECTIVE EQUIPMENT (PPE)**

- A. PPE is governed in all areas by the nature of the work the employee is performing. For example, specific PPE required for performing work on electrical equipment is identified in NFPA 70E, Standard for Electrical Safety in the Workplace.
- B. Mandatory PPE includes:
  - 1. Hard Hats - unless written authorization is given by the Contracting Officer Representative in circumstances of work operations that have limited potential for falling object hazards such as during finishing work or minor remodeling. With authorization to relax the requirement of hard hats, if a worker becomes exposed to an overhead falling object hazard, then hard hats would be required in accordance with the OSHA regulations.
  - 2. Safety glasses - unless written authorization is given by the Contracting Officer Representative appropriate safety glasses meeting the ANSI Z.87.1 standard must be worn by each person on site.

3. Appropriate Safety Shoes - based on the hazards present, safety shoes meeting the requirements of ASTM F2413-11 shall be worn by each person on site unless written authorization is given by the Contracting Officer Representative.
4. Hearing protection - Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks.

#### 1.12 INFECTION CONTROL

- A. Infection Control is critical in all medical center facilities. Interior construction activities causing disturbance of existing dust, or creating new dust, must be conducted within ventilation-controlled areas that minimize the flow of airborne particles into patient areas.
- B. An AHA associated with infection control will be performed by VA personnel in accordance with FGI Guidelines (i.e. Infection Control Risk Assessment (ICRA)). The ICRA procedure found on the American Society for Healthcare Engineering (ASHE) website will be utilized. Risk classifications of Class II or lower will require approval by the Contracting Officer Representative before beginning any construction work. Risk classifications of Class III or higher will require a permit before beginning any construction work. Infection Control permits will be issued by the Contracting Officer's Representative. The Infection Control Permits will be posted outside the appropriate construction area. More than one permit may be issued for a construction project if the work is located in separate areas requiring separate classes. The primary project scope area for this project is: **Class II**, however, work outside the primary project scope area may vary. The required infection control precautions with each class are as follows:
  1. Class I requirements:
    - a. During Construction Work:
      - i. Notify the Contracting Officer Representative.
      - ii. Execute work by methods to minimize raising dust from construction operations.
      - iii. Ceiling tiles: Immediately replace a ceiling tiles displaced for visual inspection.
    - b. Upon Completion:
      - i. Clean work area upon completion of task
      - ii. Notify the Contracting Officer Representative.
  2. Class II requirements:
    - a. During Construction Work:
      - i. Notify the Contracting Officer Representative.
      - ii. Provide active means to prevent airborne dust from dispersing into atmosphere such as wet methods or tool mounted dust collectors where possible.
      - iii. Water mist work surfaces to control dust while cutting.
      - iv. Seal unused doors with duct tape.
      - v. Block off and seal air vents.

- vi. Remove or isolate HVAC system in areas where work is being performed.
  - b. Upon Completion:
    - i. Wipe work surfaces with cleaner/disinfectant.
    - ii. Contain construction waste before transport in tightly covered containers.
    - iii. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.
    - iv. Upon completion, restore HVAC system where work was performed
    - v. Notify the Contracting Officer Representative.
- 3. Class III requirements:
  - a. During Construction Work:
    - i. Obtain permit from the Contracting Officer Representative.
    - ii. Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system.
    - iii. Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.
    - iv. Maintain negative air pressure, 0.01 inches of water gauge, within work site utilizing HEPA equipped air filtration units and continuously monitored with a digital display, recording and alarm instrument, which must be calibrated on installation, maintained with periodic calibration and monitored by the contractor.
    - v. Contain construction waste before transport in tightly covered containers.
    - vi. Cover transport receptacles or carts. Tape covering unless solid lid.
  - b. Upon Completion:
    - i. Do not remove barriers from work area until completed project is inspected by the Contracting Officer Representative and thoroughly cleaned by the VA Environmental Services Department.
    - ii. Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.
    - iii. Vacuum work area with HEPA filtered vacuums.
    - iv. Wet mop area with cleaner/disinfectant.
    - v. Upon completion, restore HVAC system where work was performed.
    - vi. Return permit to the Contracting Officer Representative.
- 4. Class IV requirements:
  - a. During Construction Work:

- i. Obtain permit from Contracting Officer Representative // or Government Designated Authority.
    - ii. Isolate HVAC system in area where work is being done to prevent contamination of duct system.
    - iii. Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non-work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. Install construction barriers and ceiling protection carefully, outside of normal work hours.
    - iv. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.
    - v. Seal holes, pipes, conduits, and punctures.
    - vi. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave work site.
    - vii. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.
  - b. Upon Completion:
    - i. Do not remove barriers from work area until completed project is inspected by the Contracting Officer Representative with thorough cleaning by the VA Environmental Services Dept.
    - ii. Remove construction barriers and ceiling protection carefully to minimize spreading of dirt and debris associated with construction, outside of normal work hours.
    - iii. Contain construction waste before transport in tightly covered containers.
    - iv. Cover transport receptacles or carts. Tape covering unless solid lid.
    - v. Vacuum work area with HEPA filtered vacuums.
    - vi. Wet mop area with cleaner/disinfectant.
    - vii. Upon completion, restore HVAC system where work was performed.
    - viii. Return permit to the Contracting Officer Representative.
- C. Barriers shall be erected as required based upon classification (Class III & IV requires barriers) and shall be constructed as follows:
- 1. Class III and IV - closed door with masking tape applied over the frame and door is acceptable for projects that can be contained in a single room.
  - 2. Construction, demolition or reconstruction not capable of containment within a single room must have the following barriers erected and made presentable on hospital occupied side:

- a. Class III & IV (where dust control is the only hazard, and an agreement is reached with Contracting Officer Representative and Medical Center) - Airtight plastic barrier that extends from the floor to ceiling. Seams must be sealed with duct tape to prevent dust and debris from escaping
  - b. Class III & IV - Drywall barrier erected with joints covered or sealed to prevent dust and debris from escaping.
  - c. Class III & IV - Seal all penetrations in existing barrier airtight
  - d. Class III & IV - Barriers at penetration of ceiling envelopes, chases and ceiling spaces to stop movement air and debris
  - e. Class IV only - Anteroom or double entrance openings that allow workers to remove protective clothing or vacuum off existing clothing
  - f. Class III & IV - At elevators shafts or stairways within the field of construction, overlapping flap minimum of two feet wide of polyethylene enclosures for personnel access.
- D. Products and Materials:
1. Sheet Plastic: Fire retardant polystyrene, 6-mil thickness meeting local fire codes
  2. Barrier Doors: Self Closing One-hour fire-rated solid core wood in steel frame, painted
  3. Dust proof one-hour fire-rated.
  4. High Efficiency Particulate Air-Equipped filtration machine rated at 95% capture of 0.3 microns including pollen, mold spores and dust particles. HEPA filters should have ASHRAE 85 or other prefilter to extend the useful life of the HEPA. Provide both primary and secondary filtrations units. Maintenance of equipment and replacement of the HEPA filters and other filters will be in accordance with manufacturer's instructions.
  5. Exhaust Hoses: Heavy duty, flexible steel reinforced; Ventilation Blower Hose
  6. Adhesive Walk-off Mats: Provide minimum size mats of 24 inches x 36 inches
  7. Disinfectant: Hospital-approved disinfectant or equivalent product
  8. Portable Ceiling Access Module
- E. Before any construction on site begins, all contractor personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.
- F. A dust control program will be establish and maintained as part of the contractor's infection preventive measures in accordance with the FGI Guidelines for Design and Construction of Healthcare Facilities. Prior to start of work, prepare a plan detailing project-specific dust protection measures with associated product data, including periodic status reports. The Dust Control Program shall be submitted for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS,



**PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted Dust Control Program.**

- G. Medical center Infection Control personnel will monitor for airborne disease (e.g. aspergillosis) during construction. A baseline of conditions will be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality with safe thresholds established.
- H. In general, the following preventive measures shall be adopted during construction to keep down dust and prevent mold.
  - 1. Contractor shall verify that construction exhaust to exterior is not reintroduced to the medical center through intake vents, or building openings. HEPA filtration is required where the exhaust dust may reenter the medical center.
  - 2. Exhaust hoses shall be exhausted so that dust is not reintroduced to the medical center.
  - 3. Adhesive Walk-off/Carpet Walk-off Mats shall be used at all interior transitions from the construction area to occupied medical center area. These mats shall be changed as often as required to maintain clean work areas directly outside construction area at all times.
  - 4. Vacuum and wet mop all transition areas from construction to the occupied medical center at the end of each workday. Vacuum shall utilize HEPA filtration. Maintain surrounding area frequently. Remove debris as it is created. Transport these outside the construction area in containers with tightly fitting lids.
  - 5. The contractor shall not haul debris through patient-care areas without prior approval of the Contracting Officer Representative and the Medical Center. When, approved, debris shall be hauled in enclosed dust proof containers or wrapped in plastic and sealed with duct tape. No sharp objects should be allowed to cut through the plastic. Wipe down the exterior of the containers with a damp rag to remove dust. All equipment, tools, material, etc. transported through occupied areas shall be made free from dust and moisture by vacuuming and wipe down.
  - 6. There shall be no standing water during construction. This includes water in equipment drip pans and open containers within the construction areas. All accidental spills must be cleaned up and dried within 12 hours. Remove and dispose of porous materials that remain damp for more than 72 hours.
  - 7. At completion, remove construction barriers and ceiling protection carefully, outside of normal work hours. Vacuum and clean all surfaces free of dust after the removal.
- I. Final Cleanup:
  - 1. Upon completion of project, or as work progresses, remove all construction debris from above ceiling, vertical shafts and utility chases that have been part of the construction.
  - 2. Perform HEPA vacuum cleaning of all surfaces in the construction area. This includes walls, ceilings, cabinets,

- furniture (built-in or free standing), partitions, flooring, etc.
3. All new air ducts shall be cleaned prior to final inspection.

### 1.13 FIRE SAFETY

- A. Fire Safety Plan: Establish and maintain a site-specific fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Contracting Officer Representative for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted Fire Safety Plan. This plan may be an element of the Accident Prevention Plan.
- B. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
- C. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- D. Temporary Construction Partitions:
1. Install and maintain temporary construction partitions to provide smoke-tight separations between construction areas and adjoining areas. Construct partitions of gypsum board or treated plywood (flame spread rating of 25 or less in accordance with ASTM E84) on both sides of fire retardant treated wood or metal steel studs. Extend the partitions through suspended ceilings to floor slab deck or roof. Seal joints and penetrations. At door openings, install Class C,  $\frac{3}{4}$  hour fire/smoke rated doors with self-closing devices.
  2. Install one-hour fire-rated temporary construction partitions as shown on drawings to maintain integrity of existing exit stair enclosures, exit passageways, fire-rated enclosures of hazardous areas, horizontal exits, smoke barriers, vertical shafts and openings enclosures.
  3. Close openings in smoke barriers and fire-rated construction to maintain fire ratings. Seal penetrations with listed through-penetration firestop materials in accordance with Section 07 84 00, FIRESTOPPING.
- E. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
- F. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with Contracting Officer Representative.

- G. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Contracting Officer Representative.
- H. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
- I. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
- J. Sprinklers: Install, test and activate new automatic sprinklers prior to removing existing sprinklers.
- K. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with Contracting Officer Representative. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the Resident Engineer.
- L. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Contracting Officer Representative.
- M. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Contracting Officer Representative to obtain permits from Facility Safety Officer at least twenty four (24) hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.
- N. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Contracting Officer Representative.
- O. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.
- P. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.

#### **1.14 ELECTRICAL**

- A. All electrical work shall comply with NFPA 70 (NEC), NFPA 70B, NFPA 70E, 29 CFR Part 1910 Subpart J - General Environmental Controls, 29 CFR Part 1910 Subpart S - Electrical, and 29 CFR 1926 Subpart K in addition to other references required by contract.

- B. All qualified persons performing electrical work under this contract shall be licensed journeyman or master electricians. All apprentice electricians performing under this contract shall be deemed unqualified persons unless they are working under the immediate supervision of a licensed electrician or master electrician.
- C. All electrical work will be accomplished de-energized and in the Electrically Safe Work Condition (refer to NFPA 70E for Work Involving Electrical Hazards, including Exemptions to Work Permit). Any Contractor, subcontractor or temporary worker who fails to fully comply with this requirement is subject to immediate termination in accordance with FAR clause 52.236-5(c). Only in rare circumstance where achieving an electrically safe work condition prior to beginning work would increase or cause additional hazards, or is infeasible due to equipment design or operational limitations is energized work permitted. The Contracting Officer Representative with approval of the Medical Center Director will make the determination if the circumstances would meet the exception outlined above. An AHA specific to energized work activities will be developed, reviewed, and accepted prior to the start of that work.
  - 1. Development of a Hazardous Electrical Energy Control Procedure is required prior to de-energization. A single Simple Lockout/Tagout Procedure for multiple work operations can only be used for work involving qualified person(s) de-energizing one set of conductors or circuit part source. Task specific Complex Lockout/Tagout Procedures are required at all other times.
  - 2. Verification of the absence of voltage after de-energization and lockout/tagout is considered "energized electrical work" (live work) under NFPA 70E, and shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rated personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical testing instruments or equipment appropriate for the environment in which they will be used.
  - 3. Personal Protective Equipment (PPE) and electrical testing instruments will be readily available for inspection by the Contracting Officer Representative.
- D. Before beginning any electrical work, an Activity Hazard Analysis (AHA) will be conducted to include Shock Hazard and Arc Flash Hazard analyses (NFPA Tables can be used only as a last alternative and it is strongly suggested a full Arc Flash Hazard Analyses be conducted). Work shall not begin until the AHA for the work activity has been accepted by the Contracting Officer Representative and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
- E. Ground-fault circuit interrupters. All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites shall have approved ground-fault circuit interrupters for personnel protection. "Assured Equipment Grounding Conductor Program" only is not allowed.

#### **1.15 FALL PROTECTION**

- A. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) for ALL WORK, unless specified differently or the OSHA 29 CFR 1926 requirements are more stringent, to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work.
  - 1. The use of a Safety Monitoring System (SMS) as a fall protection method is prohibited.
  - 2. The use of Controlled Access Zone (CAZ) as a fall protection method is prohibited.
  - 3. Fall protection while using a ladder will be governed by the OSHA requirements.

#### **1.16 SCAFFOLDS AND OTHER WORK PLATFORMS**

- A. All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926 Subpart L.
- B. The fall protection (FP) threshold height requirement is 6 ft (1.8 m) as stated in Section 1.16.
- C. The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.
  - 1. Scaffolds, platforms, or temporary floors shall be provided for all work except that can be performed safely from the ground or similar footing.
  - 2. Ladders less than 20 feet may be used as work platforms only when use of small hand tools or handling of light material is involved.
  - 3. Ladder jacks, lean-to, and prop-scaffolds are prohibited.
  - 4. Emergency descent devices shall not be used as working platforms.
- D. Contractors shall use a scaffold tagging system in which all scaffolds are tagged by the Competent Person. Tags shall be color-coded: green indicates the scaffold has been inspected and is safe to use; red indicates the scaffold is unsafe to use. Tags shall be readily visible, made of materials that will withstand the environment in which they are used, be legible and shall include:
  - 1. The Competent Person's name and signature;
  - 2. Dates of initial and last inspections.

#### **1.17 CRANES**

- A. All crane work shall comply with 29 CFR 1926 Subpart CC.
- B. Prior to operating a crane, the operator must be licensed, qualified or certified to operate the crane. Thus, all the provisions contained with Subpart CC are effective and there is no "Phase In" date of November 10, 2014.
- C. A detailed lift permit shall be submitted 14 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing. The lift will not be allowed without approval of this document.

- D. Crane operators shall not carry loads
  - 1. over the general public or VAMC personnel
  - 2. over any occupied building unless
    - a. the top two floors are vacated
    - b. or overhead protection with a design live load of 300 psf is provided

#### **1.18 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)**

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

#### **1.19 WELDING AND CUTTING**

As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with Contracting Officer Representative and Facility Safety Manager. Obtain permits from Contracting Officer Representative and Facility Safety Manager at least twenty four (24) hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.

#### **1.20 LADDERS**

- A. All Ladder use shall comply with 29 CFR 1926 Subpart X.
- B. All portable ladders shall be of sufficient length and shall be placed so that workers will not stretch or assume a hazardous position.
- C. Manufacturer safety labels shall be in place on ladders
- D. Step Ladders shall not be used in the closed position
- E. Top steps or cap of step ladders shall not be used as a step
- F. Portable ladders, used as temporary access, shall extend at least 3 ft (0.9 m) above the upper landing surface.
  - 1. When a 3 ft (0.9-m) extension is not possible, a grasping device (such as a grab rail) shall be provided to assist workers in mounting and dismounting the ladder.
  - 2. In no case shall the length of the ladder be such that ladder deflection under a load would, by itself, cause the ladder to slip from its support.
- G. Ladders shall be inspected for visible defects on a daily basis and after any occurrence that could affect their safe use. Broken or damaged ladders shall be immediately tagged "DO NOT USE," or with similar wording, and withdrawn from service until restored to a condition meeting their original design.

**1.21 FLOOR & WALL OPENINGS**

- A. All floor and wall openings shall comply with 29 CFR 1926 Subpart M.
- B. Floor holes/openings are any that measure over 2 in (51 mm) in any direction of a walking/working surface which persons may trip or fall into or where objects may fall to the level below. See 21.F for covering and labeling requirements.
- C. All floor openings or hole into which a person can accidentally walk or fall through shall be guarded either by a railing system with toeboards along all exposed sides or a load-bearing cover. When the cover is not in place, the opening or hole shall be protected by a removable guardrail system or shall be attended when the guarding system has been removed, or other fall protection system.
  - 1. Covers shall be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.
  - 2. Covers shall be secured when installed, clearly marked with the word "HOLE", "COVER" or "Danger, Roof Opening-Do Not Remove" or color-coded or equivalent methods (e.g., red or orange "X"). Workers must be made aware of the meaning for color coding and equivalent methods.

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**SECTION 01 57 19  
TEMPORARY ENVIRONMENTAL CONTROLS**

**EP-1. DESCRIPTION**

- A. This section specifies the control of environmental pollution and damage that the Contractor must consider for

air, water, and land resources. It includes management of visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants and resources encountered or generated by the Contractor. The Contractor is obligated to consider specified control measures with the costs included within the various contract items of work.

B. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:

1. Adversely effect human health or welfare,
2. Unfavorably alter ecological balances of importance to human life,
3. Effect other species of importance to humankind, or;
4. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.

C. Definitions of Pollutants:

1. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals, and inorganic wastes.
2. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
3. Sediment: Soil and other debris that has been eroded and transported by runoff water.
4. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
5. Surface Discharge: The term "Surface Discharge" implies that the water is discharged with possible sheeting



action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "water of the United States" and would require a permit to discharge water from the governing agency.

6. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.

7. Sanitary Wastes:

a. Sewage: Domestic sanitary sewage and human and animal waste.

b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

**EP-2. QUALITY CONTROL**

- A. Establish and maintain quality control for the environmental protection of all items set forth herein.
- B. Record on daily reports any problems in complying with laws, regulations, and ordinances. Note any corrective action taken.

**EP-3. REFERENCES**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
- B. U.S. National Archives and Records Administration (NARA):  
33 CFR 328.....Definitions

**EP-4. SUBMITTALS**

- A. In accordance with Section, 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, furnish the following:
  - 1. Environmental Protection Plan: After the contract is awarded and prior to the commencement of the work, the Contractor shall meet with the Contracting Officer's Representative to discuss the proposed Environmental

Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than 20 days after the meeting, the Contractor shall prepare and submit to the Contracting Officer's Representative and the Contracting Officer for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:

- a. Name(s) of person(s) within the Contractor's organization who is (are) responsible for ensuring adherence to the Environmental Protection Plan.
- b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site.
- c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
- d. Description of the Contractor's environmental protection personnel training program.
- e. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, noise control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
- f. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.
- g. Procedures to provide the environmental protection that comply with the applicable laws and regulations. Describe the procedures to correct pollution of the

environment due to accident, natural causes, or failure to follow the procedures as described in the Environmental Protection Plan.

- h. Permits, licenses, and the location of the solid waste disposal area.
  - i. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials. Include as part of an Erosion Control Plan approved by the District Office of the U.S. Soil Conservation Service and the Department of Veterans Affairs.
  - j. Environmental Monitoring Plans for the job site including land, water, air, and noise.
  - k. Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.
- B. Approval of the Contractor's Environmental Protection Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.

**EP-5. PROTECTION OF ENVIRONMENTAL RESOURCES**

- A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this contract. Confine activities to areas defined by the specifications and drawings.
- B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land

resources including trees, shrubs, vines, grasses, topsoil, and land forms without permission from the Contracting Officer's Representative. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

1. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.
2. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.
  - a. Box and protect from damage existing trees and shrubs to remain on the construction site.
  - b. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
  - c. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.
3. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
4. Temporary Protection of Disturbed Areas: Construct diversion ditches, benches, and berms to retard and

- divert runoff from the construction site to protected drainage areas approved under paragraph 208 of the Clean Water Act.
- a. Reuse or conserve the collected topsoil sediment as directed by the Contracting Officer's Representative. Topsoil use and requirements are specified in Section 31 20 00, EARTH MOVING.
  - b. Institute effluent quality monitoring programs as required by Federal, State, and local environmental agencies.
5. Erosion and Sedimentation Control Devices: The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's activities. Construct or install all temporary and permanent erosion and sedimentation control features. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
  6. Manage borrow areas on Government property to minimize erosion and to prevent sediment from entering nearby water courses or lakes.
  7. Manage and control spoil areas on Government property.
  8. Protect adjacent areas from despoilment by temporary excavations and embankments.
  9. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.

10. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.

11. Handle discarded materials other than those included in the solid waste category as directed by the Contracting Officer's Representative.

C. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this contract.

1. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.

2. Control movement of materials and equipment at stream crossings during construction to prevent violation of water pollution control standards of the Federal, State, or local government.

D. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State of California's Air Pollution Statute, Rule, or Regulation and Federal emission and performance laws and standards. Maintain ambient air quality standards set by the Environmental Protection Agency, for those construction operations and activities specified.

1. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.
  2. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinklering, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.
  3. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.
  4. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- E. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Contracting Officer's Representative. Maintain noise-produced work at or below the decibel levels and within the time periods specified.
1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 6:00 p.m. unless otherwise permitted by local ordinance or the Contracting Officer's Representative. Repetitive impact noise on the property shall not exceed the following dB limitations:

Time Duration of Impact Noise	Sound Level in dB
More than 12 minutes in any hour	70
Less than 30 seconds of any hour	85
Less than three minutes of any hour	80
Less than 12 minutes of any hour	75

2. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this contract, consisting of, but not limited to, the following:

- a. Maintain maximum permissible construction equipment noise levels at 15 m (50 feet) (dBA):

EARTHMOVING		MATERIALS HANDLING	
FRONT LOADERS	75	CONCRETE MIXERS	75
BACKHOES	75	CONCRETE PUMPS	75
DOZERS	75	CRANES	75
TRACTORS	75	DERRICKS IMPACT	75
SCAPERS	80	PILE DRIVERS	95
GRADERS	75	JACK HAMMERS	75
TRUCKS	75	ROCK DRILLS	80
PAVERS, STATIONARY	80	PNEUMATIC TOOLS	80
PUMPS	75	BLASTING	//--//
GENERATORS	75	SAWS	75
COMPRESSORS	75	VIBRATORS	75

- b. Use shields or other physical barriers to restrict noise transmission.
- c. Provide soundproof housings or enclosures for noise-producing machinery.
- d. Use efficient silencers on equipment air intakes.
- e. Use efficient intake and exhaust mufflers on internal combustion engines that are maintained so equipment performs below noise levels specified.
- f. Line hoppers and storage bins with sound deadening material.



- g. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
3. Measure sound level for noise exposure due to the construction at least once every five successive working days while work is being performed above 55 dB(A) noise level. Measure noise exposure at the property line or 15 m (50 feet) from the noise source, whichever is greater. Measure the sound levels on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, take measurements at 900 to 1800 mm (three to six feet) in front of any building face. Submit the recorded information to the Contracting Officer's Representative noting any problems and the alternatives for mitigating actions.
- F. Restoration of Damaged Property: If any direct or indirect damage is done to public or private property resulting from any act, omission, neglect, or misconduct, the Contractor shall restore the damaged property to a condition equal to that existing before the damage at no additional cost to the Government. Repair, rebuild, or restore property as directed or make good such damage in an acceptable manner.
- G. Final Clean-up: On completion of project and after removal of all debris, rubbish, and temporary construction, Contractor shall leave the construction area in a clean condition satisfactory to the Contracting Officer's Representative. Cleaning shall include off the station disposal of all items and materials not required to be salvaged, as well as all debris and rubbish resulting from demolition and new work operations.

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**SECTION 01 74 19**  
**CONSTRUCTION WASTE MANAGEMENT**

**1.1 DESCRIPTION**

This specification covers the requirements for management of non-hazardous building construction and demolition waste.

**1.2 RELATED WORK**

- A. Section 02 41 00, DEMOLITION.
- B. Demolition and removal of roads, walks, curbs, and on-grade slabs outside buildings to be demolished: Section 31 20 00, EARTH MOVING
- C. Safety Requirements: Section 00 72 00, GENERAL CONDITIONS, Article, ACCIDENT PREVENTION.
- D. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
- E. Reserved items which are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- F. Asbestos Removal: Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT.

G. Lead Paint: Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.

### 1.3 GOVERNMENT POLICY

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building construction products.
- B. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators and facilitate their recycling.
- C. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling and any revenues or savings obtained from salvage or recycling shall accrue to the Contractor.
- D. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by federal, state and local regulations.

### 1.4 PLAN

- A. Conduct a site assessment to estimate the types of materials that will be generated by demolition at the site. The Whole Building Design Guide website (<http://www.wbdg.org>) has a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects
- B. Develop and implement procedures to reuse and recycle materials to the greatest extent feasible based upon the contract, the construction and demolition debris management plan, the estimated quantities of materials, and the availability of recycling facilities.
- C. Prepare and submit to the Contracting Officer's Representative a written demolition debris management plan. The Demolition Debris Management Plan shall be submitted for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted Project Schedule. The plan shall include, but not be limited to, the following information:
  - 1. Contractor and project identification information;
  - 2. Procedures to be used for debris management;
  - 3. A listing of the materials to be reused, recycled, or taken to the landfill.
  - 4. The names and locations of reuse and recycling facilities or sites.

#### 1.5 COLLECTION

- A. Provide necessary containers, bins and storage areas to facilitate effective waste management.
- B. Clearly identify so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.

#### 1.6 DISPOSAL

- A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state law.
- B. Building or demolition materials with no practical use or that cannot be recycled shall be disposed of at a landfill or incinerator.

#### 1.7 REPORT

With each application for progress payment, the contractor shall submit a summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

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### SECTION 02 41 00 DEMOLITION

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION:

This section specifies demolition and removal of buildings, portions of buildings, utilities, other structures and debris from trash dumps shown.

##### 1.2 RELATED WORK:

- A. Demolition and removal of roads, walks, curbs, and on-grade slabs outside buildings to be demolished: Section 31 20 11, EARTH MOVING (SHORT FORM).
- B. Safety Requirements: Section 01 35 26, SAFETY REQUIREMENTS.
- C. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.

- D. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
- E. Asbestos Removal: Section 02 82 11, TRADITIONAL ASBESTOS ABATEMENT.
- F. Lead Paint: Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
- G. Environmental Protection: Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.
- H. Infectious Control: Section 01 35 26, SAFETY REQUIREMENTS, Article 1.12, INFECTION PREVENTION MEASURES.

**1.3 PROTECTION:**

- A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of Section 01 35 26, SAFETY REQUIREMENTS.
- B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.9 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.
- C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.
- D. Provide enclosed dust chutes with control gates from each floor to carry debris to truck beds and govern flow of material into truck. Provide overhead bridges of tight board or prefabricated metal construction at dust chutes to protect persons and property from falling debris.

- E. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution. Vacuum and dust the work area daily.
- F. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
1. No wall or part of wall shall be permitted to fall outwardly from structures.
  2. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
  3. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.
- G. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the Contracting Officer's Representative. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and

reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have Contracting Officer's Representative's approval.

H. The work shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

I. The work shall comply with the requirements of Section 01 35 26 SAFETY REQUIREMENTS.

**1.4 UTILITY SERVICES:**

A. Demolish and remove outside utility service lines shown to be removed.

B. Remove abandoned outside utility lines that would interfere with installation of new utility lines and new construction.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 DEMOLITION:**

A. Completely demolish and remove buildings and structures, including all appurtenances related or connected thereto, as noted below:

1. As required for installation of new utility service lines.

2. To full depth within an area defined by hypothetical lines located 1500 mm (5 feet) outside building lines of new structures.

B. Debris, including brick, concrete, stone, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer's Representative. Break up concrete slabs below grade that do not require

removal from present location into pieces not exceeding 600 mm (24 inches) square to permit drainage. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.

- C. In removing buildings and structures of more than two stories, demolish work story by story starting at highest level and progressing down to third floor level. Demolition of first and second stories may proceed simultaneously.
- D. Remove and legally dispose of all materials, other than earth to remain as part of project work, from any trash dumps shown. Materials removed shall become property of contractor and shall be disposed of in compliance with applicable federal, state or local permits, rules and/or regulations.
- E. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer's Representative. When Utility lines are encountered that are not indicated on the drawings, the Contracting Officer's Representative shall be notified prior to further work in that area.

### **3.2 CLEAN-UP:**

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

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**SECTION 31 20 11**  
**EARTHWORK (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.

- 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 Method A.
- 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.
- C. Rock Excavation:
  - 1. Solid ledge rock (igneous, metamorphic, and sedimentary rock).
  - 2. Bedded or conglomerate deposits so cemented as to present characteristics of solid rock which cannot be excavated without blasting; or the use of a modern power excavator (shovel, backhoe, or similar power excavators) of no less than 0.75 m<sup>3</sup> (1 cubic yard) capacity, properly used, having adequate power and in good running condition.
  - 3. Boulders or other detached stones each having a volume of 0.4 m<sup>3</sup> (1/2 cubic yard) or more.

**1.5 MEASUREMENT AND PAYMENT FOR EXCAVATION:**

Measurement: The unit of measurement for excavation and borrow will be the cubic yard, computed by the average end area method from cross

sections taken before and after the excavation and borrow operations, including the excavation for ditches, gutters, and channel changes, when the material is acceptably utilized or disposed of as herein specified. Quantities should be computed by a Registered Professional Land Surveyor or Registered Civil Engineer, specified in Section 01 00 00, GENERAL REQUIREMENTS. The measurement will include authorized excavation of satisfactory subgrade soil, and the volume of loose, scattered rocks and boulders collected within the limits of the work; allowance will be made on the same basis for selected backfill ordered as replacement. The measurement will not include the volume of subgrade material or other material used for purposes other than directed. The volume of overburden stripped from borrow pits and the volume of excavation for ditches to drain borrow pits, unless used as borrow material, will not be measured for payment. The measurement will not include the volume of any excavation performed prior to taking of elevations and measurements of the undisturbed grade.

**1.6 MEASUREMENT AND PAYMENT FOR ROCK EXCAVATION:**

- A. Measurement: Cross section and measure the uncovered and separated materials, and compute quantities by the Registered Professional Land Surveyor or Registered Civil Engineer, specified in Section 01 00 00, GENERAL REQUIREMENTS. Do not measure quantities beyond the following limits:
1. 300 mm (12 inches) outside of the perimeter of formed footings.
  2. 600 mm (24 inches) outside the face of concrete work for which forms are required, except for footings.
  3. 150 mm (6 inches) below the bottom of pipe and not more than the pipe diameter plus 600 mm (24 inches) in width for pipe trenches.
  4. The outside dimensions of concrete work for which no forms are required (trenches, conduits, and similar items not requiring forms).

**1.7 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Rock Excavation Report:
1. Certification of rock quantities excavated.
  2. Excavation method.
  3. Labor.
  4. Equipment.

5. Land Surveyor's or Civil Engineer's name and official registration stamp.
  6. Plot plan showing elevations.
- C. Contractor shall submit procedure and location for disposal of unused satisfactory material. Proposed source of borrow material. Notification of encountering rock in the project. Advance notice on the opening of excavation or borrow areas. Advance notice on shoulder construction for rigid pavements.

**1.8 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):  
T99-10.....Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305 mm (12 inch) Drop  
T180-10.....Standard Method of Test for 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):  
C33-03.....Concrete Aggregate  
D698-e1.....Laboratory Compaction Characteristics of Soil Using Standard Effort  
D1140-00.....Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve  
D1556-00.....Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method  
D1557-09.....Laboratory Compaction Characteristics of Soil Using Modified Effort  
D2167-94 (2001).....Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method  
D2487-06.....Standard Classification of Soil for Engineering Purposes (Unified Soil Classification System)

D6938-10.....Standard Test Methods for Density of Soil and  
Soil-Aggregate in Place by Nuclear Methods  
(Shallow Depth)

- E. Standard Specifications of California 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, granular fill shall consist of clean, poorly graded crushed rock, crushed gravel, or uncrushed gravel placed beneath a building slab with or without a vapor barrier to cut off the capillary flow of pore water to the area immediately below. Fine aggregate grading shall conform to ASTM C33 with a maximum of 3 percent by weight passing ASTM D1140, //75 micrometers (No. 200).
  2. Bedding for sanitary and storm sewer pipe, crushed stone or gravel graded from 13 mm (1/2 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
- F. Requirements For Offsite Soils: Offsite soils brought in for use as backfill shall be tested for TPH, BTEX and full TCLP including ignitability, corrosivity and reactivity. Backfill shall contain less than 100 parts per million (ppm) of total hydrocarbons (TPH) and less than 10 ppm of the sum of Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and shall not fail the TCLP test. TPH concentrations shall be determined by using EPA 600/4-79/020 Method 418.1. BTEX concentrations

shall be determined by using EPA SW-846.3-3a Method 5030/8020. TCLP shall be performed in accordance with EPA SW-846.3-3a Method 1311. Provide Borrow Site Testing for TPH, BTEX and TCLP from a composite sample of material from the borrow site, with at least one test from each borrow site. //Material shall not be brought on site until tests have been approved by the Resident Engineer.

//G. Buried Warning and Identification Tape: Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specific below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, Unaffected by moisture or soil. Warning tape color codes:

Red:	Electric
Yellow:	Gas, Oil, Dangerous Materials
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems
White:	Steam Systems
Gray:	Compressed Air

H. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.076 mm (0.003 inch). Tape shall have a minimum strength of 10.3 MPa (1500 psi) lengthwise, and 8.6 MPa (1250 psi) crosswise, with a maximum 350 percent elongation.

I. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.102 mm (0.004 inch). Tape shall have a minimum strength of 10.3 MPa (1500 psi) lengthwise and 8.6 MPa (1250 psi) crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 0.9 m (3 feet) deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

- J. Detection Wire For Non-Metallic Piping: Detection wire shall be Insulated single strand, solid copper with a minimum of 12 AWG.

**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. 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.

- 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 COR 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. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 0.9 m (3 feet) of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously, at least one (1) foot below the working level. Operate dewatering system continuously until construction work below existing water levels is complete. Submit performance records weekly. Measure and record performance of dewatering system at same time each day by use of observation wells or piezometers installed in conjunction with the dewatering system. Relieve hydrostatic head in pervious zones below subgrade elevation in layered soils to prevent uplift.

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 suitable undisturbed earth unless a mechanical support is shown. Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 150 mm (6 inches) loose thickness.
- d. The length of open trench in advance of pipe laying shall not be greater than is authorized by the Resident Engineer.
- e. Provide buried utility lines with utility identification tape. Bury tape 300 mm (12 inches) below finished grade; under pavements and slabs, bury tape 150 mm (6 inches) below top of subgrade
- f. Bury detection wire directly above non-metallic piping at a distance not to exceed 300 mm (12 inches) above the top of pipe. The wire shall extend continuously and unbroken, from manhole to manhole. The ends of the wire shall terminate inside the manholes at each end of the pipe, with a minimum of 0.9 m (3 feet) of wire, coiled, remaining accessible in each manhole. The wire shall remain insulated over its entire length. The wire shall enter manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, the wire shall terminate in the valve pit at the pump station end of the pipe.
- g. Bedding shall be of the type and thickness shown. Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Backfill to top of pipe shall be compacted to 95 percent of ASTM D 698 maximum density. Plastic piping shall have bedding to spring line of pipe. Provide materials as follows:
  - 1) Class I: Angular, 6 to 40 mm (0.25 to 1.5 inches), graded stone, including a number of fill materials that have regional

significance such as coral, slag, cinders, crushed stone, and crushed shells.

- 2) Class II: Coarse sands and gravels with maximum particle size of 40 mm (1.5 inches), including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D 2487.

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 suitable undisturbed soil or granular fill. Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 150 mm (6 inches) loose thickness.
  - 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.
- e. Provide buried utility lines with utility identification tape. Bury tape 300 mm (12 inches) below finished grade; under pavements and slabs, bury tape 150 mm (6 inches) below top of subgrade
- f. Bury detection wire directly above non-metallic piping at a distance not to exceed 300 mm (12 inches) above the top of pipe. The wire shall extend continuously and unbroken, from manhole to

manhole. The ends of the wire shall terminate inside the manholes at each end of the pipe, with a minimum of 0.9 m (3 feet) of wire, coiled, remaining accessible in each manhole. The wire shall remain insulated over its entire length. The wire shall enter manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, the wire shall terminate in the valve pit at the pump station end of the pipe.

- g. Bedding shall be of the type and thickness shown. Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Backfill to top of pipe shall be compacted to 95 percent of ASTM D698 maximum density. Plastic piping shall have bedding to spring line of pipe. Provide materials as follows:
- 1) Class I: Angular, 6 to 40 mm (0.25 to 1.5 inches), graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.
  - 2) Class II: Coarse sands and gravels with maximum particle size of 40 mm (1.5 inches), including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D2487.
- 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. If there is a question as to whether material is unsuitable or not, the Contractor shall obtain samples of the material, under the direction of the Resident Engineer, and the materials shall be examined by an independent testing laboratory for soil classification to determine whether it is unsuitable or not. Testing of

the soil shall be performed by the VA Testing Laboratory. When unsuitable material is encountered and removed, the contract price and time will be adjusted in accordance with Articles, DIFFERING SITE CONDITIONS, CHANGES and CHANGES-SUPPLEMENT of the GENERAL CONDITIONS as applicable. Adjustments to be based on meters (yardage) in cut section only.

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 rolling shall be done on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. After stripping, proof roll the existing subgrade of the with six passes of a dump truck loaded with 6 cubic meters (4 cubic yards) of soil 13.6 meter tons (15 ton), pneumatic-tired roller. Operate the roller or truck in a systematic manner to ensure the number of passes over all areas, and at speeds between 4 to 5.5 km/hour (2 1/2 to 3 1/2 mph). When proof rolling, one-half of the passes made with the roller shall be in a direction perpendicular to the other passes. 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.

- 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. Backfill adjacent to any and all types of structures shall be placed and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials to prevent wedging action or eccentric loading upon or against the structure.

- E. Borrow Material: Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from the borrow areas within the limits of the project site, selected by the Contractor or from approved private sources. Unless otherwise provided in the contract, the Contractor shall obtain from the owners the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling. Borrow material from approved sources on Government-controlled land may be obtained without payment of royalties. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval. Necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon shall be considered related operations to the borrow excavation.
- F. Opening and Drainage of Excavation and Borrow Pits: The Contractor shall notify the Resident Engineer sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements of the undisturbed ground surface to be taken. Except as otherwise permitted, borrow pits and other excavation areas shall be excavated providing adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed of as directed. Borrow pits shall be neatly trimmed and drained after the excavation is completed. The Contractor shall ensure that excavation of any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

### **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. Disposal: Transport surplus satisfactory soil to designated storage areas on Medical Center property. Stockpile or spread soil as directed by Resident Engineer.
  - 1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Medical Center property.
- C. Place excess excavated materials suitable for fill and/or backfill on site where directed.
- D. Remove from site and dispose of any excess excavated materials after all fill and backfill operations have been completed.
- E. 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.

**3.7 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 Property.

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SECTION 32 05 23  
CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Subbase for concrete pavements.
2. Curbs, gutters, and combination curbs and gutters and wheel stops.
3. Pedestrian Pavement: Walks, grade slabs, lawn mower strips, pedestrian crossings, wheelchair curb ramps, terraces, steps, patios, and healing gardens.
4. Vehicular Pavement: Service courts, driveways, parking lots, and loading docks.
5. Equipment Pads: Oxygen storage, transformers, propane tanks, and generator pads .

1.2 RELATED REQUIREMENTS

- A. Field Testing: Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Step Nosings and Railings: Section 05 50 00, METAL FABRICATIONS.
- C. Subgrade Preparation and Subbase Compaction: Section 31 20 00, EARTHWORK.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.

B. American Association of State Highway and Transportation Officials  
(AASHTO):

1. M147-65-UL-04 - Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
2. M233-86 - Boiled Linseed Oil Mixture for Treatment of Portland Cement Concrete.

C. American Concrete Institute (ACI):

1. 305R-10 - Guide to Hot Weather Concreting.
2. 306R-10 - Guide to Cold Weather Concreting.

D. American National Standards Institute (ANSI):

1. B101.3 - Wet DOCF of Common Hard Surface Floor Materials (Including Action and Limit Thresholds for the Suitable Assessment of the Measured Values).

E. ASTM International (ASTM):

1. A615/A615M-16 - Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
2. A996/A996M-15 - Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
3. A1064/A1064M-16 - Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
4. C33/C33M-16 - Concrete Aggregates.
5. C94/C94M-16 - Ready Mixed Concrete.
6. C143/C143M-15a - Slump of Hydraulic Cement Concrete.
7. C150/C150M-16 - Portland Cement.
8. C171-16 - Sheet Materials for Curing Concrete.
9. C260/C260M-10a - Air Entraining Admixtures for Concrete.
10. C309-11 - Liquid Membrane Forming Compounds for Curing Concrete.
11. C494/C494M-15a - Chemical Admixtures for Concrete.
12. C618-15 - Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
13. C979/C979M-16 - Pigments for Integrally Colored Concrete.
14. C989/C989M-14 - Slag Cement for Use in Concrete and Mortars.
15. C1240-15 - Silica Fume Used in Cementitious Mixtures.
16. D1751-04(2013)e1 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
17. D5893/D5893M-10 - Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

18.D6690-15 - Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

#### **1.4 PREINSTALLATION MEETINGS**

- A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section.
  - 1. Required Participants:
    - a. Contracting Officer's Representative>
    - b. Contractor.
    - c. Installer.
  - 2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
    - a. Installation schedule.
    - b. Installation sequence.
    - c. Preparatory work.
    - d. Protection before, during, and after installation.
    - e. Installation.
    - f. Terminations.
    - g. Transitions and connections to other work.
    - h. Inspecting and testing.
    - i. Other items affecting successful completion.
  - 3. Document and distribute meeting minutes to participants to record decisions affecting installation.

#### **1.5 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
  - 1. Show size, configuration, and fabrication and installation details.
  - 2. Show reinforcing.
  - 3. Include jointing plan for concrete pavements, curbs and gutters.
- C. Manufacturer's Literature and Data:
  - 1. Description of each product.
  - 2. Installation instructions.
- D. Samples:
  - 1. Exposed Aggregate Concrete Panel: 0.4 sq. m by 50 mm (4 sq. ft. by 2 inches) thick, 2 required, each color and finish.
  - 2. Colored Concrete Panel: As specified in Section 09 06 00, SCHEDULE FOR FINISHES, with mix data.

- E. Test reports: Certify products comply with specifications.
  - 1. Concrete materials.
  - 2. Select subbase materials.
  - 3. Field test reports.
- F. Certificates: Certify products comply with specifications.
  - 1. Expansion joint filler.
  - 2. Reinforcement.
  - 3. Curing materials.
  - 4. Concrete protective coating.
- G. Qualifications: Substantiate qualifications comply with specifications.
  - 1. Installer with project experience list.
  - 2. Land surveyor.
- H. Concrete mix design.
- I. Select subbase job-mix design.
- J. Proposed hot and cold weather concreting methods.
- K. Land surveyor's construction staking notes, before placing concrete.
  - 1. Identify discrepancies between field conditions and Drawings.

#### **1.6 QUALITY ASSURANCE**

- A. Installer Qualifications:
  - 1. Regularly installs specified products.
  - 2. Installed specified products with satisfactory service on five similar installations.
    - a. Project Experience List: Provide contact names and addresses for completed projects.
- B. Land Surveyor: Professional land surveyor or engineer registered to provide land surveys in jurisdiction where project is located.
- C. Preconstruction Testing:
  - 1. Engage independent testing laboratory to perform tests and submit reports.
    - a. Deliver samples to laboratory in number and quantity required for testing.
  - 2. Concrete mix design.
  - 3. Select subbase job-mix design. Report the following:
    - a. Material sources.
    - b. Gradation.
    - c. Plasticity index.
    - d. Liquid limit.

- e. Laboratory compaction curves indicating maximum density at optimum moisture content.

**1.7 DELIVERY**

- A. Deliver steel reinforcement to prevent damage.
- B. Before installation, return or dispose of distorted or damaged steel reinforcement.
- C. Bulk Products: Deliver bulk products away from buildings, utilities, pavement, and existing turf and planted areas. Maintain dry bulk product storage away from contaminants.

**1.8 STORAGE AND HANDLING**

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

**1.9 FIELD CONDITIONS**

- A. Hot Weather Concreting Procedures: ACI 305R.
- B. Cold Weather Concreting Procedures: ACI 306R.
  - 1. Use non-corrosive, non-chloride accelerator admixture.
  - 2. Do not use calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions.

**1.10 WARRANTY**

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

**PART 2 - PRODUCTS**

**2.1 CONCRETE MATERIALS**

- A. Portland Cement: ASTM C150/C150M, Type I or II.
- B. Pozzolans:
  - 1. Fly Ash: ASTM C618, Class C or F including supplementary optional physical requirements.
  - 2. Slag: ASTM C989/C989M; Grade 80, or Grade 100.
  - 3. Silica Fume: ASTM C1240.
- C. Coarse Aggregate: ASTM C33/C33M; size to suit application.
- D. Fine Aggregate: ASTM C33/C33M.
- E. Mixing Water: Fresh, clean, and potable.
- F. Air-Entraining Admixture: ASTM C260/C260M.
- G. Chemical Admixtures: ASTM C494/C494M.

- H. Reinforcing Steel: ASTM A615/A615M or ASTM A996/A996M, Grade 520 (75) deformed.
- I. Welded Wire Fabric: ASTM A1064/A1064M, plain; Grade 385 (56) sized as indicated.
- J. Expansion Joint Filler: ASTM D1751.
- K. Sheet Materials for Curing Concrete: ASTM C171.
- L. Color Pigment: ASTM C979/C979M, colored and white powder pigments.

## 2.2 SELECT SUBBASE

- A. Subbase: AASHTO M147; Grade B.
  - 1. Select granular material composed of sand, sand-gravel, crushed stone, crushed or granulated slag, with or without soil binder, or combinations of these materials.

SUBBASE GRADING REQUIREMENTS							
Sieve Size		Percentage Passing by Mass					
		Grades					
(mm)	(in)	A	B	C	D	E	F
50	2	100	100				
25	1		75-95	100	100	100	100
9.5	3/8	30-65	40-75	50-85	60-100		
4.47	No. 4	25-55	30-60	35-65	50-85	55-100	70-100
2.00	No. 10	15-40	20-45	25-50	40-70	40-100	55-100
0.425	No. 40	8-20	15-30	15-30	25-45	20-50	30-70
0.075	No. 200	2-8	5-20	5-15	5-20	6-20	8-25

- B. Other Acceptable Gradations: Materials within three to five percent, plus or minus, of specified gradation, or as recommended by the geotechnical engineer and approved by the Contracting Officer's Representative.

## 2.3 FORMS

- A. Forms: Wood, plywood, metal, or other materials, approved by Contracting Officer's Representative, of grade or type suitable to obtain type of finish specified.
  - 1. Plywood: Exterior grade, free of defects and patches on contact surface.
  - 2. Lumber: Sound, grade-marked, S4S stress graded softwood, minimum 50 mm (2 inches) thick, free from warp, twist, loose knots, splits, or other defects.
  - 3. Form Coating: As recommended by Architect/Engineer.

- B. Provide forms suitable in cross-section, depth, and strength to resist springing during depositing and consolidating concrete.
  - 1. Do not use forms varying from straight line more than 3 mm in 3000 mm (1/8 inch in 10 feet), horizontally and vertically.
- C. Provide flexible or curved forms for forming radii.

#### 2.4 CONCRETE CURING MATERIALS

- A. Concrete curing materials, conform to one of the following:
  - 1. Burlap: Minimum 233 g/sq. m (7 ounces/sq. yd.) dry.
  - 2. Sheet Materials for Curing Concrete: ASTM C171.
  - 3. Curing Compound: ASTM C309, Type 1 clear liquid membrane forming type, without paraffin or petroleum.

#### 2.5 CONCRETE MIXES

- A. Design concrete mixes according to ASTM C94/C94M, Option C.
- B. Concrete Type: Air-entrained //. See Table I.

TABLE I - CONCRETE TYPES					
Concrete Type	Minimum 28 Day Compressive Strength f'c MPa (psi)	Non-Air-Entrained		Air-Entrained	
		Min. Cement kg/cu. m (lbs./cu. yd.)	Max. Water Cement Ratio	Min. Cement kg/cu. m (lbs./cu. yd.)	Max. Water Cement Ratio
A	35 (5000)1,3	375 (630)	0.45	385 (650)	0.40
B	30 (4000)1,3	325 (550)	0.55	340 (570)	0.50
C	25 (3000)1,3	280 (470)	0.65	290 (490)	0.55
D	25 (3000)1,2	300 (500)	*	310 (520)	*
Footnotes:					
1. If trial mixes are used, achieve compressive strength 8.3 MPa (1,200 psi) in excess of f'c. For concrete strengths greater than 35 MPa (5,000 psi), achieve compressive strength 9.7 MPa (1,400 psi) in excess of f'c.					
2. For Concrete Exposed to High Sulfate Content Soils: Maximum water cement ratio is 0.44.					
3. Laboratory Determined according to ACI 211.1 for normal weight concrete.					

- C. Maximum Slump: ASTM C143/C143M. See Table II.

TABLE II - MAXIMUM SLUMP	
APPLICATION	MAXIMUM SLUMP
Curb & Gutter	75 mm (3 inches)
Pedestrian Pavement	75 mm (3 inches)
Vehicular Pavement	50 mm (2 inches) Machine Finished 100 mm (4 inches) Hand Finished
Equipment Pad	75 to 100 mm (3 to 4 inches)

## **2.6 ACCESSORIES**

- A. Equipment and Tools: Obtain Contracting Officer's Representative's, approval of equipment and tools needed for handling materials and performing work before work begins.
- B. Maintain equipment and tools in satisfactory working condition.
- C. Sealants:
  - 1. Concrete Paving Expansion Joints: ASTM D5893/D5893M, Type SL, single component, self-leveling, silicone joint sealant.
  - 2. Concrete Paving Joints: ASTM D6690, Type IV, hot-applied, single component joint sealant.
- D. Concrete Protective Coating: AASHTO M233 linseed oil mixture.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Prepare, construct, and finish subgrade. See Section 31 20 00, EARTHWORK.
- D. Maintain subgrade in smooth, compacted condition, in conformance with the required section and established grade until the succeeding operation has been accomplished.

### **3.2 SELECT SUBBASE**

- A. Placing:
  - 1. Place subbase material on prepared subgrade in uniform layer to required contour and grades, and to maximum 200 mm (8 inches) loose depth.
  - 2. When required compacted thickness exceeds 150 mm (6 inches), place subbase material in equal thickness layers.
  - 3. When subbase elevation is 13 mm (1/2 inch) or more below required grade, excavate subbase minimum 75 mm (3 inches) deep. Place and compact subbase to required grade.
- B. Compaction:
  - 1. Perform compaction with approved hand or mechanical equipment well suited to the material being compacted.
  - 2. Maintain subbase at optimum moisture content for compaction.
  - 3. Compact each subbase layer to minimum 95 percent or 100 percent of maximum density as specified in Section 31 20 00, EARTHWORK.
- C. Subbase Tolerances:



1. Variation from Indicated Grade: Maximum 9 mm (3/8 inch).
2. Variation from Indicated Thickness: Maximum 13 mm (1/2 inch).

D. Protection:

1. Protect subbase from damage until concrete is placed.
2. Reconstruct damaged subbase before placing concrete.

**3.3 SETTING FORMS**

A. Form Substrate:

1. Compact form substrate to uniformly support forms along entire length.
2. Correct substrate imperfections and variations by cutting, filling, and compacting.

B. Form Setting:

1. Set forms to indicated line and grade with tight joints. Rigidly brace forms preventing movement.
2. Remove forms when removal will not damage concrete and when required for finishing.
3. Clean and oil forms before each use.
4. Correct forms, when required, immediately before placing concrete.

C. Land Surveyor: Establish control, alignment, and grade for forms.

1. Notify Contracting Officer's Representative immediately when discrepancies exist between field conditions and drawings.
2. Correct discrepancies greater than 25 mm (1 inch) before placing concrete.

D. Form Tolerances:

1. Variation from Indicated Line: Maximum 6 mm (1/4 inch).
2. Variation from Indicated Grade: Maximum 3 mm in 3000 mm (1/8 inch in 10 feet).

**3.4 PLACING REINFORCEMENT**

- A. Keep reinforcement clean from contamination preventing concrete bond.
- B. Install reinforcement shown on drawings.
- C. Support and securely tie reinforcing steel to prevent displacement during concrete placement.
- D. Obtain Contracting Officer's Representative's reinforcement placement approval before placing concrete.

**3.5 JOINTS - GENERAL**

- A. Place joints, where shown on approved submittal Drawings.
  1. Conform to details shown.

2. Install joints perpendicular to finished concrete surface.
- B. Make joints straight and continuous from edge to edge of pavement.

### **3.6 CONSTRUCTION JOINTS**

- A. Locate longitudinal construction joints between slabs of vehicular pavement as shown on approved submittal Drawings.
- B. Place transverse construction joints of type shown, where indicated, and whenever concrete placement is suspended for more than 30 minutes.
- C. Provide butt-type joint with dowels in curb and gutter at planned joint locations.
- D. Provide keyed joints with tie bars when joint occurs in middle third of planned curb and gutter joint interval.

### **3.7 CONTRACTION JOINTS**

- A. Tool or cut joints to width, depth, and radius edge shown on drawings using grooving tool, jointer, or saw.
- B. Construct joints in curbs and gutters by inserting 3 mm (1/8 inch) steel plates conforming to curb and gutter cross sections.
  1. Keep plates in place until concrete can hold its shape.
- C. Finish joint edges with edging tool.
- D. Score pedestrian pavement with grooving tool or jointer.

### **3.8 EXPANSION JOINTS**

- A. Form expansion joints with expansion joint filler of thickness shown on drawings.
  1. Locate joints around perimeter of structures and features abutting site work concrete.
  2. Create complete, uniform separation between structure and site work concrete.
- B. Extend expansion joint material full depth of concrete with top edge of joint filler below finished concrete surface where sealant is indicated on Drawings.
- C. Cut and shape material matching cross section.
- D. Anchor with approved devices to prevent displacing during placing and finishing operations.
- E. Round joint edges with edging tool.

### **3.9 PLACING CONCRETE - GENERAL**

- A. Preparation before Placing Concrete:
  1. Obtain Contracting Officer's Representative approval.
  2. Remove debris and other foreign material.

3. Uniformly moisten substrate, without standing water.
- B. Convey concrete from mixer to final location without segregation or loss of ingredients. Deposit concrete to minimize handling.
- C. During placement, consolidate concrete by spading or vibrating to minimize voids, honeycomb, and rock pockets.
  1. Vibrate concrete against forms and along joints.
  2. Avoid excess vibration and handling causing segregation.
- D. Place concrete continuously between joints without bulkheads.
- E. Install construction joint in concrete placement suspended for more than 30 minutes.
- F. Replace concrete with cracks, chips, bird baths, and other defects to nearest joints, approved by Contracting Officer's Representative.

**3.10 PLACING CONCRETE FOR CURB AND GUTTER, PEDESTRIAN PAVEMENT, AND EQUIPMENT PADS**

- A. Place concrete in one layer conforming to cross section shown on Drawings after consolidating and finishing.
- B. Deposit concrete near joints without disturbing joints. Do not place concrete directly onto joint assemblies.
- C. Strike concrete surface to proper section ready for consolidation.
- D. Consolidate concrete by tamping and spading or with approved mechanical finishing equipment.
- E. Finish concrete surface with wood or metal float.
- F. Construct concrete pads and pavements with sufficient slope to drain, preventing standing water.

**3.11 PLACING CONCRETE FOR VEHICULAR PAVEMENT**

- A. Deposit concrete as close as possible to its final position.
- B. Place concrete continuously between construction joints without cold joints.
- C. Strike and consolidate concrete with finishing machine, vibrating screed, or by hand-finishing.
- D. Finish concrete surface to elevation and crown shown on drawings.
- E. Deposit concrete near joints without disturbing joints. Do not place concrete directly onto joint assemblies.
- F. Obtain Contracting Officer's Representative's approval before placing adjacent lanes.
- G. Curb-Forming Machines: Curb-forming machines for constructing integral curbs and gutter will be approved based on trial use on the project.

When equipment produces unsatisfactory results, discontinue use of the equipment at any time during construction and accomplish work by hand method construction. Remove unsatisfactory work and reconstruct full length between regularly scheduled joints. Dispose of removed portions off the project site.

**3.12 FORM REMOVAL**

- A. Keep forms in place minimum 12 hours after concrete placement. Remove forms without damaging concrete.
- B. Do not use bars or heavy tools against concrete to remove forms. Repair damage concrete found after form removal.

**3.13 CONCRETE FINISHING - GENERAL**

- A. Follow operation sequence below, unless otherwise indicated on Drawings:
  - 1. Consolidating, floating, striking, troweling, texturing, and joint edging.
- B. Use edging tool with 6 mm (1/4 inch) radius, unless otherwise shown on Drawings.
- C. Keep finishing equipment and tools clean and suitable for use.

**3.14 CONCRETE FINISHING - PEDESTRIAN PAVEMENT**

- A. Lawn Mower Crossings, Wheelchair Curb Ramps, Terraces, Healing Gardens:
  - 1. Finish concrete surfaces with metal float, troweled smooth, and finished with a broom moistened with clear water.
  - 2. Finish slab edges and formed transverse joints with edger.
  - 3. Broom surfaces transverse to traffic direction.
    - a. Use brooming to eliminate flat surface produced by edger.
    - b. Produce uniform corrugations, maximum 1.5 mm (1/16 inch) deep profile.
  - 4. Provide surface uniform in color and free of surface blemishes, form marks, and tool marks.
  - 5. Paving Tolerances:
    - a. Variation from Indicated Plane: Maximum 5 mm in 3000 mm (3/16 inch in 10 feet).
    - b. Variation from Indicated Thickness: Maximum 6 mm (1/4 inch).
  - 6. Replace paving within joint boundary when paving exceeds specified tolerances.

- B. Step Treads, Risers and Sidewalls: Finish as specified for pedestrian pavement, except as follows:
  - 1. Remove riser forms sequentially, starting with top riser.
  - 2. Rub riser face with wood or concrete rubbing block and water. Remove blemishes, form marks, and tool marks. Use outside edger to round nosing; use inside edger to finish bottom of riser.
  - 3. Apply uniform brush finish to treads, risers, and sidewall.
    - a. Apply stiff brush finish to treads to provide slip resistant surface complying with ANSI B101.3.
  - 4. Step Tolerance:
    - a. Variation from Indicated Plane: Maximum 5 mm in 3000 mm (3/16 inch in 10 feet).

### **3.15 CONCRETE FINISHING - VEHICULAR PAVEMENT**

- A. Align finish surfaces where new and existing pavements abut.
- B. Longitudinally float pavement surface to profile and grade indicated on drawings.
- C. Straighten surface removing irregularities and maintaining specified tolerances while concrete is plastic.
- D. Finish pavement edges and joints with edging tool.
- E. Broom finish concrete surface after bleed water dissipates and before concrete hardens.
  - 1. Broom surface transverse to traffic direction.
    - a. Use brooming to eliminate flat surface produced by edger.
    - b. Produce uniform corrugations, maximum 3 mm (1/8 inch) deep profile.
- F. Pavement Tolerances:
  - 1. Variation from Indicated Plane: Maximum 6 mm in 3000 mm (1/4 inch in 10 feet) tested parallel and perpendicular to traffic direction at maximum 1500 mm (5 feet) intervals.
  - 2. Variation from Indicated Thickness: Maximum 6 mm (1/4 inch).
- G. Replace paving within joint boundary when paving exceeds specified tolerances.

### **3.16 CONCRETE FINISHING - CURBS AND GUTTERS**

- A. Round edges of gutter and top of curb with edging tool.
- B. Gutter and Curb Top:
  - 1. Float surfaces and finish with smooth wood or metal float until true to grade and section and uniform color.

2. Finish surfaces, while still plastic, longitudinally with bristle brush.

C. Curb Face:

1. Remove curb form and immediately rub curb face with wood or concrete rubbing block removing blemishes, form marks, and tool marks and providing uniform color.
2. Brush curb face, while still plastic, matching gutter and curb top.

D. Curb and Gutter Tolerances: // Except at grade changes or curves. //

1. Variation from Indicated Plane and Grade:

- a. Gutter: Maximum 3 mm in 3000 mm (1/8 inch in 10 feet).
- b. Curb Top and Face: Maximum 6 mm in 3000 mm (1/4 inch in 10 feet).

E. Replace curbs and gutters within joint boundary when curbs and gutters exceed specified tolerances.

F. Correct depressions causing standing water.

**3.17 CONCRETE FINISHING - EQUIPMENT PADS**

- A. Strike pad surface to elevation shown on Drawings.
- B. Provide smooth, dense float finish, free from depressions or irregularities.
- C. Finish pad edges with edger.
- D. After removing forms, rub pad edge faces with wood or concrete rubbing block, removing blemishes, form marks, and tool marks and providing uniform color.

E. Pad Tolerances:

1. Variation from Indicated Plane: Maximum 3 mm in 3000 mm (1/8 inch in 10 feet).
2. Variation from Indicated Elevation: Maximum 6 mm (1/4 inch).
3. Variation from Indicated Thickness: Maximum 6 mm (1/4 inch).

F. Replace pads when pads exceed specified tolerances.

**3.18 SPECIAL FINISHES**

A. Exposed Aggregate Finish:

1. Prepare concrete base 10 to 13 mm (3/8 to 1/2 inch) lower than the finish grade.
2. Scatter aggregate over concrete base surface and embed by use of hand float, straight edge, or darby.
3. Apply concrete mix and mark off surface as indicated on Drawings with surface joints at least 10 mm (3/8 inch) deep. Level off finish

to a true surface and compact with wood float, working as little as possible so that coarse material will remain at the top. Before finish has set, treat top surface with cement retarding material. When body of concrete finish has set, remove retarded surface film by wire brushes and fine water spray to remove mortar from top of colored aggregate. Continue washing and brushing until flush water runs clear and no noticeable cement film left on the aggregate.

### **3.19 CONCRETE CURING**

#### **A. Concrete Protection:**

1. Protect unhardened concrete from rain and flowing water.
2. Provide sufficient curing and protection materials available and ready for use before concrete placement begins.
3. Protect concrete to prevent pavement cracking from ambient temperature changes during curing period.
  - a. Replace pavement damaged by curing method allowing concrete cracking.
  - b. Employ another curing method as directed by Contracting Officer's Representative.

#### **B. Cure concrete for minimum 7 days by one of the following methods appropriate to weather conditions preventing moisture loss and rapid temperature change:**

1. Burlap Mat: Provide minimum two layers kept saturated with water during curing period. Overlap Mats at least 150 mm (6 inches).
2. Sheet Materials:
  - a. Wet exposed concrete surface with fine water spray and cover with sheet materials.
  - b. Overlap sheets minimum 300 mm (12 inches).
  - c. Securely anchor sheet materials preventing displacement.
3. Curing Compound:
  - a. Protect joints indicated to receive sealants preventing contamination from curing compound.
  - b. Insert moistened paper or fiber rope into joint or cover joint with waterproof paper.
  - c. Apply curing compound before concrete dries.
  - d. Apply curing compound in two coats at right angles to each other.
  - e. Application Rate: Maximum 5 sq. m/L (200 sq. ft./gallon), both coats.

- f. Immediately reapply curing compound to surfaces damaged during curing period.

### **3.20 CONCRETE PROTECTIVE COATING**

- A. Apply protective coating of linseed oil mixture to exposed-to-view concrete surfaces, drainage structures, and features that project through, into, or against concrete exterior improvements to protect the concrete against deicing materials.
- B. Complete backfilling and curing operation before applying protective coating.
- C. Dry and thoroughly clean concrete before each application.
- D. Apply two coats, with maximum coverage of 11 sq. m/L (50 sq. yds./gal.); first coat, and maximum 16 sq. m/L (70 sq. yds./gal.); second coat, except apply commercially prepared mixture according to manufacturer's instructions.
- E. Protect coated surfaces from vehicular and pedestrian traffic until dry.
- F. Do not heat protective coating, and do not expose protective coating to open flame, sparks, or fire adjacent to open containers or applicators. Do not apply material at temperatures lower than 10 degrees C (50 degrees F).

### **3.21 FIELD QUALITY CONTROL**

- A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
  - 1. Compaction.
    - a. Pavement subgrade.
    - b. Curb, gutter, and sidewalk.
  - 2. Concrete:
    - a. Delivery samples.
    - b. Field samples.
  - 3. Slip Resistance: Steps and pedestrian paving.

### **3.22 CLEANING**

- A. After completing curing:
  - 1. Remove burlap and sheet curing materials.
  - 2. Sweep concrete clean, removing foreign matter from the joints.
  - 3. Seal joints as specified.

### **3.23 PROTECTION**

- A. Protect exterior improvements from traffic and construction operations.



1. Prohibit traffic on paving for minimum seven days after placement, or longer as directed by Contracting Officer's Representative.
- B. Remove protective materials immediately before acceptance.
- C. Repair damage.
  1. Replace concrete containing excessive cracking, fractures, spalling, and other defects within joint boundary, when directed by Contracting Officer's Representative, and at no additional cost to the Government.

- - - E N D - - -

## **SECTION 32 84 00 PLANTING IRRIGATION**

### **PART 4 - GENERAL**

#### **4.1 SUMMARY**

- A. Section Includes:
  1. Automatically-controlled lawn trees irrigation system, controllers and all other appurtenances.

#### **4.2 RELATED REQUIREMENTS**

- A. Concrete Work, Reinforcing, Placement and Finishing: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Metering: SECTION 25 10 10, ADVANCED UTILITY METERING SYSTEM.
- C. Excavation, Trench Widths, Pipe Bedding, Backfill, Shoring, Sheeting, Bracing: Section 31 20 00, EARTH MOVING.

#### **4.3 ABBREVIATIONS**

- A. HDPE: High-density polyethylene plastic.
- B. NPT: National pipe thread.
- C. PTFE: Polytetrafluoroethylene.
- D. PVC: Polyvinyl chloride plastic.

#### **4.4 DEFINITIONS**

- A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves.
- B. Drain Piping: Downstream from circuit-piping drain valves.
- C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves.

- D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 Volts or for remote-control, signaling power-limited circuits.

#### **4.5 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. American Society Of Mechanical Engineers (ASME):
  - 1. B16.18-2012 - Cast Copper Alloy Solder Joint Pressure Fittings.
  - 2. B16.22-2013 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  - 3. B16.24-2011 - Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 600, 900, 1500 and 2500.
  - 4. B40.100-2013 - Pressure Gauges and Gauge Attachments.
- C. American Society Of Sanitary Engineering (ASSE):
  - 1. 1013-2011 - Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers.
- D. ASTM International (ASTM):
  - 1. B88-14/B88M-13 - Seamless Copper Water Tube.
  - 2. B813-10 - Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
  - 3. D1785-15 - Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedule 40, 80, and 120.
  - 4. D2239-12- Polyethylene (PE) Plastic Pipe (SIDR) Based on controlled Inside Diameter.
  - 5. D2241-15 - Poly(Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series).
  - 6. D2464-15 - Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
  - 7. D2466-15 - Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
  - 8. D2564-12 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
  - 9. D2609-15 - Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
  - 10. D2683-14 - Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
  - 11. D2855-15 - Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.

12.F477-14 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

E. American Water Works Association (AWWA):

1. C504-15 - Rubber-Seated Butterfly Valves.
2. C906-15 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 65 In. (100 mm Through 1,650 mm), for Waterworks.

F. American Welding Society (AWS):

1. A5.8/A5.8M-04 - Filler Metals for Brazing and Braze Welding.

G. National Fire Protection Association (NFPA):

1. 70 2011 Edition - National Electrical Code.

#### **4.6 PREINSTALLATION MEETINGS**

A. Conduct preinstallation meeting.

1. Required Participants:

- a. Contracting Officer's Representative.
- b. Contractor.
- c. Installer.

2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.

- a. Installation schedule.
- b. Installation sequence.
- c. Preparatory work.
- d. Protection before, during, and after installation.
- e. Installation.
- f. Terminations.
- g. Transitions and connections to other work.
- h. Inspecting and testing.
- i. Other items affecting successful completion.

3. Document and distribute meeting minutes to participants to record decisions affecting installation.

#### **4.7 SUBMITTALS**

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:

1. Show size, configuration, and installation details.
2. Show complete detailed irrigation layout covering design of system showing pipe sizes and lengths; fittings; locations; types and sizes of sprinklers; controls; backflow preventers; valves; location and mounting details of electrical control equipment complete wiring

diagram showing routes and wire sizes for; power, signal and control wiring details and connections to water supply main.

3. Do not start work before final shop drawing approval.

C. Manufacturer's Literature and Data:

1. Description of each product.

a. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

b. Include zone chart and controller timing schedule showing each irrigation zone and its control valve; and show time settings for each automatic controller zone.

2. Installation instructions.

3. Warranty.

D. Extra Materials: Show labels describing contents.

1. Rotary and Spray Head Sprinklers, Bubblers, Emitters: Insert number and percent of amount installed for each type and size indicated, but no fewer than 2 units.

E. Certificates: Certify each product complies products comply with specifications.

1. Control systems.

2. Show control system is UL Listed for specified application.

F. Qualifications: Substantiate qualifications comply with specifications.

1. Irrigation Installer with project experience list.

2. Service provider with project experience list.

G. Delegated Design Drawings and Calculations: Signed and sealed by responsible design professional.

H. Operation and Maintenance Data:

1. Start-up, maintenance, troubleshooting, emergency, and shut-down instructions for each operational product.

**4.8 QUALITY ASSURANCE**

A. Installer Qualifications:

1. Regularly installs specified products.

2. Installed specified products with satisfactory service on five similar installations for minimum five years.

a. Project Experience List: Provide contact names and addresses for completed projects.

b. DELIVERY, STORAGE, AND HANDLING

B. Deliver products in manufacturer's original sealed packaging.

- C. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- D. Before installation, return or dispose of products within distorted, damaged, or opened packaging.
- E. Store plastic piping protected from direct sunlight. Support pipe to prevent sagging and bending.

#### **4.9 WARRANTY**

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

### **PART 5 - PRODUCTS**

#### **5.1 SYSTEM DESCRIPTION**

- A. Irrigation Zone Control: Automatic operation with controller and automatic control valves.

#### **5.2 SYSTEM PERFORMANCE**

- A. Delegated Design: Prepare submittal documents including design calculations and drawings signed and sealed by registered design professional, licensed in state where work is located.
- B. Design piping, valves, and specialties complying with following maximum pressure performance requirements:
  - 1. Irrigation Main Piping: 640 kPa (100 psi).
  - 2. Circuit Piping: 520 kPa (80 psi).

#### **5.3 MATERIALS**

- A. Piping Materials:
  - 1. Copper Tubes: ASTM B88, Type L.
    - a. Fittings: ASME B16.18 and ASME B16.22 solder-joint fittings.
    - b. Bronze Flange: ASME B16.24, class 150, ASTM B32 solder-joint end.
    - c. Union: Cast-copper alloy with ball-and-socket, solder joints or threaded ends.
    - d. Brazing Filler Metal: AWS A5.8.
    - e. Solder: ASTM B32, tin-antimony. Flux soldering, ASTM B813.
  - 2. Polyethylene (PE) Plastic Pipe with Controlled ID: ASTM D2239, SDR 15.
    - a. Fittings: ASTM D2609.
    - b. Flange Gaskets, Bolts, and Nuts: Type as recommended by manufacturer.

3. Polyethylene (PE) Plastic Pipe: AWWC906 with dimension ratio of 7.3, 9, or 9.3 to provide 1100 kPa (160 psi) minimum pressure rating.
  - a. Fittings: ASTM D3261.
4. Polyvinyl Chloride (PVC) Pipe: ASTM D1785 PVC 1120, Schedule // 40 // 80 //; or ASTM D2241, PVC 1120 compound, // SDR 21 // or // SDR 26 //.
  - a. Fittings:
    - 1) Socket Type: // ASTM D2466, Schedule 40 // ASTM D, 2464 Schedule 80 //.
    - 2) Threaded Type: ASTM D2464, Schedule 80.
    - 3) Swing Joints: Threaded fittings with elastomeric seals and minimum 1380 kPa (200 psi) working pressure.
  - b. Solvent Cement: ASTM D2564.
  - c. Flange Gaskets, Bolts, and Nuts: Type as recommended by manufacturer.

B. Valves:

1. Underground Shut-Off Valves:
  - a. Butterfly Valves 50 mm (2 Inches) and Larger: AWWC504, iron body, bronze mounted, double disc with parallel seats, non-rising stem turning clockwise to close, 150 psi (1025 kPa) minimum working pressure.
  - b. Ball Valves, Isolation valves, 38 mm (1-1/2 Inch) and Smaller: Full-port ball valves with bronze body, PTFE seats, and 90 degree on/off handle. Ball valves to have NPT female end connections.
  - c. Operations:
    - 1) Underground Applications: Use valves with 50 mm (2 inch) nut for T-Handle socket wrench operation.
    - 2) Aboveground and Valve Pit Applications: Use valves with handwheels.
    - 3) Provide enclosed gear drive operators for all butterfly valves 150 mm (6 inches) and larger.
    - 4) Valve ends: Accommodate type of main pipe adjacent to valve.
2. Swing Check Valves:
  - a. Valves Smaller than 100 mm (4 inches): ASTM B61, 850 kPa (125 psi) bronze body and bonnet.

- b. Valves 100 mm (4 inches) and Larger: ASTM B61, 1380 kPa (200 psi), iron body, bronze trim, vertical or horizontal installation, flange connection.
- 3. Pressure Reducing Valve: Cast steel body with renewable seats and stainless steel trim. Design flow passages and all parts to withstand high velocity applications, flange connected.
- 4. Remote Control Valves: Solenoid actuated valves, 24 Volt AC, installed underground.
  - a. Globe Valves: Heavy duty construction with manual shut-off and flow control adjustment manual operation.
  - b. Straight or Angle Valve:
    - 1) Cast iron valve body with brass bonnet, trim and renewable seat with two inlet taps.
    - 2) Molded-plastic body, normally closed diaphragm type with manual shut off and flow control adjustment.
  - c. Provide valves with unions and housing with minimum working pressure, 1025 kPa (150 psi).
- 5. Quick Couplers: Brass parts, two-piece unit consisting of coupler water seal valve assembly and removable upper body to allow spring and key track to be serviced without shut down of main.
  - a. Lids: Lockable vinyl cover with springs for positive closure on key removal.
  - b. Provide Insert number hose swivels and operating keys for each size coupler to Contracting Officer's Representative.
- 6. Reduced Pressure Principle Backflow Preventer: ASSE 1013. Provide for new connection to water distribution system.
- 7. Valves Serviceability: From top without removing valve body from system. Provide Insert Number 750 mm (30 inch) long adjustment keys. Valves to operate at no more than 50 kPa (7 psi) pressure loss at manufacturers maximum recommended flow rate.
- C. Sleeve Material: ASTM D2241, Schedule 40.

#### **5.4 AUTOMATIC CONTROL EQUIPMENT - ELECTRIC**

- A. Control Equipment: NEMA ICS 2 with / 20-volt single phase service 24 Volt AC solar, operating with indicated station, and ground chassis. Provide enclosure NEMA ICS 6 Type 3R, with locking hinge cover, wall mounted pedestal mounted.

1. Electric Controller: Programmed for various schedules by operating individual remote control valves, with following manufacturer's standard recommended components:
  - a. Central computer.
  - b. Flow meter.
  - c. Moisture sensor.
  - d. ET (evapotranspiration).
  - e. Measurement device.
  - f. Rain measurement device.
  - g. Wind measurement device.
  - h. Central control software.
  - i. Field controller.
  - j. Accessories required to operate system.
2. Independent Electric Controllers: UL approved. Programmed for various schedules by one or more independent controllers to operate individual remote control valves, with following manufacturer's standard recommended components:
  - a. Flow meter.
  - b. Rain sensor.
  - c. Accessories required to operate system.
3. Independent Electric Controller with No Flow Sensing (For Small Installations): Programmed for various schedules by one controller to operate individual remote control valve, with manufacturer's standard components.
4. Solar-Powered: Programmed for various schedules by one or more independent controllers to operate individual remote control valves, with manufacturer's recommended components.

#### **5.5 SPRINKLER HEADS**

- A. Sprinkler Heads: Manufacturer's standard unit designed to provide uniform coverage over entire area of spray as indicated on Drawings. Internal assembly includes filter screen, capable of removal from top without removing sprinkler case from riser.
  1. Rotary Pop-Up Sprinklers: Gear-driven, impact resistant heavy-duty ABS with gears and pinions assembled on stainless steel spindles.
    - a. Full circle sprinklers, dual or tri-nozzle combination type with positive water-driven gear assembly.
    - b. Part circle sprinklers, variable arc type.



2. Shrub Spray: Pop-up or fixed spray type with heavy-duty, ultraviolet resistant plastic sprinkler body, stem, nozzle, and screen and stainless steel retract spring and ratcheting system for alignment of pattern.
3. Drip Emitters: Pressure compensating, permanently assembled type with 13 mm (1/2 inch) FPT inlet, capable of providing 3.8 L/min. (1 gpm) at inlet pressures between 100 and 340 kPa (15 and 50 psi).
4. Emitter Distribution Tubing: Constructed of UV resistant vinyl material, 5.5 mm (0.22 inch) O.D. and 4 mm (0.16 inch) I.D., manufactured by same manufacturer as drip emitters.

#### **5.6 LOW VOLTAGE CONTROL VALVE WIRE**

- A. Wire: NFPA 70, solid copper wire, minimum 1.8 mm (14 gage), UL LLC approved for direct burial in ground.

#### **5.7 LOW VOLTAGE CONTROLLER CABLE**

- A. Multi-strand cable, UL-approved for direct burial in ground, size and wire type according to manufacturer's recommendations.

#### **5.8 TRACER WIRES**

- A. Tracer Wires: Plastic-coated copper tracer wire, 1.8 mm (14 gage), green, Type TW, installed with non-metallic irrigation main lines.

#### **5.9 SPLICING MATERIALS**

- A. Epoxy waterproof sealing packet.

#### **5.10 ACCESSORIES**

- A. Valve Box: Precast concrete with compressive strength in excess of 30 MPa (4,000 psi). Provide valve boxes suitable and adjustable for valve used.
  1. Cast word "Irrigation" on cover.
  2. Provide "T" handle socket wrenches, 15 mm (5/8 inch) round stock with sufficient length to extend 600 mm (2 feet) above top of deepest valve box cover.
  3. Stencil controller and circuit numbers with permanent white epoxy paint. Letters minimum 75 mm (3 inches) height.
  4. Provide Insert Number 760 mm (30 inches) long valve adjustment keys.
5. Valve Box in Plant Bed Areas: HDPE structural foam Type A, Class III.
  - a. Color: Green.

- b. Size: Minimum 480 (19 inches) long by 355 mm (14 inches) deep with key-lockable hinged cast iron cover.
- 6. Drip Zone Lateral Flush Cap Assembly: HDPE round reinforced plastic valve box and lid with lift hole, minimum 145 mm (5-3/4 inches) diameter top opening and 230 mm (9-1/16 inches) minimum height.  
Emitter Access Boxes: UV resistant thermoplastic round plastic boxes with lid, tan in color. Top diameter 125 mm (5 inches) and 260 mm (10-1/4 inches) high, minimum.
- B. Backflow Preventer: ASSE 1013. Provide reduced pressure principle backflow preventer at each new connection to water distribution system.
- C. Water Meters:  
Not Used
- D. Pressure Gages: ASME B40.100, 113 mm (4-1/2 inches) diameter, all metal case, with bottom connection.
  - 1. Dial: Dead black throughout with maximum graduations of 13.8 kPa (2 psi). Provide shut-off cocks.
- E. Concrete Pit: Reinforced poured in place concrete structure as specified in Section 03 30 00, CAST-IN-PLACE CONCRETE or approved precast concrete unit.
  - 1. Frames And Covers for Concrete Pit:
    - a. For roadway applications, traffic rated frame and cover, AASHTO H20-44 loading.
    - b. For non-roadway applications, provide:
      - 1) Cast-iron cover with cast-in identification symbol "IRR-WATER".
      - 2) Frame: Type I, Straight Traffic Frame, Style A, Size 30A.
      - 3) Cover: Type Type B, Size 30A.
- F. Strainers:
  - 1. Brass Strainer Basket:
    - a. Bodies smaller than 63 mm (2-1/2 inches), brass or bronze.
    - b. Bodies 63 mm (2-1/2 inches) and larger, cast iron or semi-steel.
    - c. Provide strainer cover with blow-off connection and shut-off valve to accommodate 18 mm (3/4 inch) diameter hose connection.
- G. Warning Tape: Polyethylene film warning tape, 0.1 mm (4 mils) thick, 75 mm (3 inches) wide, detectable, imprinted with "CAUTION BURIED IRRIGATION WATER LINE BELOW", colored as follows:
  - 1. Blue with Black Letters: Potable water.
  - 2. Purple with Black Letters: Reclaimed or untreated well water.

**PART 6 - EXECUTION**

**6.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Examine proposed irrigation areas for compliance with requirements and conditions affecting installation and performance.
- D. Set stakes to identify locations of proposed irrigation system. Obtain Contracting Officer's Representative's approval before excavation.

**6.2 INSTALLATION - GENERAL**

- A. Install products according to manufacturer's instructions // and approved submittal drawings //.
  - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Perform excavation, trenching, and backfilling for sprinkler system as specified in Section 31 20 00, EARTHWORK.

**6.3 PIPE INSTALLATION - GENERAL**

- A. Layout work as indicated on drawings. Lines are to be in common trench wherever possible.
- B. Install sprinkler lines to avoid HVAC trenches, electric ducts, storm and sanitary sewer lines, and existing water and gas mains; all of which have right of way.
- C. Cut existing sidewalks and curbs during trenching and installation of pipe. Install pipe under sidewalks and curbs by jacking, auger boring, or by tunneling. Repair or replace any cracked concrete, due to settling, during warranty period.
- D. Do not lay pipe on unstable material, in wet trenches or, in opinion of Contracting Officer's Representative, when trench or weather conditions are unsuitable for work.
- E. Allow minimum of 75 mm (3 inches) between parallel pipes in same trench.
- F. Clean interior portion of pipe and fittings of foreign matter before installation. Securely close open ends of pipe and fittings with caps or plugs to protect fixtures and equipment against dirt, water and chemical or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.

- G. Install full length of each section of pipe resting upon pipe bed with recesses excavated to accommodate bells or joints. Do not lay pipe on wood blocking.
- H. Hold pipe securely in place while joint is being made.
- I. Do not work over, or walk on, pipe in trenches until covered by layers of earth, well tamped, in place to depth of 300 mm (12 inches) over pipe.
- J. Install irrigation lines and control wire at boundaries of graves, through designated utility lanes or beside roadways without disruption of irrigation system.
- K. Install irrigation lines and control wire at designated utility lanes or beside roadways where possible.
- L. Connect new system to existing mains.
- M. Install concrete thrust blocks where irrigation main changes direction at "L" and "T" locations and where irrigation main terminates. Delay pressure tests until minimum 36 hours after completing thrust blocks. Size and place concrete thrust blocks for supply mains according to pipe manufacturer's instructions.
- N. Minimum cover over water mains, 760 mm (30 inches). Cover laterals to minimum depth of 600 mm (24 inches).
- O. Place warning tape 300 mm (12 inches) above sprinkler system water mains and laterals.

#### **6.4 PLASTIC PIPE INSTALLATION**

- A. Install plastic pipe snaked in trench at least 1 m per 30 m (1 foot per 100 feet) to allow for thermal construction and expansion and to reduce strain on connections.
- B. Joints:
  - 1. Solvent Welded Socket Type: ASTM D2855.
  - 2. Threaded Type: Apply liquid Polytetrafluoroethylene (PTFE) thread lubricant or PTFE thread tape. After joint is made hand tight (hard), strap wrench should be used to make up to two additional full turns.
  - 3. Elastomeric Gasket: ASTM F477.

#### **6.5 VALVE INSTALLATION**

- A. Group remote control valves wherever possible and aligned at set dimension back of curb along roads.
- B. Do not install valves under roads, pavement or walks.

- C. Clean interior of valves of foreign matter before installation.
- D. House pressure control valves installed adjacent to remote control valve in same valve box.
- E. Install valve box with cover flush with finished grade.
- F. Install control valves minimum 75 mm (3 inches) below finished grade.

#### **6.6 SLEEVE INSTALLATION**

- A. Install sleeves where pipe and control wires are installed under walks, paving, walls, and other similar areas.
- B. Install sleeves twice line size or greater extend 300 mm (12 inches) beyond edges of paving or construction.
- C. Bed sleeves with minimum 100 mm (4 inches) sand backfill above top of pipe in areas where pipe is placed before hardscape is installed.

#### **6.7 EMITTER HOSE INSTALLATION**

- A. Joint: Solvent weld connection.
- B. Install line size by 9 mm (3/8 inch) insert bushings adapters from PVC Schedule 40 fittings to flex vinyl hose.

#### **6.8 SPRINKLER AND QUICK COUPLER INSTALLATION**

- A. Install sprinkler heads and quick couplers on temporary nipples extending at least 75 mm (3 inches) above finished grade. After turf is established, remove temporary nipples, install sprinkler heads and quick couplers at ground surface.
- B. Locate part circle heads to maintain maximum distance of 150 mm (6 inches) from edges and other boundaries.
- C. Provide swing joint assembly in all sprinklers, shrub sprays and quick couplers.
- D. Set shrub spray heads 200 mm (8 inches) above grade and 300 mm (12 inches) from edge of curb or pavement. Place adjacent to walls. Stake heads before backfilling trenches. Support stakes parallel to riser.
- E. Install entire system for manual and automatic draining. Equip low point of each underground line with drain valve draining into an excavation containing gravel. Backfill with excavated material and cover with 50 mm (2 inches) precast concrete cover.

#### **6.9 DRIP IRRIGATION SPECIALTY INSTALLATION**

- A. Install drip heads in plastic drip box. Connect drip head to rigid PVC nipple drip directly to tubing. Attach tubing to barbed fitting and daylight distribution tubing at root ball secured with stake. Add bug

cap at end of secured distribution tubing. After installing drip heads and before operating system, open end of drop lateral and flush lines clean. Limit number of drip heads on line according to manufacturer's recommendations for hose or distribution tubing size and length.

**6.10 AUTOMATIC IRRIGATION - CONTROL SYSTEM INSTALLATION**

- A. Determine exact location of controllers in field before installation. Coordinate electrical service to these locations. Install according to manufacturer's instructions and NFPA 70.

**6.11 CONTROL WIRE INSTALLATION**

- A. Install electric control cable in trenches with new mains or in separate trench at back of curb, unless cross-country route is indicated on Drawings. Locate in trench with mains when possible on cross-country routes.
- B. Install wiring bundles located with piping 50 mm (2 inches) below bottom of pipe. Color code each wire in bundle differently. Bundle multiple wires and tape together at 4570 mm (15 foot) intervals. Tag wires at controllers and control valve location with plastic tie wire tags. Provide same number and color of wire at each ends.
- C. Hold splicing to minimum. Provide pullbox at each splice. No splices will be allowed between field located controllers and remote control valves.
- D. Provide 300 mm (12 inch) expansion loops in wiring at each wire connection or change in wire direction. Provide 600 mm (24 inches) loop at remote control valves.
- E. Do not install power wires for operation of irrigation system in same conduit as irrigation control wires.

**6.12 TRACER WIRE INSTALLATION**

- A. Install tracer wire on bottom of trench, adjacent to vertical pipe projections, and continuous throughout length of pipe, with spliced joints soldered and covered with insulation type tape.
- B. Install tracer wire following main line pipe and branch lines and terminate in yard box with gate valve controlling these main irrigation lines. Provide sufficient length of wire to reach finish grade, bend back end of wire to make loop and attach plastic label with designation "Tracer Wire."
- C. Record locations of tracer wires and their terminations on project record documents.

### **6.13 FRAMED INSTRUCTIONS**

- A. Post framed instructions, containing wiring and control diagrams under glass or in laminated plastic, where directed by Contracting Officer. Condensed operating instructions, prepared in typed form, framed and posted beside diagrams. Post framed instructions before acceptance testing of system. Submit labels, signs, and templates of operating instructions that are required to be mounted or installed on or near product for normal, safe operation. Prepare controller charts and programming schedule after as-built drawings are approved by Contracting Officer. Provide one black-line chart for each controller as reduced drawing of actual as-built system that will fit maximum dimensions inside controller housing. Indicate each station coverage area with different pastel or transparent color on chart. After chart is completed and approved for final acceptance, laminate chart, sealed between two 0.5 mm (20 mil) pieces of clear plastic.

### **6.14 FIELD TRAINING**

- A. Provide field training course for designated operating and maintenance staff members for total period of 4 hours of normal working time and starting after system is functionally complete but before final acceptance tests. Submit information describing training to be provided, training aids to be used, samples of training materials to be provided, and schedules and notification of training. Cover items contained in operating and maintenance manuals. Provide two additional years of software support for one hour each month.

### **6.15 FIELD QUALITY CONTROL**

- A. Special Inspections and Tests:
- B. Field Tests and Inspections: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
  - 1. Pressure test lines before joint areas are backfilled. Backfill minimum of 300 mm (12 inches) over pipe to maintain pipe stability during test period. Test piping at hydraulic pressure of 1030 kPa (150 psi) for two hours.
    - a. Maximum Loss: 3 L/25 mm pipe diameter/300 m (0.8 gallons per inch pipe diameter per 1,000-feet). Locate pump at low point in line and apply pressure gradually. Install pressure gage shut-off valve and safety blow-off valve between pressure source and piping. Inspect each joint and repair leaks. Repeat test

until satisfactory results are achieved and accepted by  
Contracting Officer's Representative.

2. After testing, flush system with minimum 150 percent of operating flow passing through each pipe beginning with larger mains and continuing through smaller mains in sequence. Flush lines before installing sprinkler heads and quick couplers.
  3. Charge system and test for leaks after installation. Repair leaks and retest until no leaks exist.
  4. After electrical circuitry has been energized and final adjustment of sprinkler heads is complete, test each sprinkler section by pan test and visual test to indicate uniform distribution within any one sprinkler head area and over entire area. Operate controllers and automatic control valves to demonstrate complete and successful installation and operation of all equipment.
- C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment. Any irrigation product will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

#### **6.16 PROTECTION**

- A. Protect irrigation system from traffic and construction operations.
- B. Remove protective materials immediately before acceptance.
- C. Repair damage.

- - - E N D - - -



**SECTION 32 90 00  
PLANTING**

**PART 7 - GENERAL**

**7.1 SUMMARY**

A. Section Includes:

1. Plants, soils, edging, turf, and landscape materials.

**7.2 RELATED REQUIREMENTS**

**7.3 DEFINITIONS**

- A. Pesticide: Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests and is specifically labeled for use by U.S. Environmental Protection Agency (EPA). Also, any substance used as plant regulator, defoliant, disinfectant, or biocide.
- B. Planter Bed: An area containing one or combination of following plant types: shrubs, vines, wildflowers, annuals, perennials, ground cover, // and mulch topdressing // excluding turf. Trees may also be found in planter beds.
- C. Stand of Turf: 95 percent of established species.

**7.4 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. American National Standards Institute (ANSI):
  1. Z60.1-2014 - Nursery Stock.
- C. American Society for Testing And Materials (ASTM):
  1. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

2. B221M-13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
3. C33/C33M-16-Concrete Aggregates.
4. C136/C136M-14 - Sieve Analysis of Fine and Coarse Aggregates.
5. C602-13a - Agricultural Liming Materials.
6. D977-13e1 - Emulsified Asphalt.
7. D5268-13 - Topsoil Used for Landscaping Purposes.
- D. Hortus Third: Concise Dictionary of Plants Cultivated in United States and Canada.
- E. Tree Care Industry Association (TCIA):
  1. A300P1-2008 - Tree Care Operations - Trees, Shrubs and Other Woody Plant Maintenance Standard Practices (Pruning).
  2. Z133.1-2012 - Arboricultural Operations - Safety Requirements.
- F. Turfgrass Producers International (TPI):
  1. 2006 Guideline Specifications to Turfgrass Sodding.
- G. United States Department of Agriculture (USDA):
  1. DOA SSIR 42-2014 - Soil Survey Laboratory Methods Manual.
  2. Handbook No. 60 - Diagnosis and Improvement of Saline and Alkali Soils.

#### **7.5 PREINSTALLATION MEETINGS**

- A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section.
  1. Required Participants:
    - a. Contracting Officer's Representative.
    - b. Contractor.
    - c. Installer.
  2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
    - a. Inspection of planting materials.
    - b. Installation schedule.
    - c. Installation sequence.
    - d. Preparatory work.
    - e. Protection before, during, and after installation.
    - f. Installation.
    - g. Inspecting.
    - h. Environmental procedures.
  3. Document and distribute meeting minutes to participants to record decisions affecting installation.

## 7.6 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Description of each product.
  - 2. Photographs: Color photographs of each plant species showing actual size and condition of plants to be provided with measuring device included for scale. Where more than 20 plants are required of any species, submit minimum three photographs of average, best, and worst quality plant to be provided. Include on each photograph, plant full scientific name, size, and source nursery.
  - 3. Installation instructions.
  - 4. Warranty.
- C. Samples:
  - 1. Trees and Shrubs: Full sized of each variety and size. Deliver samples to project site and maintain samples for duration of construction period.
  - 2. Organic and Compost Mulch: 1 L. (1 quart) sealed plastic bag of each required mulch, including label with percentage weight of each material and source representing material to be provided. Samples to match color, texture, and composition of installed material.
  - 3. Mineral Mulch: 1.0 kg (2 lb.) sealed plastic bag of mulch, including label with source. Samples to match color, texture, and composition of installed material.
  - 4. Filter Fabric: 300 by 300 mm (12 by 12 inches).
  - 5. Edging Materials and Accessories: Manufacturer's standard sizes.
  - 6. Tree Wrap: Width of panel by 300 mm (12 inches).
- D. Sustainable Construction Submittals:
  - 1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
  - 2. Biobased Content:
    - a. Show type and quantity for each product.
- E. Test reports: Certify products comply with specifications.
- F. Certificates: Certify products comply with specifications.
  - 1. Plant Materials: Department of Agriculture certification by State Nursery Inspector declaring material to be free from insects and disease.
  - 2. Seed and Turf Materials: Notarized certificate of product analysis.

- G. Qualifications: Substantiate qualifications comply with specifications.
  - 1. Installer, including supervisor with project experience list.
- H. Operation and Maintenance Data:
  - 1. Care instructions for each plant material.

#### **7.7 QUALITY ASSURANCE**

- A. Installer Qualifications:
  - 1. Regularly installs specified products.
  - 2. Installed specified products with satisfactory service on five similar installations for minimum five years.
    - a. Project Experience List: Provide contact names and addresses for completed projects.
  - 3. Member in good standing of either Professional Landcare Network or American Nursery and Landscape Association.
  - 4. Field supervisor and Personnel assigned to Work are certified in one of following categories from Professional Landcare Network and submit one copy of certificate to Contracting Officer's Representative:
    - a. Certified Landscape Technician (CLT) - Exterior, with installation, maintenance, irrigation, specialty areas, designated CLT-Exterior.
    - b. Certified Landscape Technician (CLT) - Interior, designated CLT-Interior.
    - c. Certified Ornamental Landscape Professional, designated COLP.
- B. Licensed Arborist required to submit one copy of license to Contracting Officer's Representative.
- C. Independent or university laboratory, recognized by State Department of Agriculture, with experience and capability to conduct testing indicated and that specializes in types of tests to be performed.
- D. Measure plants according to ANSI Z60.1. Pruning to obtain required sizes will not be permitted.
- E. Contracting Officer's Representative may review plant materials either at place of growth or project site before planting for compliance with requirements. Contracting Officer's Representative retains right to inspect trees and shrubs to determine if any unacceptable conditions exist and to reject any trees or shrubs at any time during Project. All rejected trees and shrubs must be immediately removed from Project site.

1. Submit plant material source information to Contracting Officer's Representative seven days in advance of delivery to Project site.
- F. Material Test Reports: For standardized ASTM D5268 topsoil existing native surface topsoil existing in-place surface soil.
1. For each unamended soil type, provide soil analysis and written report by qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of soil.
  2. Comply with USDA's Handbook No. 60 testing methods and written recommendations.
  3. Soil-testing laboratory to oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Contracting Officer's Representative. Take minimum 3 representative samples from varied locations for each soil to be used or amended for planting purposes.
  4. Report suitability of tested soil for plant growth.
  5. Based on test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 92.9 sq. m (1000 sq. ft.) or volume per 0.76 cu. m (1 cu. yd.) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
  6. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

#### **7.8 DELIVERY**

- A. Deliver packaged products in manufacturer's original sealed packaging.
- B. Bulk Products:
  1. Deliver bulk products away from buildings, utilities, pavement, and existing turf and planted areas. Maintain dry bulk product storage away from contaminants.
  2. Install erosion control materials to prevent erosion or displacement of bulk products.
- C. Apply antidesiccant to trees and shrubs according to manufacturer's instructions to protect during digging, handling, and transportation.

1. For deciduous trees or shrubs in full leaf, spray with antidesiccant at nursery before transporting and again two weeks after planting.
- D. Wrap trees and shrubs with tree wrap according to manufacturer's instructions to protect from wind and other damage during digging, handling, and transportation.
- E. Deliver bare-root stock plants freshly dug with root system packed in wet straw, hay, or similar material.
- F. Deliver branched plants with branches tied and exposed branches covered with material that allows air circulation. Prevent damage to branches, trunks, root systems, and root balls and desiccation of leaves.
- G. Use of equipment such as "tree spades" is permitted provided plant balls are sized according to ANSI Z60.1 and tops are protected from damage.

#### **7.9 STORAGE AND HANDLING**

- A. Store bulbs, corms, and tubers in dry location at 16 to 18 degrees C (60 to 65 degrees F) until planting.
- B. Store seeds and other packaged materials in dry locations away from contaminants.
- C. Plant Storage and Protection: Store and protect plants not planted on day of arrival at Project site as follows:
  1. Shade and protect plants in outdoor storage areas from wind and direct sunlight until planted.
  2. Heel-in bare root plants.
  3. Protect balled and burlapped plants from freezing or drying out by covering balls or roots with moist burlap, sawdust, wood chips, shredded bark, peat moss, or other approved material. Provide covering that allows air circulation.
  4. Keep plants in moist condition until planted by watering with fine mist spray.
  5. Do not store plant materials directly on concrete or bituminous surfaces.
- D. Topsoil: Before stockpiling topsoil, eradicate on site undesirable growing vegetation. Clear and grub existing vegetation three to four weeks before stockpiling existing topsoil.
- E. Root Control Barrier and Weed Control Fabric: Store materials in site in enclosures or under protective covering in dry location out of direct sunlight. Do not store materials directly on ground.

- F. Handling: Do not drop or dump plants from vehicles. Avoid damaging plants being moved from nursery or storage area to planting site. Handle, boxed, balled and burlapped, bare root, balled and potted, container plants carefully to avoid damaging or breaking earth ball or root structure. Do not handle plants by trunk or stem. Puddle bare-root plants after removal from heeling-in bed to protect roots from drying out. Remove damaged plants from Project site.

#### **7.10 FIELD CONDITIONS**

- A. Environment:
1. Coordinate installation of planting materials during optimal planting seasons for each type of plant material required.
  2. Planting Dates:
  3. Restrictions: Do not plant when ground is frozen, snow covered muddy, or when air temperature exceed 32 degrees C (90 degrees F).
- B. Weather Limitations: Install plantings only during current and forecasted weather conditions that are comply with plant requirements. Apply associated products in compliance with manufacturers' instructions.

#### **7.11 WARRANTY**

- A. Manufacturer's Warranty: Warrant plantings and against material defects.
1. Warranty Period: Two years.
  2. Plant and Turf Warranty Periods will begin from date of planting completion Substantial Completion Government acceptance of project or phase for beneficial use and occupancy.
  3. Contracting Officer's Representative will reinspect plants and turf at end of Warranty Period. Replace any dead, missing, or defective plant material and turf immediately. Warranty Period will end on date of this inspection provided Contractor has complied with warranty work required by this specification. Comply with following requirements:
    - a. Replace any plants more than 25 percent dead, missing or defective plant material before final inspection.
    - b. Only one replacement of each plant will be required except when losses or replacements are due to failure to comply with these requirements.

- c. Complete remedial measures directed by Contracting Officer's Representative to ensure plant and turf survival.
- d. Repair damage caused while making plant or turf replacements.

## **PART 8 - PRODUCTS**

### **8.1 PRODUCTS - GENERAL**

- A. Provide each product from one source or manufacturer.
- B. Sustainable Construction Requirements:
  - 1. Select products with recycled content to achieve overall Project recycled content requirement.
    - a. Fertilizer.
    - b. Weed control fabric.
    - c. Root control barrier.
  - 2. Steel Recycled Content: 30 percent total recycled content, minimum.
  - 3. Aluminum Recycled Content: 50 percent total recycled content, minimum.
  - 4. Biobased Content:
    - a. Organic Mulch: 100 percent.
    - b. Peat: 100 percent.

### **8.2 PLANT MATERIALS**

- A. Plant Materials: ANSI Z60.1, conforming to varieties specified and be true to scientific name as listed in Hortus Third. Well-branched, well-formed, sound, vigorous, healthy planting stock free from disease, sunscald, windburn, abrasion, and harmful insects or insect eggs and having healthy, normal, and undamaged root system.
  - 1. Trees-Deciduous and Evergreen: Single trunked with single leader, unless otherwise indicated; symmetrically developed deciduous trees and shrubs of uniform habit of growth; straight boles or stems; free from objectionable disfigurements; evergreen trees and shrubs with well-developed symmetrical tops, with typical spread of branches for each particular species or variety. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk; crossing trunks; cut-off limbs more than 19 mm (3/4 inch) in diameter; or with stem girdling roots will be rejected.
  - 2. Ground Cover and Vine Plants: Provide number and length of runners for size specified on drawings, together with proper age for grade of plants specified. Provide vines and ground cover plants well



established in removable containers, integral containers, or formed homogeneous soil sections. Provide plants grown under climatic conditions similar to those in locality of project. Spray all plants budding into leaf or having soft growth with an anti-desiccant at nursery before digging.

3. Provide plants of sizes indicated, measured before pruning with branches in normal position. Plants larger in size than specified is acceptable with approval of Contracting Officer's Representative, with no change in contract price. When larger plants are used, increase ball of earth or spread of roots according to ANSI Z60.1.
  4. Provide nursery grown plant material conforming to requirements and recommendations of ANSI Z60.1. Dig and prepare plants for shipment in manner that will not cause damage to branches, shape, and future development after planting.
  5. Balled and burlapped (B&B) plant ball sizes and ratios will conform to ANSI Z60.1, consisting of firm, natural balls of soil wrapped firmly with burlap or strong cloth and tied.
  6. Bare root (BR) plants to have root system substantially intact, but with earth carefully removed. Cover roots with thick coating of mud by "puddling" after plants are dug.
  7. Container grown plants to have sufficient root growth to hold earth intact when removed from containers, but not be root bound.
  8. Make substitutions only when plant (or alternates as specified) is not obtainable and Contracting Officer's Representative authorizes change order providing for use of nearest equivalent obtainable size or variety of plant with same essential characteristics and an equitable adjustment of contract price.
  9. Existing plants to be relocated: Ball sizes to conform to requirements for collected plants in ANSI Z60.1, and plants dug, handled, and replanted according to applicable articles of this Section.
  10. Only plants grown in nursery are permitted.
- B. Label plants with durable, waterproof labels in weather-resistant ink. Provide labels stating correct botanical and common plant name and variety and size as specified in list of required plants. Groups of plants may be labeled by tagging one plant. Labels to be legible for minimum 60 days after delivery to planting site.

### 8.3 SOD

- A. Sod: Nursery grown, certified and classified in TPI's "Guideline Specifications to Turfgrass Sodding" as GSS. Machine cut sod at uniform thickness of 19 mm (3/4 inch) within tolerance of 6 mm (1/4 inch), excluding top growth and thatch. Each individual sod piece to be strong enough to support its own weight when lifted by ends. Broken pads, irregularly shaped pieces, and torn or uneven ends will not be permitted.
- B. SEED
- C. Grass Seed: State-certified Endophyte-enhanced seed of latest season's crop delivered in original sealed packages, bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weed seed content, and inert material. Label in conformance with AMS Seed Act and applicable state seed laws. Wet, moldy, or otherwise damaged seed will not be acceptable. Field mixes will be acceptable when field mix is performed on site in presence of Contracting Officer's Representative.

### 8.4 TURF SELECTIONS

- A. Grasses for Cool Regions:
  - 1. Bentgrasses: Redtop (*Agrostis alba*) and Colonial (*Agrostis tenuis*).
  - 2. Bluegrasses: Kentucky (*Popratisensis*), Rough-stalked (*Potrivialis*) and Canada(*Poa compressa*).
  - 3. Fescue: Red (*Festucrubra*), Meadow (*Festucpratensis*) and Tall (*Festucarundinacea*).
  - 4. Ryegrasses: Perennial (*Lolium perenne*).
- B. Grasses for Warm Regions:
  - 1. Bermuda grass (*Cynodon dactylon*).
  - 2. Carpetgrass (*Axonopus affinis*).
  - 3. Centipedegrass (*Eremochloophiuroides*).
  - 4. St. Augustinegrass (*Stenotaphrum secundatum*).
  - 5. Zoysiagrass (*Zoysimatrella*).

### 8.5 SPRIGS

- A. Sod Sprigs: Healthy living stems, stolons, or rhizomes and attached roots of locally adapted grass without adhering soil, including two to three nodes and from 100 to 150 mm (4 to 6 inches) long. Obtain from heavy, dense certified sod classified as TPI GSS. // Obtain sprigs from designated area on project site. // Provide sprigs grown under climatic

conditions similar to those of project site. Coordinate harvesting and planting to prevent sun exposure for more than 30 minutes before covering and moistening. Sprigs containing weeds or other detrimental material or that are heat damaged will be rejected.

#### **8.6 PLUGS**

- A. Plugs: Nursery grown sod, certified and classified in TPI's "Guideline Specifications to Turfgrass Sodding" as GSS.
- B. Square or round sections with deep, mature root system.
  - 1. Species to match adjacent sod.
  - 2. Plug Size: 50 mm (2 inches) 75 mm (3 inches) 100 mm (4 inches) by 50 mm (2 inches).

#### **8.7 PLANTING SOILS**

- A. Planting Soil: Evaluate soil for use as topsoil according to ASTM D5268. From 5 to 10 percent organic matter as determined by topsoil composition tests of Organic Carbon, 6A, Chemical Analysis Method described in USDA DOA SSIR 42. Maximum particle size, 19 mm (3/4 inch), with maximum 3 percent retained on 6 mm (1/4 inch) screen. Mix topsoil with following soil amendments as recommended by soils analysis.
- B. Existing Planting Soil: Existing, native surface topsoil formed under natural conditions retained during excavation process. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
  - 1. Supplement with planting soil when quantities are insufficient.
  - 2. Mix existing, native surface topsoil with soil amendments as recommended by soils analysis.
- C. Imported Planting Soil: Imported topsoil or manufactured topsoil from off-site sources are acceptable if sufficient topsoil is not available on site to meet specified depth. At least 10 days before topsoil delivery, notify Contracting Officer's Representative of topsoil sources. Obtain imported topsoil displaced from naturally well-drained construction or mining sites where topsoil is at least 100 mm (4 inches) deep. Topsoil from bogs, or marshes will be rejected.

#### **8.8 INORGANIC SOIL AMENDMENTS**

- A. Lime: Commercial grade hydrate or limestone containing calcium carbonate equivalent (CCE) specified in ASTM C602 of minimum 80 percent.
- B. Sulfur: 100 percent elemental.
- C. Iron Sulfate: 100 percent elemental.
- D. Aluminum Sulfate: Commercial grade.
- E. Perlite: Horticultural grade.
- F. Agricultural Gypsum: Coarsely ground from recycled scrap gypsum board comprised of calcium sulfate dehydrate 91 percent, calcium 22 percent, sulfur 17 percent, minimum 96 percent passing through 850 micrometers 20 mesh screen, 100 percent passing through 970 micrometers 16 mesh screen.
- G. Coarse Sand: ASTM C33/C33M, clean and free of materials harmful to plants.
- H. Vermiculite: Horticultural grade for planters.
- I. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
- J. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

#### **8.9 ORGANIC SOIL AMENDMENTS**

- A. Organic Matter: Commercially prepared compost. Free of substances toxic to plantings and as follows:
  - 1. Organic Matter content: Wood cellulose fiber wood chips ground or shredded bark shredded hardwood bark peelings pine straw mulch pine needles from project site when available. Biobased content 100 percent. Wood cellulose fiber processed to contain no growth or germination-inhibiting factors, dyed with non-toxic, biodegradable dye to appropriate color to facilitate visual metering of materials application.
  - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- B. Peat: Natural product of sphagnum moss peat, peat moss, hypnum moss, peat reed sedge peat, peat humus derived from fresh-water site, conforming to ASTM D4427 and containing no invasive species, including seeds. Shred and granulate peat to pass 12.5 mm (1/2 inch) mesh screen

and condition in storage pile for minimum 6 months after excavation.  
Biobased content minimum 100 percent.

- C. Composted Derivatives: Ground bark, nitolized sawdust, humus, or other green wood waste material free of stones, sticks, invasive species, including seeds, and soil stabilized with nitrogen and having following properties:
  - 1. Particle Size: Minimum percent by weight passing:
    - a. 4.75 mm (No. 4) mesh screen: 95.
    - b. 2.36 mm (No. 8) mesh screen: 80.
  - 2. Nitrogen Content: Minimum percent based on dry weight:
    - a. Fir sawdust: 0.7.
    - b. Fir or pine bark: 1.0.
  - 3. Biobased Content: 100 percent.
- D. Manure: Well-rotted, horse or cattle manure containing maximum 25 percent by volume of straw, sawdust, or other bedding materials; free of seeds, stones, sticks, soil, and other invasive species.

#### **8.10 PLANT FERTILIZERS**

- A. Soil Test: Evaluate existing soil conditions and requirements before fertilizer selection and application to minimize use of all fertilizers and chemical products. Obtain approval of Contracting Officer's Representative for allowable products, product alternatives, scheduling and application procedures. Evaluate existing weather and site conditions before application. Apply products during favorable weather and site conditions according to manufacturer's instructions and warranty requirements. Fertilizers to be registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer applicable to specific areas as required for Project conditions and application. Provide commercial grade plant and turf fertilizers, free flowing, uniform in composition and conforms to applicable state and federal regulations.
- B. Fertilizer for groundcover, wildflowers, and grasses is not acceptable. Provide fertilizer for trees, plants, and shrubs as recommended by plant supplier, except synthetic chemical fertilizers are not acceptable. Fertilizers containing petrochemical additives or that have been treated with pesticides or herbicides are not acceptable.
- C. Granular Fertilizer: Organic, granular controlled release fertilizer containing minimum percentages, by weight, of plant food nutrients.

1. Composition: Nitrogen, phosphorous, potassium, sulfur, and iron in amounts recommended in soil reports from qualified soil-testing laboratory.

D. Fertilizer Tablets: Organic plant tablets composed of tightly compressed fertilizer chips, insoluble in water, to provide continuous release of nutrients for minimum 24 months and containing following minimum percentages, by weight, of plant food nutrients:

1. Nutrient Composition: 20 percent available nitrogen, 20 percent available phosphorous, and 5 percent available potassium.

#### **8.11 WEED CONTROL FABRIC**

A. Roll Type Polypropylene or Polyester Mats: Woven, needle punched, or non-woven fabric treated for protection against deterioration due to ultraviolet radiation. Minimum 99 percent opaque to prevent photosynthesis and seed germination, fabric allows air, water, and nutrients to pass through to plant roots.

1. Minimum weight: 0.11 kg per square meter (5 ounces per square yard).
2. Minimum thickness: 0.50 mm (20 mils).

#### **8.12 MULCH**

A. Organic Mulch:

1. Wood cellulose fiber, wood chops, ground or shredded bark, shredded hardwood, bark peelings for project site when available. Biobased content minimum 100 percent. Wood cellulose fiber processed to contain no growth or germination-inhibiting factors, dyed with non-toxic, biodegradable dye to an appropriate color to facilitate visual metering of application.

- a. Straw for Lawn Seed Bed Mulch: Stalks from oats, wheat, rye, barley, or rice free of noxious weeds, mold or other objectionable material. Air dried and suitable for placing with blower equipment.
- b. Wood cellulose fiber for hydraulic application of grass seed and fertilizer: Specially prepared wood cellulose fiber, processed to contain no growth or germination inhibiting factors, and dyed an appropriate color to facilitate visual metering of application of materials. Maximum 12 percent moisture dry weight, plus or minus 3 percent at time of manufacture. pH range from 3.5 to 5.0. Manufacturer wood cellulose fiber for application as follows:

- 1) After addition and agitation in slurry tanks with fertilizers, grass seeds, water, and other approved additives, fibers will become uniformly suspended to form a homogeneous slurry.
  - 2) When hydraulically sprayed, material will form blotter-like cover impregnated uniformly with grass seed.
  - 3) Cover will allow absorption of moisture and allow rainfall or applied water to percolate to underlying soil.
2. Color: Natural.
- B. Compost Mulch: Decomposed organic matter with low carbon to nitrogen ratio.
- C. Mineral Mulch: Coarse, clean stone of following type, size, and color:
1. Type: crushed volcanic rock or pea gravel .
  2. Size: ASTM C136/C136M, 65 mm (2-1/2 inches) maximum and 25 mm (1 inch) minimum.
  3. Color: Acceptable to Contracting Officer's Representative.

#### **8.13 EDGING**

Not Used

#### **8.14 ANTIDESICCANT**

- A. Antidesiccant: An emulsion specifically manufactured for agricultural use that will provide protective film over plant surfaces permeable enough to permit transpiration.

#### **8.15 EROSION CONTROL**

- A. Erosion Control Blankets: 70 percent agricultural straw and 30 percent coconut fiber matri, stitched with degradable nettings, designed to degrade within , 18 months.
- B. Erosion Control Fabric: Knitted construction of polypropylene yarn with uniform mesh openings 19 to 25 mm (3/4 to 1 inch) square with strips of biodegradable paper. Minimum filler paper strip life of six months.
- C. Erosion Control Net: Heavy, twisted jute mesh weighing approximately 605 grams per meter (1.22 pounds per linear yard) and 1200 mm (4 feet) wide with mesh openings approximately 25 mm (1 inch) square.
- D. Erosion Control Material Anchors: As recommended by erosion control material manufacturer.

#### **8.16 ROOT CONTROL BARRIER**

- A. Root Control Barrier: Flexible and permeable geotextile fabric with permanently attached time-release nodules. Pre-formed linear barrier

with integral vertical root deflecting ribs constructed of ultraviolet resistant polypropylene material.

#### **8.17 BIOSTIMULANTS**

- A. Biostimulants: Formulation containing soil conditioners, VAM fungi, and endomycorrhizal and ectomycorrhizal fungi spores and soil bacteria appropriate for existing soil conditions.

#### **8.18 STAKING AND GUYING MATERIALS**

- A. Staking Material:
  - 1. Tree Support Stakes: Rough sawn hardwood free of knots, rot, cross grain, bark, long slivers, or other defects that impair strength. Minimum 50 mm (2 inches) square, 64 mm (2-1/2 inches) diameter by 2.4 m (8 feet) long, pointed at one end.
  - 2. Ground Stakes: 50 mm (2 inches) square by 0.91 m (3 feet) long wood or plastic, pointed at one end.
- B. Guying Material:
  - 1. Guying Wire: ASTM A580/A580M, galvanized steel wire.
  - 2. Guying Cable: Minimum five-strand, 5 mm (3/16 inch) galvanized steel cable.
- C. Hose Chafing Guards: New or used 2 ply 19 mm (3/4 inch) reinforced rubber or plastic hose, black or dark green, all of same color.
- D. Flags: White surveyor's plastic tape 150 mm (6 inches) long, fastened to guying wires or cables.
- E. Turnbuckles: Galvanized or cadmium-plated steel with minimum 75 mm (3 inch) long openings fitted with screw eyes and galvanized or cadmium-plated steel eye bolts with 25 mm (1 inch) diameter eyes and 38 mm (1-1/2 inches) minimum screw length.

#### **8.19 TREE WRAP**

- A. Crinkled Paper Tree Wrap: Two thicknesses of crinkled paper cemented together with layer of bituminous material. Minimum 100 mm (4 inches) wide with stretch factor of 33 1/3 percent. Tie with lightly tarred medium or coarse sisal yarn twine.
- B. Tree Shelters: Extruded, translucent, twin walled polypropylene protection board sheets, 3 mm (1/8 inch) thick, 1800 mm (6 feet) long, utilized for short trunk trees 75 mm (3 inch) caliper or less.
- C. Synthetic Fabric Tree Wrap: White, breathable polypropylene fabric in 75 mm (3 inch) wide rolls.



- D. Tape: Bio-degradable tape suitable for nursery use to secure tree wrap which degrades in sunlight maximum 2 years after installation.

#### **8.20 TACKIFIERS AND ADHESIVES**

- A. Nonasphalt Tackifier: Colloidal liquid fixative recommended by fiber mulch manufacturer for hydroseeding.
- B. Asphalt emulsion: ASTM D977, Grade SS-1.

#### **8.21 WATER**

- A. Water: Source approved by Contracting Officer's Representative and suitable quality for irrigation, containing no elements toxic to plant life, including acids, alkalis, salts, chemical pollutants, and organic matter. Use collected storm water or graywater when available.

#### **8.22 PESTICIDES**

- A. Consider IPM (Integrated Pest Management) practices to minimize use of all pesticides and chemical products. Obtain Contracting Officer's Representative's approval for allowable products, product alternatives, scheduling and application procedures. Evaluate existing weather and site conditions before application. Apply products during favorable weather and site conditions according to manufacturer's instructions and warranty requirements.

#### **8.23 FINISHES**

- A. Steel Paint Finish:
  - 1. Powder-Coat Finish: Manufacturer's standard two-coat finish system consisting of following:
    - a. One coat primer.
    - b. One coat thermosetting topcoat.
    - c. Dry-film Thickness: 0.05 mm (2 mils) minimum.
    - d. Color: Refer to Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Aluminum Anodized Finish: NAAMM AMP 500.
  - 1. Color Anodized Finish: AA-C22A32 or AA-C22A34; Class II Architectural, 0.01 mm (0.4 mil) thick.

### **PART 9 - EXECUTION**

#### **9.1 EXAMINATION**

- A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no materials that would inhibit plant growth are present in planting area. If such materials are present, remove soil and contaminants as directed by Contracting Officer's Representative and provide new planting soil.
  2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
  3. Suspend soil spreading, grading, and tilling operations if soil moisture becomes excessive. Resume soil preparations when moisture content returns to acceptable level.
  4. If soil is excessively dry, not workable, and too dusty, moisten uniformly.
  5. Special conditions may exist that warrant variance in specified planting dates or conditions. Submit written request to Contracting Officer's Representative stating special conditions and proposed variance.
- B. Proceed with planting operations only after unsatisfactory conditions have been corrected.

## **9.2 PREPARATION**

- A. Protect existing and proposed landscape features, elements, and site construction and completed work from damage. Protect trees, vegetation, and other designated features by erecting high-visibility, reusable construction fencing. Locate fence no closer to trees than drip line. Plan equipment and vehicle access to minimize and confine soil disturbance and compaction to areas indicated on drawings.
- B. Install erosion control materials at all areas inside or outside limits of construction that are disturbed by planting operations. Provide erosion control and seeding with native plant species to protect slopes.
- C. Stake out approved plant material locations and planter bed outlines on project site before digging plant pits or beds. Contracting Officer's Representative reserves right to adjust plant material locations (to inches) to building wall, pavement edge, fence or wall edge, and other similar structures. Provide on-site locations for excavated rock, soil, and vegetation.

## **9.3 PLANT BED PREPARATION**

- A. Verify location of underground utilities before excavation. Protect existing adjacent turf before excavations are made. Do not disturb

topsoil and vegetation in areas outside those indicated on Drawings. Where planting beds occur in existing turf areas, remove turf to depth that will ensure removal of entire roof system. Measure depth of plant pits from finished grade. Provide depth of plant pit excavation and relation of top of root ball and finish grade as indicated on drawings. Install plant materials as specified in Article 3.8. Do not plant trees within 3 m (10 feet) of any utility lines or building walls.

- B. For newly graded subgrades, loosen subgrade to minimum 100 mm (4 inches) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Government's property.
  - 1. Apply fertilizer and soil amendments directly to subgrade before loosening, at rates recommended by soils analysis.
  - 2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
  - 3. Spread planting soil 100 mm (4 inches) deep but minimum required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
    - a. Spread approximately 1/2 thickness of planting soil over loosened subgrade. Mix thoroughly into top of subgrade. Spread remainder of planting soil.
    - b. Reduce elevation of planting soil to allow for soil thickness of sod.
- C. Finish grade planting areas to smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 13 mm (1/2 inch) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in immediate future.

#### **9.4 GROUND COVER AND PLANT INSTALLATION**

- A. Place ground cover and plants, not including trees, shrubs, and vines, 300 mm (12 inches) apart as indicated on drawings in even rows and with triangular spacing.
- B. Use prepared soil mixture for backfill.
- C. Place so roots are in natural position.
- D. Do not remove plants from flats or containers until immediately before planting. Plant at depth to sufficiently cover all roots. Start watering areas planted as required by temperature and wind conditions. Water

plants at sufficient rate to ensure thorough wetting of soil to 150 mm (6 inches) deep without runoff or puddling. Smooth planting areas after planting to provide even, smooth finish.

- E. Plant ground cover in areas to receive erosion control materials through material after erosion control materials are in place.

#### **9.5 TREE, SHRUB, AND VINE PLANTING**

- A. Move plant materials only by supporting root ball container. Set plants on hand compacted layer of prepared backfill soil mixture 150 mm (6 inches) thick and hold plumb in center of pit until soil has been tamped firmly around root ball.
- B. Set plant materials in relation to surrounding finish grade 25 to 50 mm (1 to 2 inches) above depth at which they were grown in nursery, collecting field, or container. Replace plant material whose root balls are cracked or damaged either before or during planting process.
- C. Place backfill soil mixture on previously scarified subsoil to completely surround root balls and bring to smooth and even surface, blending into existing areas.
- D. Balled and Burlapped Stock: Backfill with prepared soil mixture topsoil to approximately half ball depth then tamp and water. Carefully remove or fold back excess burlap and tying materials from top to minimum 1/3 depth from top of root ball. Tamp and complete backfill, place mulch topdressing, and water. Remove wires and non-biodegradable materials from plant pit before backfilling.

#### **9.6 MECHANIZED TREE SPADE PLANTING**

- A. At designated locations and with approved equipment, trees may be planted by mechanized tree spade. Tree spade is not acceptable for moving trees that are larger than maximum size of similar field-grown, balled-and-burlapped root-ball diameter recommended by ANSI Z60.1, or that are larger than manufacturer's recommended maximum size for tree spade to be used, whichever is smaller.
- B. For tree extraction, center trunk in tree spade and move tree and solid root ball.
- C. Cut any exposed roots with sharp instruments.
- D. Excavate planting hole with same tree spade used to extract and move tree.
- E. If possible, place trees with same orientation as at location from which they were extracted.

#### **9.7 TREE WRAP**

- A. Wrap deciduous tree trunks immediately after planting. Wrap tree trunks 40 mm (1-1/2 inches) or greater in caliper with specified material beginning at base and extending to lowest branches. Remove tree wrap after one year. Securely tie crinkled paper wrap with twine at top and bottom and at maximum 450 mm (18 inch) intervals.

#### **9.8 TREE AND SHRUB PRUNING**

- A. Pruning: Performed by trained and experience personnel according to TCIA A300P1.
- B. Remove dead and broken branches. Prune only to correct structural defects.
- C. Retain typical growth shape of individual plants with as much height and spread as practical. Do not central leader on trees. Make cuts with sharp instruments. Do not flush cut with trunk or adjacent branches. Collars to remain in place.
- D. Do not apply tree wound dressing to cuts.

#### **9.9 STAKING AND GUYING**

- A. Staking: Stake plants with number of stakes indicated on drawings with double strand of guy wire. Attach guy wire at half tree trunk height but maximum 1.5 m (5 feet) high. Drive stakes to depth of 0.80 to 0.91 m (2-1/2 to 3 feet) into the ground outside plant pit. Do not injure root ball. Install hose chafer guards where wire is in contact with tree trunk.
- B. Guying: Guy plants as indicated on drawings. Attach guying cable around tree trunk at 0.785 rad (45 degrees) at half tree trunk height. Install hose chafer guards where cable is in contact with tree trunk. Anchor guys to ground stakes. Fasten flags to each guying wire cable // at 2/3 of the distance above ground level.

#### **9.10 ROOT CONTROL BARRIER INSTALLATION**

Not Used

- A.

#### **9.11 MULCH INSTALLATION**

- A. Provide specified mulch over entire planting bed surfaces and individual plant surfaces, including earth mount watering basin around plants, to 75 mm (3 inches) depth after plant installation and before watering. Do not place mulch in crowns of shrubs. Place mulch minimum

50 to 75 mm (2 to 3 inches) away from tree or shrub trunks. Place mulch on all weed control fabric.

#### **9.12 EDGING INSTALLATION**

- A. Uniformly edge beds of plants to provide clear cut division line between planted area and adjacent lawn. Construct bed shapes as indicated on drawings.
- B. Metal Edging: Install aluminum edging material according to manufacturer's instructions. Install edging material in perfect 1.22 m (4 foot) diameter circle inside 1.37 m (4-1/2 foot) watering basin, around specimen trees and shrubs not planted in close group. Install edging with minimum 25 mm (1 inch) visible above ground level.
- C. Natural Cut Edging: Provide uniform 'V' cut with one vertical side adjacent to turf areas 125 mm (5 inches) deep and second side angled 250 mm (10 inches) toward center of plant bed for clear cut division line between plant bed and adjacent lawn.

#### **9.13 SODDING**

- A. Place sod maximum 36 hours after initial harvesting according to TPI GSS, except as modified herein.
- B. For slopes 2 to 1 and greater, lay sod with long edge perpendicular to contour. For V-ditches and flat bottomed ditches, lay sod with long edge perpendicular to water flow. Anchor each piece of sod with wood pegs or wire staples maximum 600 mm (24 inches) on center. On sloped areas, start sodding at bottom of slope.
- C. Finishing: After sodding, blend edges of sodded area smoothly into surrounding area. Eliminate air pockets and provide true and even surface. Trim frayed areas and patch holes and missing areas with sod.
- D. Rolling: Immediately after sodding, firm entire area, except slopes in excess of 3: 1, with roller maximum 134 kg (90 lbs.) for each foot of roller width.
- E. Watering: Start watering sodded areas as required by daily temperature and wind conditions. Water at rate sufficient to ensure thorough wetting of soil to minimum 150 mm (6 inches) deep. Prevent run-off, puddling, and wilting. Do not drive watering trucks over turf areas, unless otherwise directed. Prevent watering of other adjacent areas or plant materials.

#### **9.14 SPRIGGING**

- A. Plant sod sprigs after finish grade is properly prepared and thoroughly soaked day in advance. Plant sprigs in rows spaced maximum 300 mm (12 inches) apart with springs placed in rows at maximum 150 mm (6 inches) apart. Firm entire area with roller not exceeding 130 kg/m (90 lb./ft.) of roller width. Do not roll slopes over maximum 3: 1. Water thoroughly and keep soil moist. Weed by hand or hoe. Do not treat sprig area with herbicide.

#### **9.15 PLUGGING**

- A. Plant fresh sod plugs after finish grade is properly prepared. Plant plugs in rows, spaced 450 mm (18 inches) apart in both directions. On slopes, contour rows to near level. Water thoroughly and keep soil moist. Weed by hand or hoe. Do not treat plug area with herbicide.

#### **9.16 SEEDING**

- A. Broadcast and Drop Seeding: Uniformly broadcast seed at rate of one kilograms per hectare two pounds per 1000 square feet). Use broadcast or drop seeders. Sow one-half seed in one direction and sow remainder at right angles to first sowing. Cover seed uniformly to maximum 6 mm (1/4 inch) deep in clay soils and 13 mm (1/2 inch) deep in sandy soils by means of spike-tooth harrow, cultipacker, raking, or other approved device.
- B. Drill Seeding: Drill seed at rate of 500 kilograms per hectare 25 pounds per 1000 sq. ft.). Use grass seed drills. Drill seed uniformly to 13 mm (1/2 inch) deep.
- C. Rolling: Immediately after seeding, firm entire area, except for slopes in excess of 3 to 1, with roller not exceeding 130 kg/m (90 lb./ft.) of roller width.

#### **9.17 HYDROSEEDING**

- A. Mix water with wood cellulose fiber, paper fiber, or recycled paper at rate of 11.2 kg per 100 square meters (1,000 lb. per acre) dry weight. Add seed and fertilizer to fiber and water and mix to produce homogeneous slurry.
  - 1. Broadcast seed mixture at rate of 20 kilograms per hectare 35 pounds per 1000 square feet).
  - 2. Hydraulically spray slurry to form uniformly impregnated grass seed cover. Spread with one application with no second application of mulch.

#### **9.18 TURF RENOVATION**

- A. General: Restore to original condition existing turf areas damaged during turf installation and construction operations. Keep at least one paved pedestrian access route and one paved vehicular access route to each building clean at all times. Clean other paving when work in adjacent areas is complete.
- B. Aeration: Eradicate weeds and, with Contracting Officer's Representative's approval to proceed, aerate turf areas with approved device. Core, by pulling soil plugs to minimum 1/2 inches) deep. Vertical Mowing: At completion of aerating and, with Contracting Officer's Representative's approval to proceed, vertical mow turf areas indicated on drawings with approved device to 6 mm (1/4 inch) deep above existing soil level to reduce thatch build-up, grain, and surface compaction. Remove all debris generated during this operation off site.
- C. Dethatching: At completion of aerating and, with Contracting Officer's Representative's approval to proceed, dethatch turf areas indicated on drawings with approved device to 6 mm (1/4 inch) deep below existing soil level to reduce thatch build-up, grain, and surface compaction. Remove all debris generated during this operation off site.
- D. Overseeding: Apply seed according to applicable portions of "Seed Application Method" at rates specified in "Seed Composition."

#### **9.19 PLANT MAINTENANCE**

- A. Frequency: Begin maintenance immediately after plants have been installed. Inspect plants at least once week and perform required maintenance promptly.
- B. Promotion of Plant Growth and Vigor: Water, prune, fertilize, mulch, eradicate weeds, and perform other operations necessary to promote plant growth and vigor.
- C. Planter Beds: Weed, fertilize, and irrigate planter beds and keep pest free, pruned, and mulch levels maintained. Do not permit planter beds encroach into turf areas. Maintain edging breaks between turf areas and planter beds. Fertilize plant materials to promote healthy growth without encouraging excessive top foliar growth. Remove noxious weeds common to area from planter beds by mechanical means.
- D. Shrubs: In addition to planter bed maintenance requirements, selectively prune and shape shrubs for health and safety when following conditions exist:



1. Remove growth in front of windows, over entrance ways or walks, and any growth which will obstruct vision at street intersections or of security personnel.
  2. Remove dead, damaged, or diseased branches or limbs where shrub growth obstructs pedestrian walkways, where shrub growth is growing against or over structures, and where shrub growth permits concealment of unauthorized persons.
  3. Properly dispose of all pruning debris.
- E. Trees: Adjust stakes, ties, guy supports and turnbuckles and water, fertilize, control pests, mulch, and prune for health and safety and provide fall leaf cleanup.
1. Fertilize trees to promote healthy plant growth without encouraging excessive top foliar growth. Inspect and adjust stakes, ties, guy supports and turnbuckles to avoid girdling and promote natural development.
  2. Selectively prune all trees within project boundaries, regardless of caliper, for safety and health reasons, including, but not limited to, removal of dead and broken branches and correction of structural defects. Prune trees according to their natural growth characteristics leaving trees well shaped and balanced.
  3. All pruning, including palm tree pruning, must be by or in presence of certified member of International Society of Arboriculture and according to TCIA Z133.1.
  4. Properly dispose of all pruning debris.

#### **9.20 SLOPE EROSION CONTROL MAINTENANCE**

- A. Provide slope erosion control maintenance to prevent undermining of all slopes in newly landscaped and natural growth areas. Maintenance tasks include immediate repairs to weak spots in sloped areas // and maintaining clean to intercept and direct water flow to prevent development of large gullies and slope erosion/ and securing irrigation systems during periods of extended rainfall .
1. Fill eroded areas with amended topsoil and replant with same plant species.

#### **9.21 REMOVAL OF DYING OR DEAD PLANTS**

- A. Remove dead and dying plants and provide new plants immediately upon commencement of specified planting season and replace mulch, and eroded earth mound water basins. No additional correction period will be

required for replacement plants beyond original warranty period. Plants will be considered dead or dying as follows:

1. Tree: Main leader died back or minimum 20 percent of crown died.
2. Shrub and Ground Cover: Minimum 20 percent of plant died.
3. Determination: Scrape on maximum 2 mm (1/16 inch) square branch area to determine dying plant material cause and provide recommendations for replacement.

#### **9.22 TURF MAINTENANCE**

- A. Mow turf to uniform finished height measured from soil. Perform mowing in manner that prevents scalping, rutting, bruising, uneven and rough cutting. Before mowing, remove and dispose of all rubbish, debris, trash, leaves, rocks, paper, and limbs or branches on turf areas. Sweep or vacuum clean adjacent paved areas.
- B. Apply fertilizer in manner that promotes health, growth, vigor, color and appearance of cultivated turf areas. Determine method of application, fertilizer type and frequencies by results of laboratory soil analysis. Apply fertilizer by approved methods and according to manufacturer's instructions.
- C. Watering: Perform irrigation in manner that promotes health, growth, color, and appearance of cultivated vegetation, complying with Federal, State, and local water agency and authority directives. Prevent overwatering, water run-off, erosion, and ponding due to excessive quantities or rate of application.
- D. Aeration: Eradicate weeds and, with Contracting Officer's Representative's approval to proceed, aerate turf areas with approved device. Core, by pulling soil plugs to minimum 13 mm 1/2 inches) deep. Clean all soil plugs off of other paving when work is complete.

#### **9.23 CLEANING**

- A. Remove and legally dispose of all excess soil and planting debris.

#### **9.24 PROTECTION**

- A. Protect plants from traffic and construction operations.
- B. Provide temporary fences or enclosures and signage, at planted areas. Maintain fences and enclosures during maintenance period.
- C. Remove protective materials immediately before acceptance.
- D. Repair damage.

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